COUNTY OF
HAWAII

PLANNING DEPARTMENT

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DANTE K. CARPENTER
Mayor

ALBERT LONO LYMAN
Director

ILIMA A. PIHANAIA
Deputy Director

October 8, 1986

Office of Environmental Control
465 South King Street
Kekuanaoa Building, #115
Honolulu, HI 96813

Gentlemen:

Final EIS-Ooma II
Determination of Acceptability

We have reviewed the final EIS submitted for Kahala Capital Corporation for their proposed Ooma II resort and mixed urban use project.

Chapter 343, HRS, requirements were triggered with the filing of a petition to amend the County of Hawaii's General Plan. A determination was made by the Planning Department that a full environmental impact statement was required. Since then the applicant has complied with all procedural requirements and has responded to comments submitted by agencies and individuals.

During this process two major concerns have surfaced. These relate to coastal water quality and the impact of airport noise on the project. With respect to coastal water quality, the applicant has agreed to coordinate a water quality monitoring program with both NELH and HOST. Moreover, there are opportunities within the planning and permitting process to mitigate potential impacts to coastal waters.

With respect to the question of aircraft noise, while a study done for the applicant may ultimately differ from those that are now being conducted by the State Department of Transportation, Airports Division, the data in the EIS is an adequate indication of the overall potential magnitude of impact to the project site. Differences between studies, such as noise studies, are to be expected, and ultimately the County would rely on the noise contours provided by the State for land use planning purposes.

As all content requirements have been satisfied we find the final EIS acceptable. We note, however, that should there be major changes to the project from that which is described in the final impact statement, supplemental environmental impact statements may be required.

Sincerely,

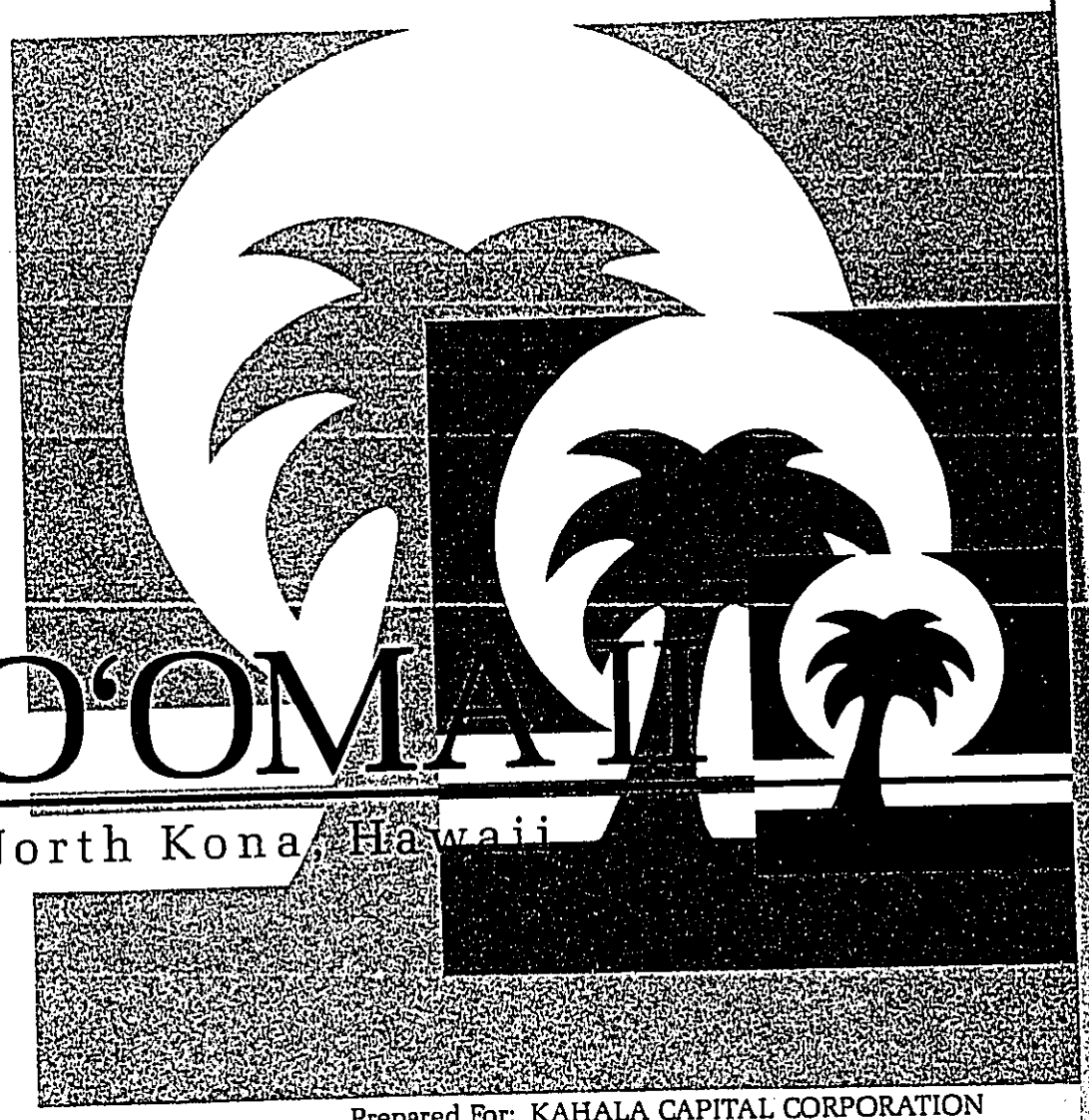
for Albert Lono Lyman
Planning Director

AL/VKG/smn

cc: Mark Hastert of Helber, Hastert, Van Horn and Kimura
Sandy Pechter-Schutte

FINAL ENVIRONMENTAL IMPACT STATEMENT

SEPTEMBER 1986



'O'OMA II

North Kona, Hawaii

Prepared For: KAHALA CAPITAL CORPORATION
Prepared By: HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS
For Submittal To: PLANNING DEPARTMENT, COUNTY OF HAWAII

FINAL ENVIRONMENTAL IMPACT STATEMENT SEPTEMBER 1986

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

'O'OMA II

North Kona, Hawaii

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CHAPTER I

INTRODUCTION

Development Summary

Applicant:	Kahala Capital Corporation
Property Owner:	American Trust Company of Hawaii, Inc., Trustee
Property Location:	North Kona Judicial District, County of Hawaii Ooma, 2nd Ahupua'a, south of the Keahole Airport and approximately six miles north of Kailua-Kona.
Tax Map Key:	Division 3, Zone 7, Section 3, Plat 09, Parcel 4.
Size:	313.66 acres
Existing Land Use Regulations:	State Land Use District: Conservation County General Plan: Open and Conservation County Zoning: Open Special Management Area: Entire Site Shoreline Setback: 40' Coastal Setback
Existing Land Uses:	Vacant and unimproved. Existing land use is limited to recreational use of the coastal areas of the site.
Proposed Land Uses:	Intermediate Resort, including approximately 600 hotel rooms and 300 multi-family residential units, 18-hole golf course and clubhouse, marine park/visitor center, office park, and an area for high technology industries which might complement the adjacent Hawaii Ocean Science and Technology (HOST) Park.
Proposed Changes to the General Plan:	Requested changes to the General Plan are: (1) to add the proposed Ooma II 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, Medium Density Urban, and Industrial. The proposed LUPAG Map is shown in Figure 7 of this EIS.
EIS Approving Agency:	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 April 14, 1986, Kahala Capital Corp., a limited partnership, submitted a request for an amendment to the Hawaii County General Plan involving a 313.66-acre property known as Ooma II located south of the Keahole Airport. Specifically, the application requested the addition of Ooma II 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, Medium Density Urban, and Industrial 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 May 8, 1986 issue of the Environmental Quality Commission Bulletin. Twenty-one 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.

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 Ooma II 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 Corp. 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, an 18-hole golf course and clubhouse, and a marine park/visitor center. A major portion of the development is oriented toward growth of high-technology/aquaculture in the Keahole area, with land planned for light industrial uses and an office park.

Public access from Queen Kaahumanu Highway to the shoreline will be provided via the development's internal boulevard and two beach parking areas at the north and south ends of the property. A system of trails will allow pedestrian access to the coastal area fronting the property.

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

Land Use	Gross Acreage	Density	Units
Resort Hotel	25 ac.	24/ac.	600
Multi-family Residential	20 ac.	15/ac.	300
Marine Park/Visitor Center	20 ac.		
Office Park	20 ac.		
High-tech Area	50 ac.		
Golf Course/Clubhouse	130 ac.		
Beach Parking/Open/ Roads/STP	49 ac.		
Total	**314 ac.**		900

1.3 Rationale for Action

A market study prepared by The Hallstrom Group, Inc. identified "integrated intermediate-size resort development with compatible light industrial uses in the mauka and northerly portions" as the highest and best use of the property. The analysis also identified potential markets that could support a development level of "up to 600 hotel rooms, up to 450 condominiums, and 12,000-35,000 square feet of commercial space in conjunction with an 18-hole golf course. Key locational advantages cited by the study were: (1) its leeward site and favorable climatic conditions, (2) proximity to the Keahole Airport and the urban services available in Kailua-Kona, while being relatively isolated, (3) situation in a healthy, expanding market, (4) significant beach frontage and high-quality, off-shore conditions, and (5) archaeological sites that could contribute to the resort's ambience and landscaping concepts.

1.4 Summary of Impacts

Land Use

The proposed action will convert approximately 314 acres from its present undeveloped state to urban uses. Soil limitations render the land agriculturally sterile; however, development of aquaculture would allow the cultivation of certain marine "crops" on the site.

Topography

Average slopes on the site range from 0 to 5 percent. The predominant land type is pahoehoe lava with smaller areas of a'a lava and beaches. Because of the relative flatness of the site, large-scale reshaping of the ground surface will be minimized. The golf course and landscaped areas will require importation of soil.

Hydrology

The ground water beneath the project site will not be extracted. Changes in land use are expected to produce an insignificant increase in storm water run-off from 260 to 450 cubic feet per second (cfs). There will be no overland impact on adjacent properties. All run-off generated on site will be disposed of on site through natural percolation and dry wells or by directing the run-off to coastal outlets at the north and south ends of the property. Storm water run-off from the northern portion of Ooma II will discharge near the HOST Park warm water intake pipes; however, potential impacts are expected to be minimal and infrequent. Soil erosion due to run-off will occur mainly when the soil layer is being placed over the lava rock. Even under the worst case scenario (clearing or grading of 20 acres at any one time), the computed erosion rate is considerably lower than the allowable rate.

Natural Hazards

The Ooma II property is sited within Zone DE for overall relative risk associated volcanic activity. The U.S. Geological Survey classification system contains six zones, descending 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 Map identifies a coastal high hazard zone in portions of the coastline makai of the jeep trail except near Puhili Point where the boundary extends inland. The coastal hazard zone is defined as areas at risk from tsunami and high wave run-up.

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, especially discharge containing high nutrient loads; (3) shoreline modification; and (4) changes in marine ecosystems. 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. Shoreline modification can be expected to increase turbidity in the water; however, past experience has shown that plumes will dissipate in less than 24 hours with no adverse effect on the coral community. 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.

Material input from the Ooma II site could adversely impact warm, near-shore waters whose quality is checked by a high precision, surface nutrient monitoring program conducted at NELH. It does not appear that the Ooma II development could alter the chemical characteristics of the cold water used by NELH.

the Ooma II development. Among the mitigating actions that can be taken by the developer are the siting of compatible land uses and the employment of structural and design techniques for sound attenuation.

- 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.

- o 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 or as part of the marine park/visitor center complex.

- o Paved accesses to the shoreline will be available for public use. Developer installed improvements, such as the beach parking areas and restroom/shower facilities, will enhance the recreation experience.

- 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 marine park/visitor center was recently incorporated into the land use scheme for the Ooma II development and was not included in the scope of the earlier market study. However, operators of existing marine park facilities have expressed serious interest in such a project at Ooma II, and it is strongly supported by HOST Park sponsors. Nevertheless, market demand for this type of facility and its ultimate viability must still be verified.

- o Modifying the shoreline to provide safe access into the water has been considered in concept only. More in-depth study is needed regarding the work involved for such a project, including potential environmental impacts and economic feasibility. Shoreline modification would require a Corps of Army Engineers permit and detailed planning will proceed in consultation with this agency.

- o Design of certain improvements, particularly the circulation and utility systems, will require coordination with the HOST Park. In particular, we note the easement through the HOST Park property which provides the main access from Queen Kaahumanu Highway to the subject property.

- o Projected levels of air traffic are being studied as part of an effort to update the Keahole Airport Master Plan that is currently under way. The projections and ultimate impacts on the sonic environment will be evaluated by the Ooma II planning team as new information becomes available.

- o The archaeological reconnaissance by Paul H. Rosendahl, Inc. concluded that 23 sites will require further work to determine the appropriateness of future disposition. Additional archaeological work will be coordinated with

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Flora and Fauna

No endangered flora or fauna are known to inhabit the site. While the proposed development will result in the loss of vegetation, primarily the scrub community, and some wildlife habitat, it is expected to have only a minimal impact on the total island populations of the species involved.

Historic and Archaeological Sites

Most of the identified archaeological sites are located in the coastal area within 600 feet of the shoreline. Since development will be concentrated in this area, many of the sites could be affected. However, significant sites will be protected and insignificant sites which must be disturbed will be recorded.

Visual Resources

The landscape of the property will be irretrievably altered from its present natural state to a man-made one. The development is not expected to interfere substantially with the line of sight from Queen Kaahumanu Highway because of slope gradients that already obscure scenic vistas from the highway. The development will be visible, however, from higher elevations, from the air, and from off shore.

Traffic

The additional traffic generated by the Ooma II development is not expected to have a significant adverse effect on highway capacity. This assessment would have to be reevaluated with implementation of other major developments between Keahole Airport and Kailua-Kona and their cumulative traffic requirements. A high level of service can be maintained with improvements at the intersection of Queen Kaahumanu Highway and the Ooma II access road.

Air Quality

Existing air quality is good in the vicinity of the subject property. 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.

Noise

Noise from air operations at Keahole Airport could present an annoyance problem for certain activities within the development. The location of specific land uses has been influenced by the need to satisfy compatibility standards for the various levels of noise impacts.

Recreational Resources

The coastline along the Ooma II property is a recognized recreational area. The proposed development provides for continued and improved public access, including paved roads, beach parking, and shower/restroom facilities.

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.

- Traffic improvements at the intersection of Queen Kaahumanu Highway and the Ooma II access road will require coordination with the State Highways Division.

- 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.

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 Ooma II 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 that are the subject of amendment petitions pending before the Hawaii County Planning Department and the State Land Use Commission, respectively.

West Hawaii, particularly the North Kona-South Kohala area, has been the focus of efforts to expand the Big Island visitor industry. The Ooma II development represents an opportunity to promote economic growth by establishing a viable, high-quality resort area. But unlike resort-only developments, this project seeks to provide a wide variety of employment types, including skilled and technical jobs within its high-technology component. A diverse range of quality jobs can have a ripple effect throughout the community stimulating educational goals and entrepreneurial interest.

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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.

In addition to the aforementioned alternatives, reference is made to a proposed land exchange involving approximately 85 acres in the northern portion of the Ooma II property and a comparable number of acres in the souterh portion of the HOST Park. This proposed action is discussed more fully in a related DLNR Conservation District Use Application (CDUA) in Appendix J of this document. A site plan for the reconfigured Ooma II property is shown as Appendix K. These

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Public Utilities

The estimated water demand for the project is 1.34 million gallons per day (MGD). Based on currently available information, development of a new water agreement is the most probable alternative for the Ooma II project. Domestic wastewater flows from the project is estimated at .30 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.

Public Services

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

Employment and Employee Housing

The project will generate increased direct and indirect employment and a related need for additional employee housing. Both of these are cumulatively significant within the context of proposed developments for the North Kona region.

1.5 Summary of Mitigating Measures

- To minimize the need for large-scale reshaping and filling of the underlying land form, land uses have been sited to take advantage of natural physiographic features, such as lowlands for aquaculture and a local high point for the golf clubhouse.

- 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.

- 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.

- 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. Preliminary discussions with NELH and HOST Park have been initiated concerning cooperation go concerned parties in a monitoring program that would be able to detect significant changes in water quality parameters and to identify the probable source of pollutants. Such a program would essentially expand the ongoing monitoring procedures currently employed by NELH.

- Several noise abatement strategies are available to enable reasonable coexistence between the Keahole Airport and surrounding uses, including

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documents were appended to the EIS to provide alternative parameters from which the subject action may be assessed.

1.9 Necessary Permits and Approvals

Authority	Approval Required
Federal Government	
Army Corps of Engineers	COE permit for shoreline modification
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 Chapter 6E review
Historic Sites Section	
Dept. of Health	Private wastewater treatment plant certification/permit New water source development approval
Dept. of Planning and Economic Development High Technology Development Corp.	CZM consistency determination Easement improvements
County of Hawaii	
Planning Dept./ Planning Commission	General Plan/LUPAG amendment Rezoning Special Management Area (SMA) permit Shoreline setback variance Subdivision approval Grading permit
Dept. of Water Supply	Modified water distribution system approval

CHAPTER II

CHAPTER II

PROJECT DESCRIPTION

2.1 Location

The subject property lies within the Ooma second ahupua'a on the leeward coast of the island of Hawaii, just south of the Keahole Airport and seven 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.

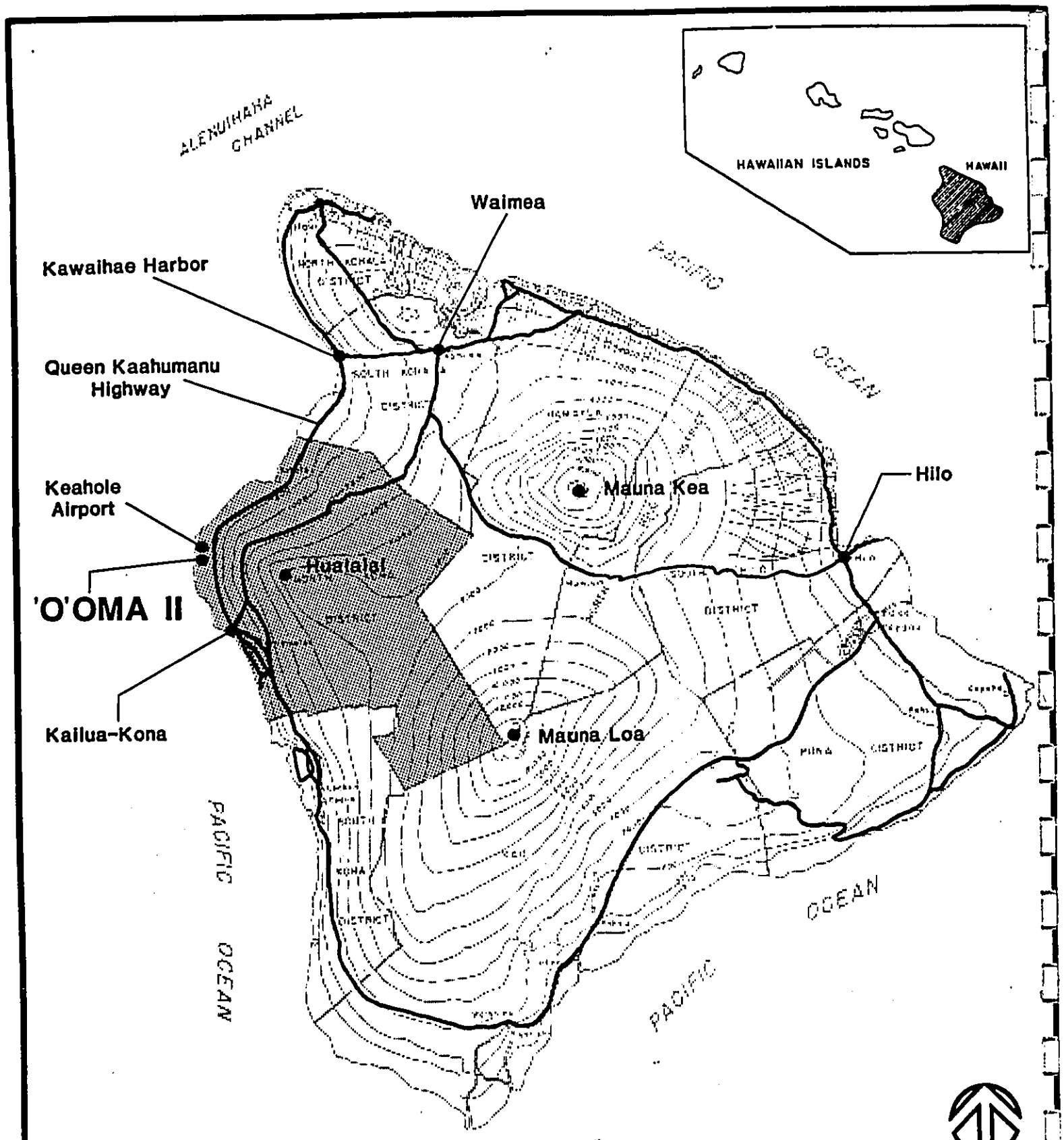
Table 1: Distances to Major Activity Centers

Activity Center	Distance (miles)	Trip Time
Keahole Airport	1	5 min
Honokohau Harbor	2	10 min
Kailua-Kona	7	20 min
Kawaihae	26	30 min
Waimea	36	45 min
Hilo	80	2 hrs
Honolulu	169	45 min
Los Angeles	2,500	5 hrs

2.2 Historical Perspective

Permanent settlement in Ooma II is believed to have started in 1400-1450 (Cordy, 1985: 38). There is some debate about how intensively populated were the Ooma-Kalaloa ahupua'a in North Kona, estimates ranging from just over a hundred to well into the hundreds. The Kona region figures largely in the history of Hawaiian royalty and unified governance of the Islands. One of the earliest archival references notes that between 1814-1819, the future Kamehameha III was raised in Ooma by the younger relatives of his guardian (ibid., 34). Between 1819 and through the 1850s, however, the area experienced gradual depopulation as the populace moved to Kailua and Keauhou, the centers of port commercial activities and Christianity. Maps of that era show only a few households in North Kona. An 1888 map by Emerson shows one house on the shore of Ooma II (ibid., 35).

Spurred by trading and agriculture, particularly coffee farming and ranching, the population in the Kona region increased steadily after the turn of the century, but remained relatively concentrated in the established communities. Agriculture continued to be the mainstay of the Kona economy. In 1960, North and South Kona had a population of 8,743 persons with 1,449 workers claiming employment in the agricultural sector versus 291 workers employed in the hotels (Kona Regional Plan, 1982: 76). The 1970 Census, reported a population of 8,836 persons or an increase of only 1 percent in ten years. The 1970 Census did, however, register the end of domination by the agricultural sector. There were only 333 agricultural employees, compared with 659 in personal services (including hotels).



Project Location Map

'O'OMA II

Kahala Capital Corporation

Figure: 1

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The Kona population increased over 120 percent during the 1970s as seen in the 1980 Census which recorded a population 19,664. The population of North Kona, separate from South Kona grew 184 percent during this time period. In 1970, Kona's population constituted less than 14 percent of the County total; however, by 1980, it had grown to more than 21 percent of the County-wide population.

In the early 1980s, the Kona region experienced an economic slowdown coincident with the national recession. The confluence of local and national business cycles is indicative of Kona's growing interrelatedness with the state and national economies. This trend is likely to continue in the future, with regional economic performance closely affected by the larger economic picture.

2.3 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, and for access to the popular beach area south of the property known as "Pine Trees" Beach.

2.4 Project Objectives

Recognizing the opportunities presented by oceanfront property under a single ownership and with sufficient acreage to develop a high-quality, multi-use project, the developers have been engaged in land planning for several years. The objectives of the proposed project are as follows:

- To adopt a land use plan based on sound marketing concept(s) that identify market segments not yet satisfied by existing developments in order to compete successfully against other development proposals.

- To become part of the local community by generating jobs and spawning businesses that will be patronized by local residents. This development strategy is not intended merely to add a veneer of "local color," but to establish an activity node that is used by residents, as well as visitors.

- To contribute to the improvement of visitor facilities in the Kona region by expanding the types of amenities offered and by increasing tax revenues that may ultimately be used for capital improvement and enhanced services.

- To minimize adverse impacts on the physical and socio-economic environments and on public facilities and services through continuous coordination with appropriate public agencies and organizations; mitigative actions to be refined as plans become more definite and their attendant impacts more evident.

- To implement a logical phasing plan so that building construction can proceed in response to market demand without unnecessary delay.

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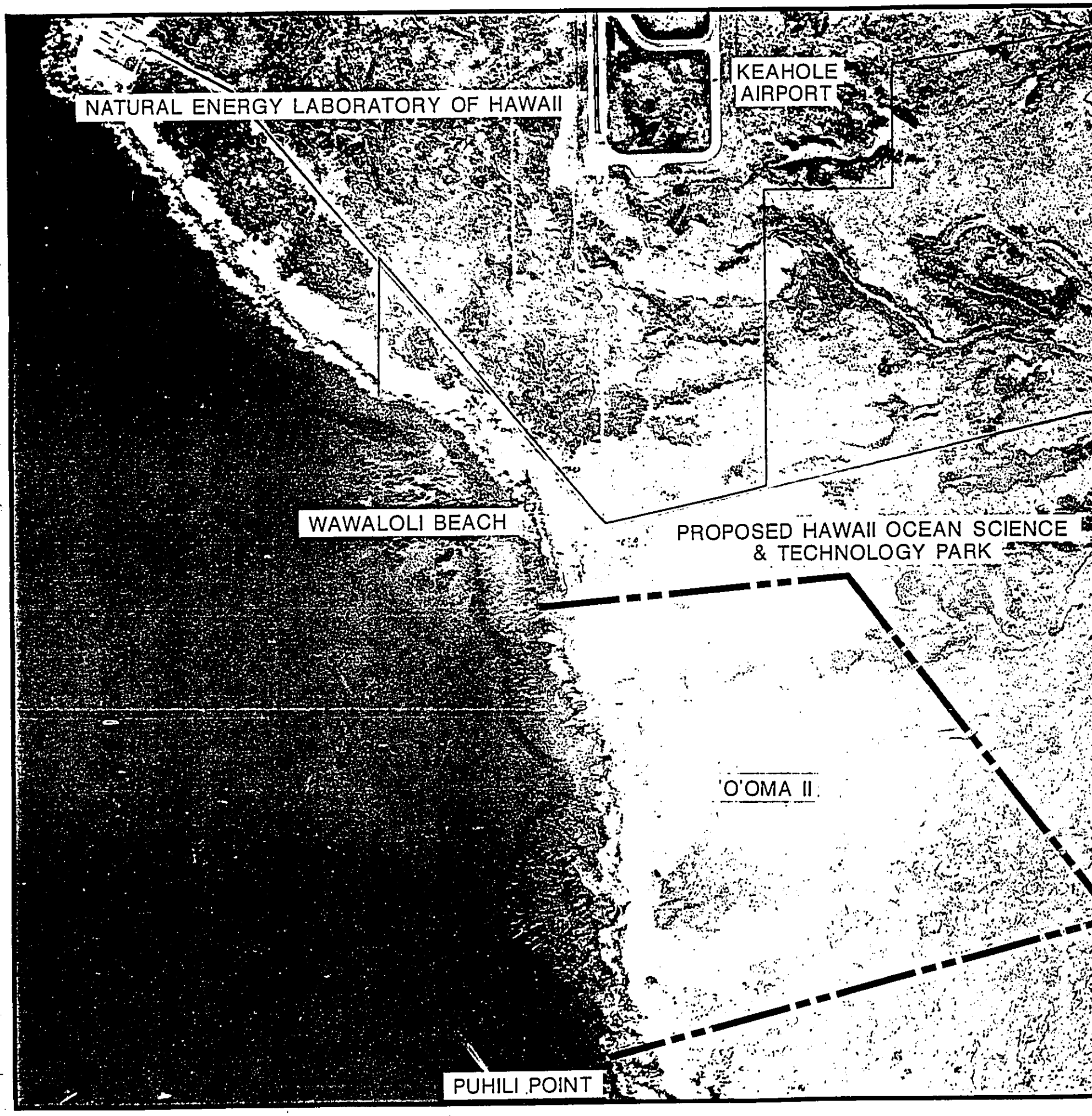

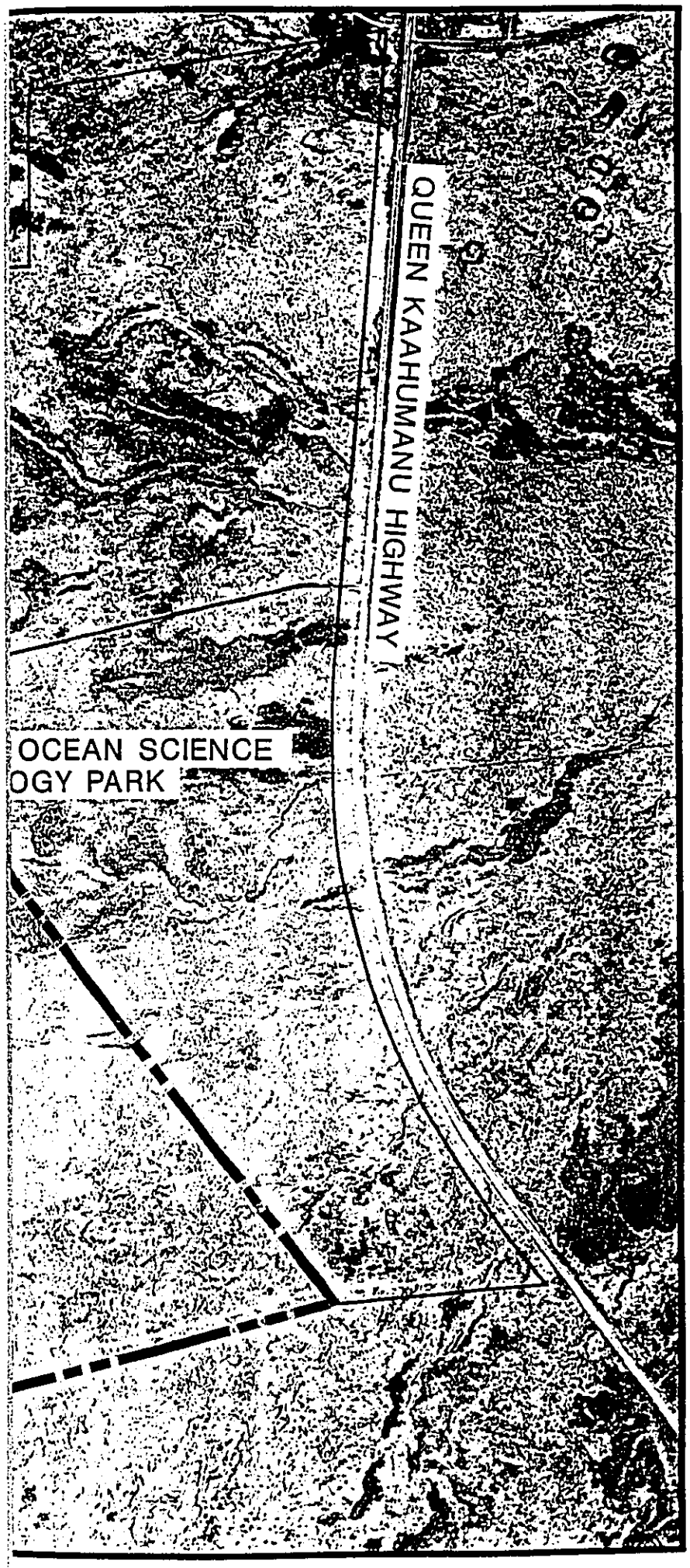

Site Photograph

'O'OMA II

Kahala Capital Corp.

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

0 1000'

Figure: 2

2.5 Ooma II Master Plan

2.5.1 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 multi-use community. One of the central elements of the development concept is the creation of a self-contained, intermediate resort development with an 18-hole golf course. Uses complementary to anticipated high-technology development in the adjacent HOST Park provide another focus for the project. 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 is subject to change as additional information becomes available. No site plan showing building locations or site improvements has been prepared as yet.

Resort Hotel

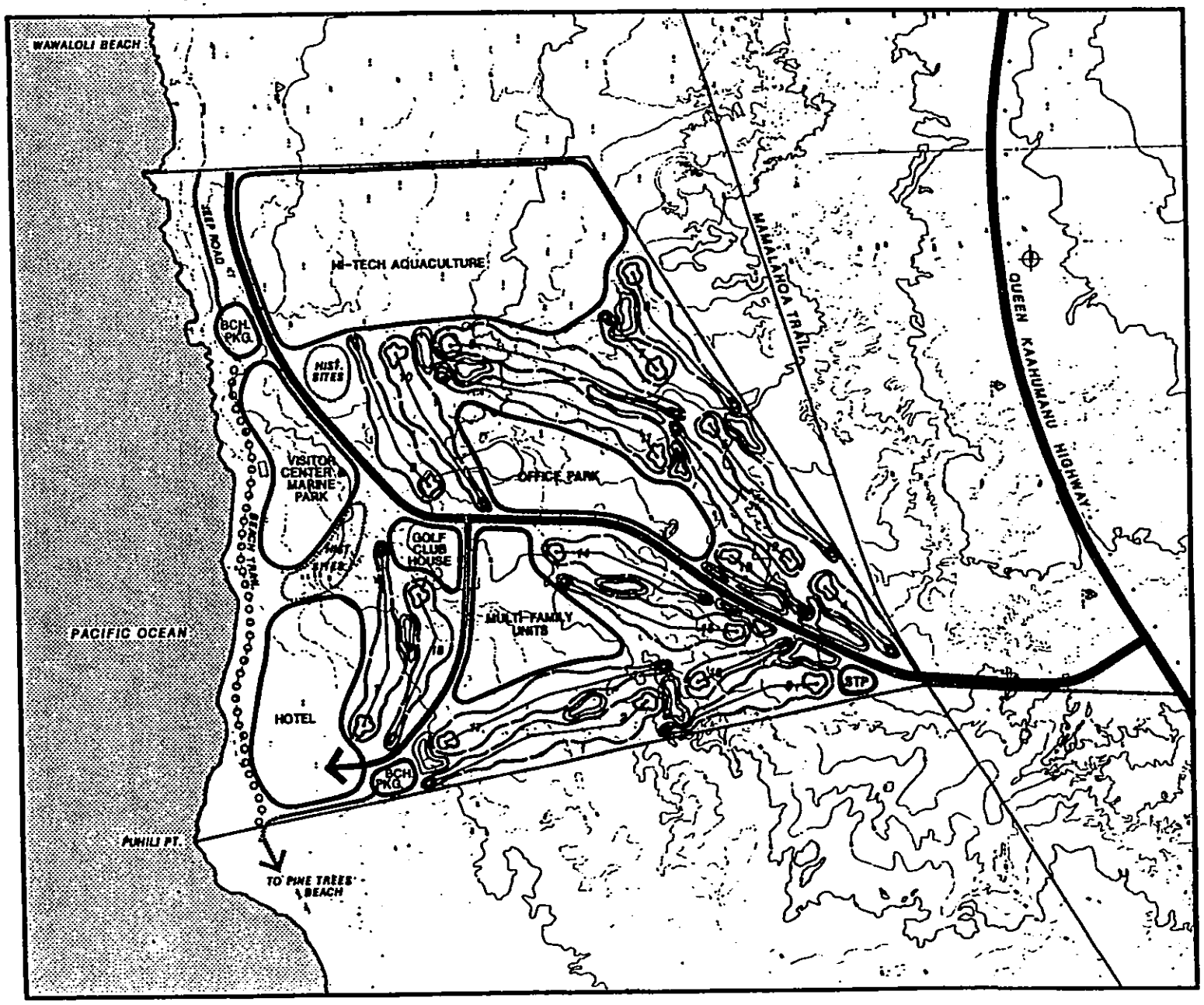
- The centerpiece of the planned intermediate resort development is the 600-room hotel planned for the coastal area near Puhili Point. The 25-acre hotel site is located on a relatively level area of the property approximately 400 feet inland from the shoreline. The hotel is intended to serve several different user groups. These include:
  - Visiting business people who prefer the convenience of proximity to the airport coupled with resort amenities;
  - HOST Park visitors and staff who will not only use the guest rooms for short-term stays, but also the restaurants, conference facilities, and communications services to support their operations; and
  - Visitors to the Kona region who are seeking facilities, services, and amenities of a fully planned resort community.

Multi-family Residential

- Complementing the hotel, approximately 300 multi-family 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. However, they are seen in part as providing long-term transient housing for visiting HOST Park or NELH researchers and their families.

Marine Park and Visitor Center

- The Marine Park and Visitor Center is seen as a focal point which draws people to the development and becomes an activity node within the development. It envisioned as an attraction similar to Sea Life Park at Makapuu Point, Oahu, or the recently developed aquariums at Boston, Baltimore, and Monterey Bay. It would be designed to take advantage of



Preliminary Land Use Plan

'O'OMA II

Kahala Capital Corp.

HELBER, HASTERT, VAN HORN & KIMURA

0 500'

Figure: **3**

natural coastal resources, such as the tidal pools. The visitor center would explain and illustrate the NELH/HOST Park operations, as well as provide an organized means of conveying the interpretive value of historic sites preserved on the property.

Office Park

- The office park is intended to support the expansion in professional white-collar services related to industrial and resort development. There is no office park development in proximity to Keahole Airport, the region's air transportation center, that is closer than Kailua-Kona. The surrounding golf course provides a congenial, landscaped setting for the offices.

High Technology Aquaculture and other High Technology Uses

- Another major element of the master plan is the provision of space for uses which support the Hawaii Ocean Science and Technology (HOST) Park currently being developed on the adjacent property by the State High Technology Development Corporation. Approximately 50 acres of low elevation land have been allocated to accommodate possible high technology/aquaculture uses along the northern border.

Golf Course

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

  - It provides a soothing relief to the harsh lava landscape;
  - It acts as an open space buffer between different land uses;
  - It provides a recreational amenity to the residents of the North Kona; and,
  - 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 commercial enterprises, including a restaurant or coffee shop and a pro shop.

Beach and Public Shoreline Access

- The coastal areas of the site have provided an important recreational amenity to residents of North Kona. Beachcombers, fishermen, and picnickers frequent the area. The master plan recognizes this recreational resource and has provided two public access points: one at Puhili Point near the hotel site; and the other adjacent to the HOST Park boundary near Wawaloli Beach. The beach and setback areas will remain open to public pedestrian traffic via pathways along property's oceanfront. However, vehicular movements will be restricted beyond the beach parking areas.

- The beach parking area may include shower/restroom facilities; however neither of the beach parking areas would be developed as an improved public beach park.

- Depending on a detailed feasibility study, portions of the shoreline may be modified to improve access into the water and/or to enhance the sandy portion of the beach.

Archaeological Resources

- Archaeological reconnaissance surveys conducted for the master plan have identified numerous sites, most of which lie near the coast. The land use plan recognizes the value of preserving significant remains that link the present with the past. Major sites in the coastal areas are to be restored and connected by a series of pedestrian ways tying in with the visitor center and the beach parking areas located at the extreme ends of the site.

Internal Circulation

- The principal entrance to the site will be located at the southern-mauka corner where an existing easement connects the property with Queen Kaahumanu Highway. The main parkway is tentatively aligned to run diagonally through the property, with the option of linking with the HOST Park circulation system at the northern-makai corner. This roadway will serve the office park, multi-family residential area, marine park/visitor center, and high-technology industrial areas. A secondary road will service the hotel and southern beach parking area.

Table 2: Preliminary Land Use Summary

Land Use	Gross Acreage	Density	Units
Resort Hotel	25 ac.	24/ac.	600
Multi-family Residential	20 ac.	15/ac.	300
Marine Park/ Visitor Center	20 ac.		
Office Park	20 ac.		
High-tech Area	50 ac.		
Golf Course/Clubhouse	130 ac.		
Beach Parking/ Open/Roads/STP	49 ac.		
Total	**314 ac.**		**900**

2.6 Project Rationale

The market analysis conducted for the subject property provides the basic economic rationale for the proposed development. The highest and best use of the site was identified as an "integrated intermediate-size resort development with compatible light industrial uses in the mauka and northerly portions" (Hallstrom Group, 1985, Vol 2: 20). The market analysis indicated that the proposed development could support "up to 600 hotel rooms... up to 450 resort condominiums and 12,000 to 35,000 square feet (gross leaseable area) of commercial space" in conjunction with an 18-hole golf course (ibid., 12). In addition to the resort uses, the market study indicated the desirability of providing an area to support high technology industries that might complement the adjacent Hawaii Ocean Science and Technology (HOST) Park. The preliminary land use plan (Figure 3) has allocated these land uses subject to the physical limitations of the site.

The findings of the market study, which identified the major potential uses of the property, and the highest and best use analysis, which detailed the probability of efficient realization of those uses, are summarized below and presented in their entirety in Appendix A.

2.6.1 Market Study

The market study examined a range of land uses and determined that the greatest potential was found in resort uses "[R]esort development is anticipated to continue unabated in the Primary Economic Market Sector over the next decade, with potentials for increased expansion levels above current trends should the economy remain strong" (ibid., Vol 1: 3).

The study found sufficient market demand to support resort development on well located sites. "[W]e are of the opinion that sufficient demand does exist for additional resort-integrated hotel facilities at sites having prime locational attributes... [A] golf course, and extensive on-site amenity development [are] seen as integral to planned resort improvement on the subject" parcel (ibid., 3).

The report also identified a potential market demand for sites with attributes supporting new ocean-related technologies, such as those being developed at the Natural Energy Laboratory of Hawaii at Keahole Point. Substantial investment by the State of Hawaii to plan and develop the Hawaii Ocean Science and Technology Park on the adjoining property was noted.

2.6.2 Highest and Best Use Analysis

The highest and best use analysis indicated that "the subject property appears to contain the requisite physical attributes for efficient integrated resort development; and, in fact, is very favorable in many aspects" (ibid. Vol 2, 14). In addition, the study noted the desirability of reserving a portion of the site for "high-tech aquacultural uses" requiring access to the coldwater piping system at the adjacent Hawaii Ocean Science and Technology Park.

2.6.3 Correlation

The correlation section of the market study and highest and best use analysis concluded that the subject property could support the following uses:

- o up to 600 hotel rooms to be located near the shoreline;
- o up to 450 resort condominium units to be located by the shoreline and golf course frontage;
- o one 18-hole golf course to be located in the interior of the site;
- o 12,000 to 35,000 square feet (GLA) of commercial space located in the middle to mauka areas of the site; and,
- o approximately 50 acres reserved for high technology uses supporting the adjacent HOST Park located along the northern property line.

2.7 Project Phasing and Preliminary Costs

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. Beach parking is planned for the early phases of development.

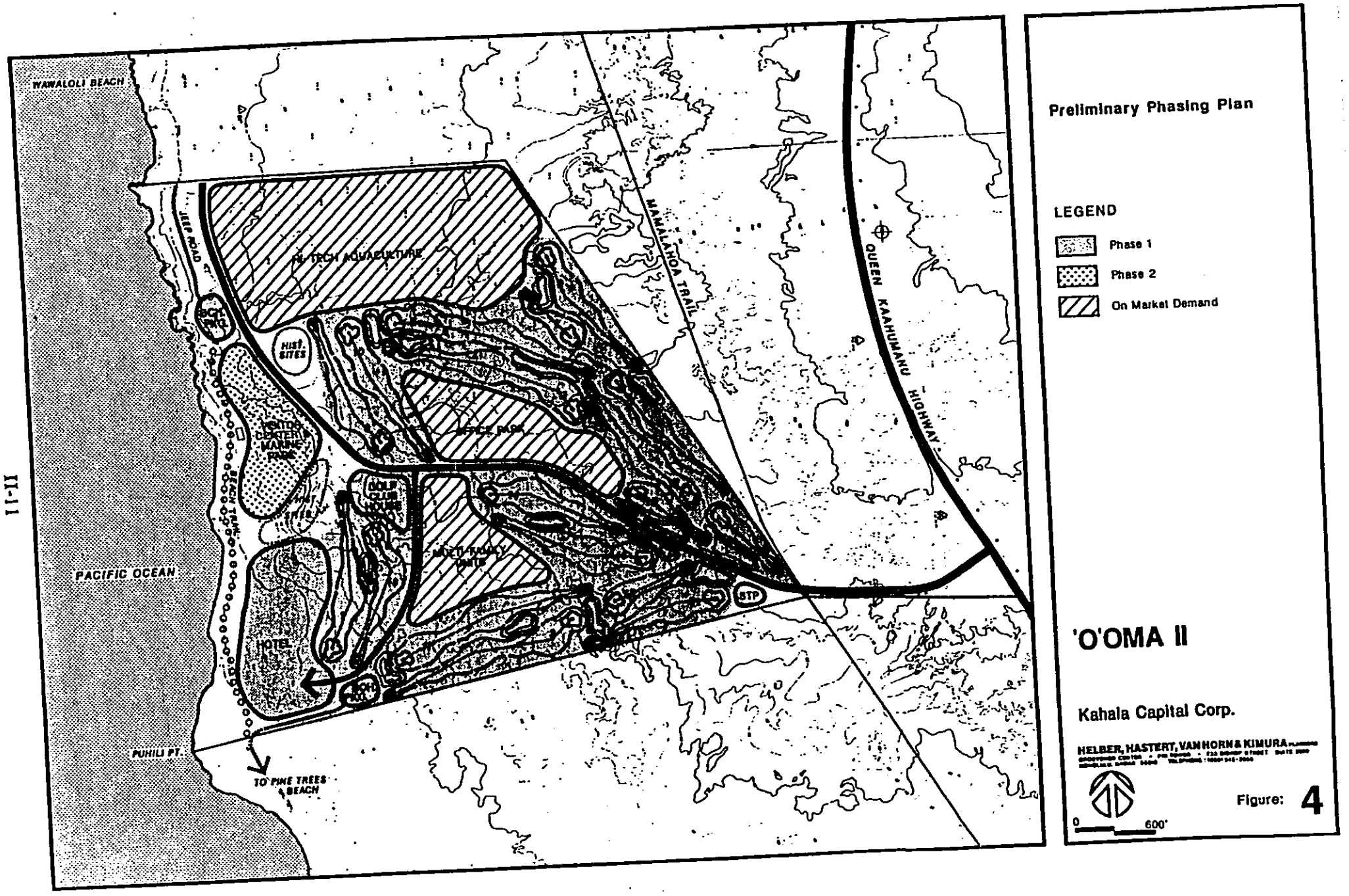
To the extent that the project can be phased, the hotel, golf course, and a scaled-down golf clubhouse would be programmed for Phase 1. It would be beneficial to develop the marine park and visitor center concurrently with the hotel or soon after in Phase 2. Development of the multi-family residential, office park, and high-technology aquaculture areas would be driven by market conditions.

Figure 4 shows a preliminary phasing plan. Incremental phasing of the development would be dependent upon receiving the necessary government approvals.

Table 3 summarizes the projected order of magnitude costs for installation and construction of Ooma II infrastructure.

Table 3: Order of Magnitude Costs for Ooma II Infrastructure

Description	Cost Estimate ($ millions)
Site Development	12.0
Roads	3.0
Drainage	3.0
Water Supply	11.5
Wastewater	6.5
Power and Telecommunications	1.5
Total	37.5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JEEP ROAD
HI TECH AQUACULTURE
HIST. SITES
MAMALAHOA TRAIL
QUEEN KAAHUMANU HIGHWAY
VISITOR CENTER & MARINE PARK
OFFICE PARK
GOLF CLUB HOUSE
MULTI-FAMILY UNITS
STP
HOTEL
PACIFIC OCEAN
PUHILI PT.
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Figure: 4

2.8 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.

Table 4: Development Permits and Approvals

Authority	Approval Required
Federal Government	
Army Corps of Engineers	COE Permit for shoreline modification
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
Historic Sites Section	Chapter 6E review
Dept. of Health	Private wastewater treatment plant certification/permit
	New water source development approval
Dept. of Planning and Economic Development	CZM consistency determination
High Technology Development Corp.	Easement improvements
County of Hawaii	
Planning Dept.	General Plan/LUPAG amendment
	Rezoning
	Special Management Area (SMA) permit
	Shoreline setback variance
	Subdivision approval
	Grading permit
Dept. of Water Supply	Modified 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 of Hawaii; provide the basis for determining priorities and allocating limited resources, such as public funds, services, manpower, 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 tourism sector, 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 proposed project will contribute toward these economic objectives. The proposed mix of economic activities, including resort and ocean-related commercial and high technology industrial enterprises, will expand and diversify the economic base of the North Kona area in particular and the County of Hawaii in general. These activities are intended to be "basic" industries, i.e., those that earn revenues from outside the local economy and are able to generate relatively high employment multipliers. The ocean-related high technology ventures (including aquaculture operations) will augment the State's activities currently under way at the adjacent Natural Energy Laboratory of Hawaii (NELH) and the HOST Park.

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 beaches and lava promontories, are actively used by local beach-goers and the maintenance of this shoreline resource is a prerequisite for the success of the proposed mixed use development. Public beach 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 to the sustained economic viability of ocean-related research and commercial enterprises adjacent to and within the project site, and ultimately to the success of 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.

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. Discussion of the Education and

Higher Education Functional Plans has been omitted as these policies are not related directly to the project.

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 does not contain soils with agricultural capability; however, the proposed high-technology aquaculture land use would allow the cultivation of "crops" that otherwise could not be obtained from the barren land.

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 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 has been filed with the State Land Use Commission. Further consideration of that petition is pending acceptance of the EIS.

3.2.3 State Energy Functional Plan

The objectives of the State Energy Functional Plan (prepared by th Department of Planning and Economic Development) include the provision of dependable, efficient, and economical state-wide energy systems capable of supporting the needs of the people and increasing energy self-sufficiency.

The Big Island is at the forefront of much of the research on alternative sources of energy being conducted in the state. The Natural Energy Laboratory of Hawaii (NELH) and its Seacoast Test Facility are perhaps the world's premier R&D facilities for ocean thermal energy conversion (OTEC), a promising renewable energy technology. Advocates of OTEC see it as a potentially major integrated resource which, in addition to electrical power generation, can generate by-products for aquaculture, fresh water production, and air conditioning. Indeed, the commercial value of OTEC's by-products may be a significant factor in continued interest for the technology, especially while petroleum prices remain relatively low. The Ooma II project is intended to interface with the adjacent NELH and HOST Park by providing an expansion area for high-technology industries, as well as support facilities, such as office space, conference facilities, lodging, and restaurants.

3.2.4 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.

3.2.5 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.

Following a preliminary assessment of 72 sites, 22 sites are considered to be of sufficient value to warrant further field investigation. In addition, seven of those sites are considered to have cultural significance and are being considered for integration into a pedestrian network. Increasing the visibility and interpretive value of these archaeological artifacts will help to promote public appreciation where the physical remains might otherwise be lost through neglect or vandalism.

3.2.6 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 415 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.

3.2.7 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. Beach 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 at both ends of the property. The 18-hole golf course will be designed for Kona residents, as well as visitors.

3.2.8 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 to related to this objective include the following:

- Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people;
- Encourage greater cooperation between the public and private sectors in developing and maintaining well-designed and adequately serviced visitor industry and related developments which are sensitive to neighboring communities and activities;
- Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawaii's people; and
- Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawaii's cultures and values.

Applicable Guidelines as stated in the Functional Plan are:

- Fostering a social environment enhancing the Aloha Spirit;
- Maintaining and enhancing the quality of visitor facilities which conform to certain criteria;
- Preserving and enhancing Hawaii's significant natural, scenic, historic and cultural sites;
- Expanding career opportunities in the visitor industry, particularly in managerial positions; and
- Encouraging a favorable resort investment climate.

The benefits to the visitor industry through the development of the Ooma II project are as follows:

- o The development encourages the planning of an orderly mix of visitor accommodations including full-service hotels and condominium apartments.
- o Creation of an activity center with a mixture of uses, including conference facilities and recreation and commercial attractions, rather than the singular expansion of accommodations for the transient market.
- o Shoreline building setbacks and improved beach access to minimize disturbance of coastal resources while facilitating public use of the shoreline.
- o An opportunity to interact with and create a vital visitor destination area within the Keahole-Kailua-Kona corridor, with Kailua, an established visitor-oriented community; Kaloko-Honokohau, being considered for acquisition by the National Parks Service; NELH/HOST Park, creating a potentially new segment of the visitor accommodation market; and the Keahole Airport, the region's primary entry/exit point.

3.2.9 State Water Resources Development Functional Plan

The State Water Resources Development Functional Plan (prepared and implemented by the Department of Land and natural Resources) has, as its stated purpose, establishment of water-related objectives, policies, programs, and projects to guide State and County governments. The plan's guidelines are intended to: (1) regulate the development and use of water to assure adequate supplies for the future; (2) develop water resources to meet municipal, agricultural, and industrial requirements and to reduce flood damage; and (3) preserve water-related ecological, recreational, and aesthetic values and the quality of water resources.

Demand for potable water will increase due to the proposed development and there will be a need for new source development and transmission lines. The private sewage treatment plant will generate secondary treated wastewater that will irrigate the golf course and other landscaped areas, thereby limiting the load on the municipal water supply to domestic and industrial consumption. Rainfall levels are so low as to present no serious threat of flooding. No measurable degradation in the quality of the off-lying waters is foreseen.

3.2.10 State Transportation Plan

The State Transportation Plan (prepared and maintained by the State Department of Transportation) covers three transportation systems: airport, highways, and harbors.

A policy of the state-wide airport system is to "[p]lan and develop airfields and surrounding land use in coordination with the counties to assure safety, efficiency and economy in air transportation." A related action is to "[u]pdate airfield master plans and land use maps for the surrounding areas to optimize airfield use for the projected air traffic and assure compatible surrounding land use with airport operations." The Ooma II land use plan has been developed based on the currently available information regarding air operations at Keahole Airport. The plan is consistent with common criteria for accepted land uses within areas affected by certain levels of noise, i.e., noise contours. However, as the State proceeds with its

update of the Keahole Airport Master Plan, further revision may be required to resolve perceived noise impacts.

A policy of the state-wide highway system is to "[p]romote the planning for and improvement of the primary, secondary, and urban highway and street systems consistent with State and County plans to control growth." At the present time, the subject property is adequately serviced by the limited access Queen Kaahumanu Highway. However, as urbanization increases in the region, the two-lane highway may reach unacceptable levels of service, thus requiring further improvements. In designing the project's access road from the highway, the developer will consult the Department's engineering staff to ensure compliance with safety standards and observance of the right-of-way and future plans for the highway.

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 313.66 acres of the property lie within the State Conservation District (Figure 5). Urban Districts are located to the north and east, encompassing the adjoining HOST Park, NELH, and Keahole Airport, and to the south, encompassing the Honokohau Small Boat Harbor-Kaloko Fishpond area and the Kaloko Light Industrial Subdivision. Agricultural District lands are present at the Kona Agricultural Park, directly mauka of the Keahole Airport, and on much of the lands mauka of the Queen Kaahumanu Highway above the 400-foot elevation.

Reclassification to the Urban District is a prerequisite for development of the subject property. The review process was initiated with filing of the boundary amendment petition to the State Land Use Commission on 16 May 1986 and assignment of Docket No. A86-602 (WH).

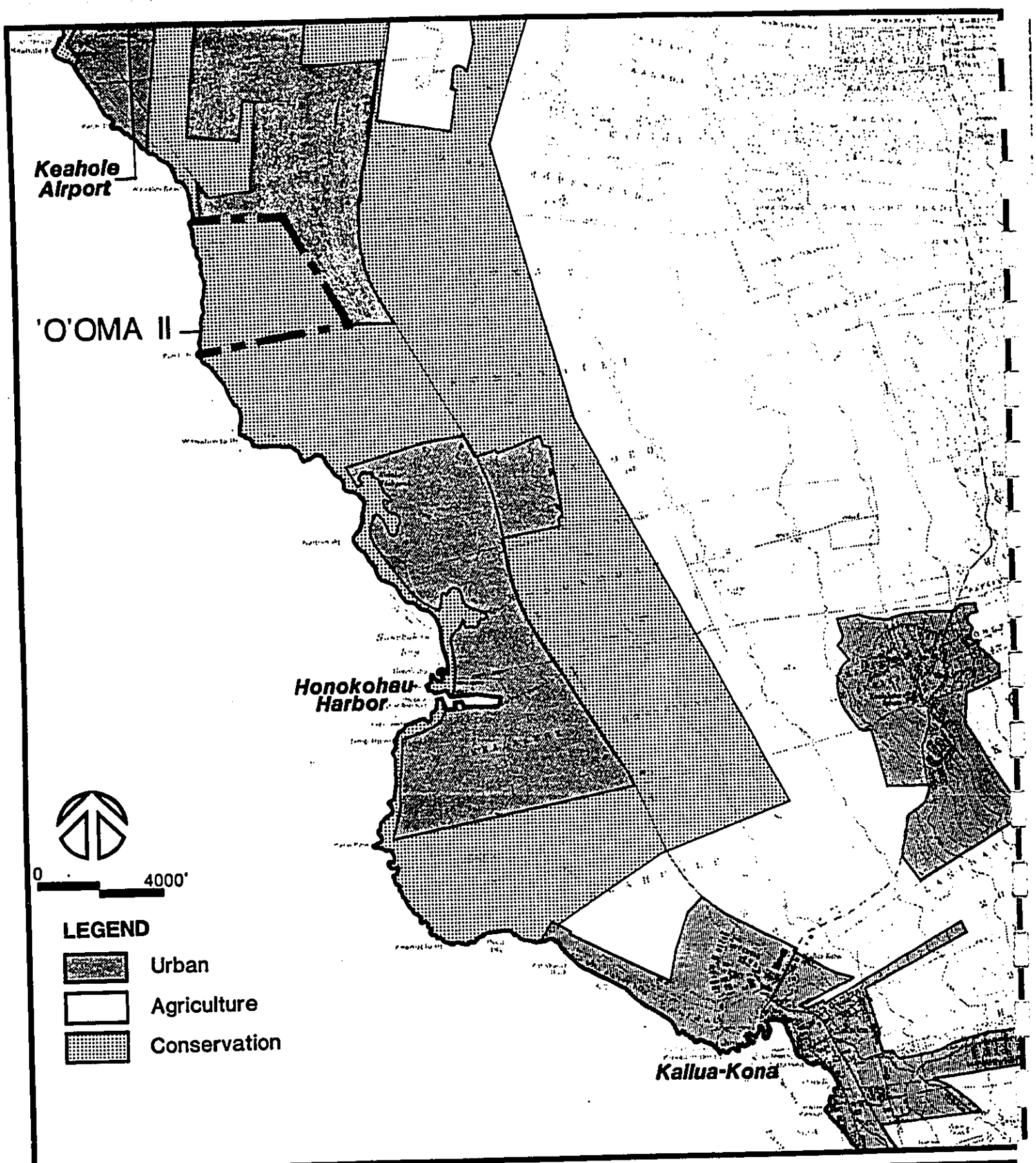
In deciding whether to approve amendment of a district boundary the State Land Use Commission is required to observe and comply with the following policy guidelines:

(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.

(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.



State Land Use Districts

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Figure: 5

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(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.

The State High Technology Development Corporation (HTDC), developer of the adjacent 547-acre HOST Park, recently petitioned the State Land Use Commission and obtained a boundary amendment from the Conservation District to the Urban District. However, a strip of land approximately 300 feet wide along the shoreline was not reclassified and remains in the Conservation District. With reclassification of the HOST Park, the subject property abuts Urban District land along the full length of its northern and eastern boundaries (Figure 4).

In addition to the general Conservation District classification, two conservation subzones have been assigned to the site by DLNR. Approximately one-third of the property's makai lands are situated in the Resource Subzone. The objective of this subzone is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas. The area seaward of the jeep trail has been designated a "no build" area in which the recreational resource would continue to be accessible to the public.

The General Subzone covers the remaining portions of the site (approximately two-thirds). The objective of this subzone is to designate open space where specific conservation uses may not be defined, but where urban use would be premature. This subzone functions largely as a "holding" land-use designation in which the timing of development is a major factor. The Ooma II master plan is based on market studies which indicate that a demand exists for the types of development proposed and that economic returns will offset the substantial investments required.

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.

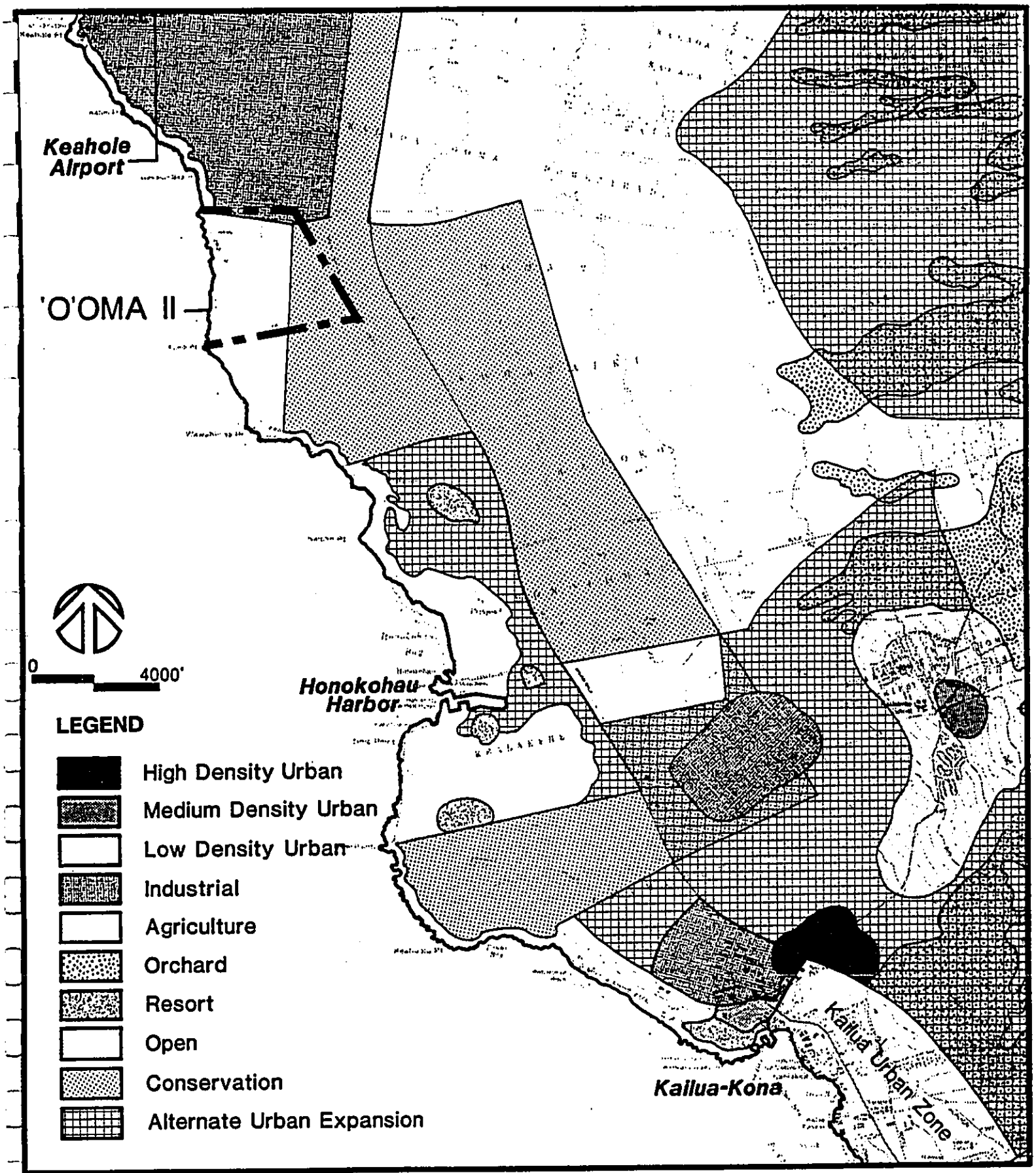
The current LUPAG map designates the project area as Open and Conservation (Figure 6). The Open designation is generally reserved for parks and historic sites, and conservation areas such as forest and water reserves and natural and scientific preserves. The Conservation designation is a subcategory of the Open category, generally mapping State Land Use Conservation Districts. The Keahole Airport and NELH facility to the north of the subject property, have been designated Industrial except for a strip of Open-designated land along the coastline. The adjoining parcel to the south of the subject property is also designated as Open and Conservation. Further along the coast lies the Kaloko-Honokohau area, which is currently designated as Intermediate Resort, Alternate Urban Expansion and Open.

In April 1986, the developer petitioned the Hawaii County Planning Department to amend the LUPAG land use designations from Open and Conservation to Intermediate Resort, Industrial, Medium Density Urban, and Open (see Figure 7). A general description of each of these General Plan land uses is presented in Table 3 below.

Table 5: Selected LUPAG Map Designations

LUPAG Designation	Land Use Description
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.
Industrial:	Manufacturing and processing; wholesaling; large storage and transportation facilities; power plants and government baseyards.
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.*



Existing Land Use Pattern Allocation Guide Map

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Figure: **6**

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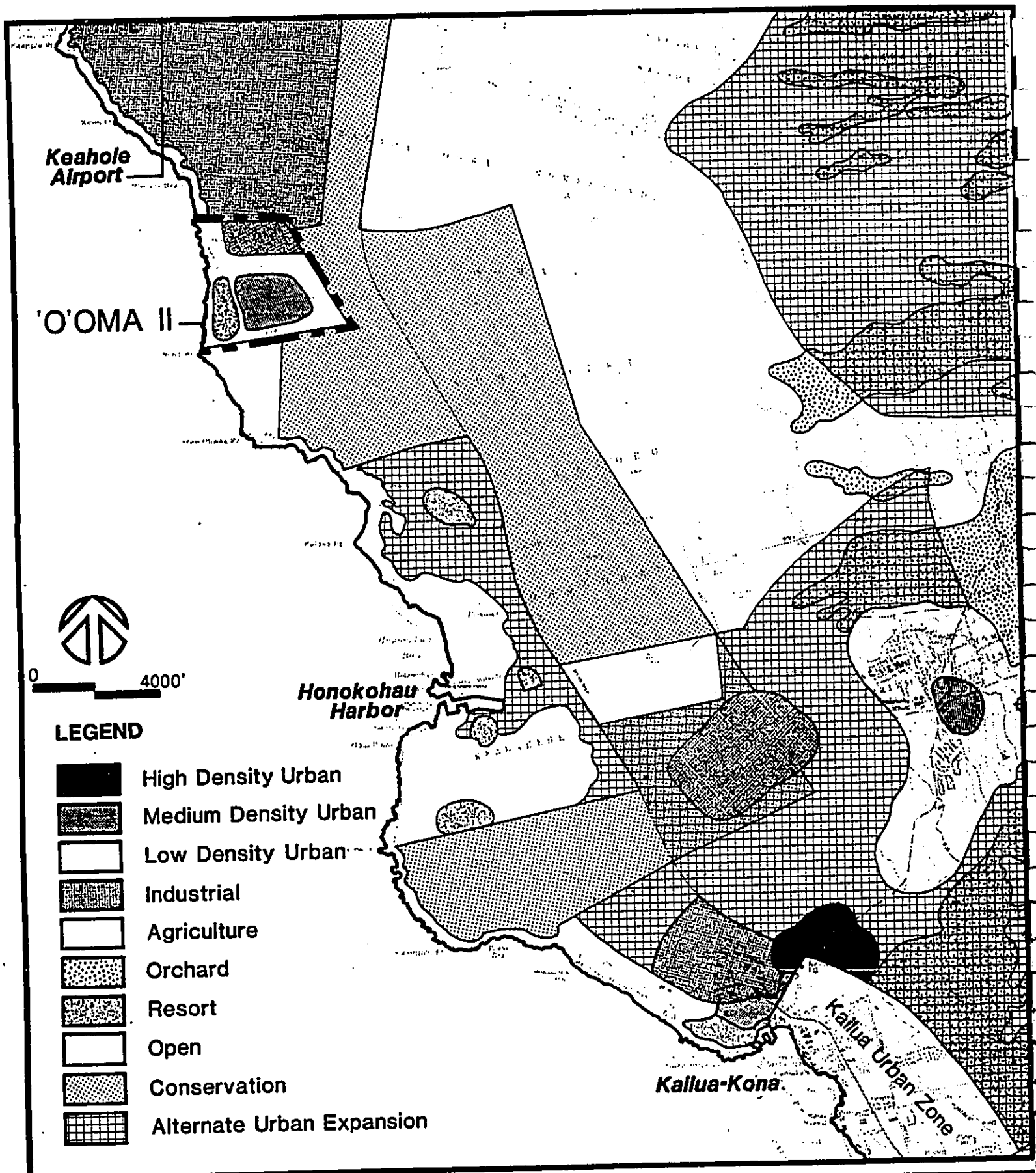

Proposed Land Use Pattern Allocation Guide Map

Figure: 7

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Each of the thirteen elements contained in the County of Hawaii General Plan is discussed below as it relates to the Ooma II 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 Ooma II 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 and high-wave run up are identified in the Flood Insurance Rate Map prepared by the Federal Emergency Management Agency (May 3, 1982). The 100-year boundary along the Ooma II property closely follows the coastline makai of the beach trail, except near Puhili 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 developer is preparing 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 Ooma II 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 Ooma II 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. Actual housing needs will be determined before the project becomes

operational, and a program to meet those needs will be established with the County.

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. Sandy 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.

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 Ooma II 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 Ooma II 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, beach park areas at both ends of the project site, and recreational amenities 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." The Ooma II property is at the hub of three forms of transportation: Keahole Airport lies approximately one mile to the north of the property, the Honokohau Small Boat Harbor is approximately one mile to the south, and the Queen Kaahumanu Highway is just mauka of the property's eastern boundary. Land uses proposed for the property are suitable for this prime transportation situation.

Land Use. Land-use policies contained in the General Plan and 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, which lies between a major airport at Keahole, the largest urban area in West Hawaii, and the major highway connecting the two, the Queen Kaahumanu Highway. 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.

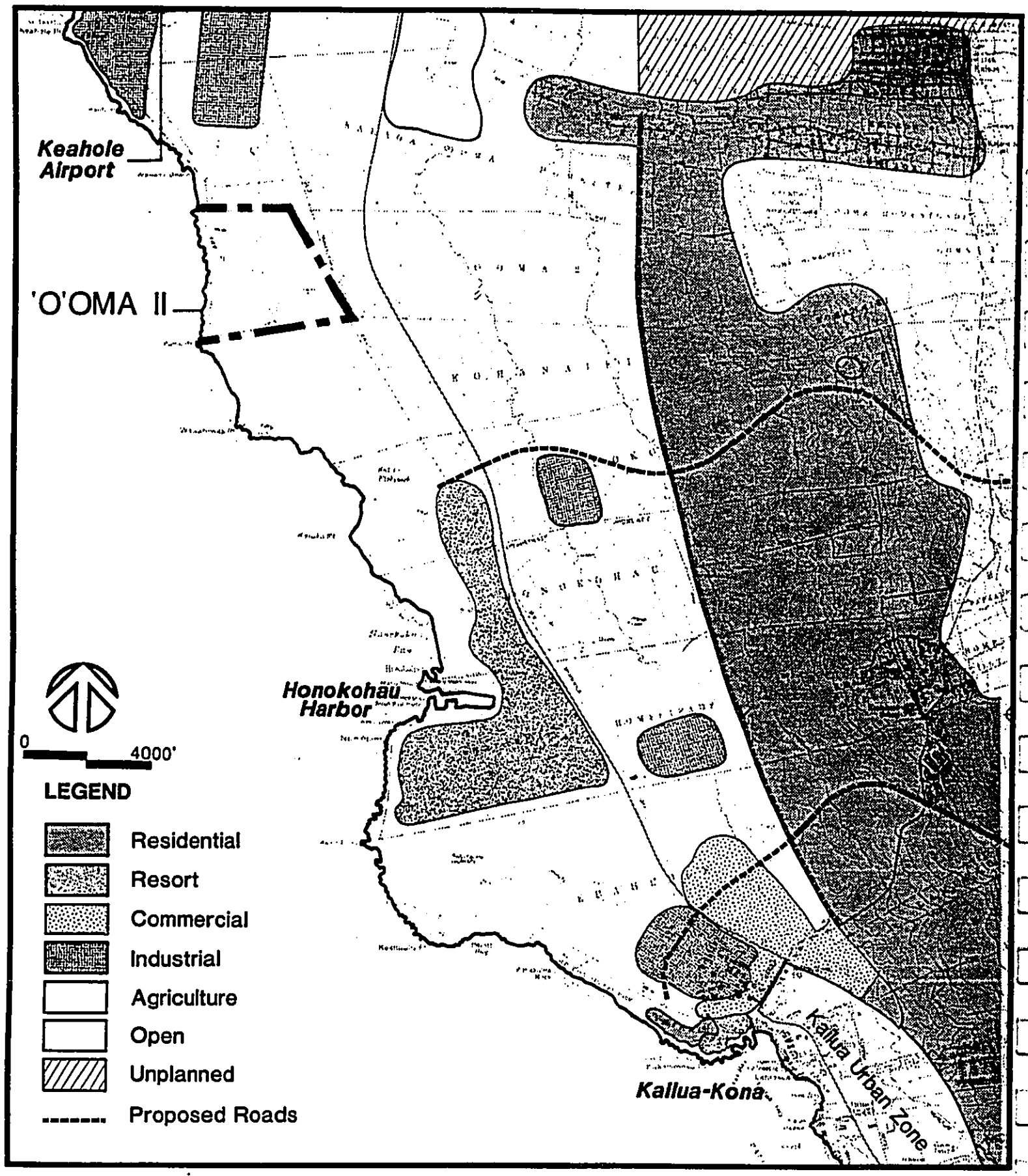
The conceptual development plan for the site is also consistent with County expectations for industrial development in the area. The HOST Park parcel already is substantially designated for industrial use and is currently at the rezoning stage. The proposed redesignation to industrial land use in the northern portion of Ooma II would be an extension of this land use pattern. In addition, the Ooma project would complement the HOST Park operations by supplying support facilities, such as conference rooms, restaurants, and accommodations for business visitors and employees.

Energy. The island of Hawaii, more than anywhere else in the state, has seen the active research, development, and commercialization of alternative sources of energy, including geothermal, hydroelectric, wind, ocean, and biomass conversion. The Ooma II project particularly recognizes the potential of ocean thermal energy conversion (OTEC) and seeks to take advantage of its proximity to NELH and the HOST Park by proposing mutually beneficial high-technology industries and support facilities, such as convention and conference rooms, lodgings, and restaurants.

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



Land Use Concept Map (Kona Regional Plan)

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Figure: 8

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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 Kealakehe/Honokohau/Kaloko resort area, and development of public facilities within the State-owned Kealakehe 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 43,300 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.)

3.6 Hawaii County Zoning

The existing County zoning is shown in Figure 9. The subject property is currently zoned Open. The Keahole Airport and the Natural Energy Laboratory to the north and the Kaloko Light Industrial Subdivision to the south are zoned Industrial. The County Planning Department is processing a rezoning application by the High Technology Development Corporation for the HOST Park which abuts the subject property to the north and east. The Ooma II development is anticipated to request a zoning change to allow a mix of uses as indicated in the master plan.

3.7 Coastal Zone Management/Special Management Area Rules and Regulations

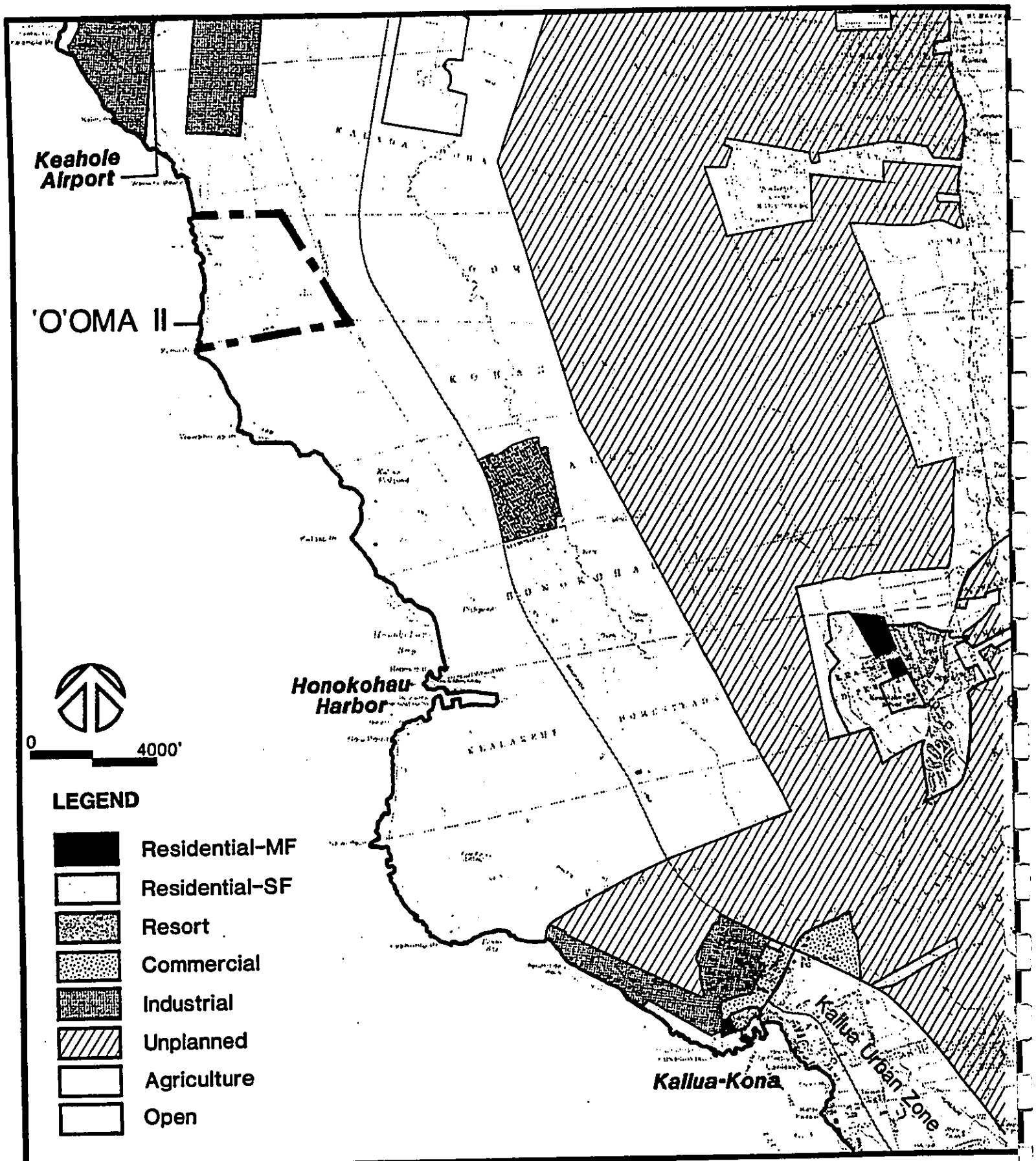
County regulations apply to lands within the Special Management Area (SMA) established by the Hawaii Shoreline Protection Act of 1975. In the Keahole area, the SMA runs from the ocean to Queen Kaahumanu Highway and, therefore, includes the entire Ooma II property. Section 205A-Part I of the 1977 Hawaii CZM Act stipulates the objectives, policies, and guidelines to which the Counties must adhere in their administration of the SMA. To ensure compliance with those policies, the Counties are authorized to issue permits for specific land or water uses falling under the definition of "development."

The proposed development is consistent with the County of Hawaii SMA guidelines in the following manner:

Recreational Resources. The development is not expected to reduce the size of any beach or any other area suitable for public recreation. Coastal access will be improved with the provision of paved roadways and public beach parking.

Historic Resources. The master plan provides for preservation of culturally significant archaeological remains.

Scenic and Open Space Resources. The development is not expected to interfere substantially with the line of sight toward the sea from Queen Kaahumanu Highway because of the change in elevation. The impact could also be mitigated through architectural designs that do not detract from coastal view planes.



County Zoning

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Figure: 9

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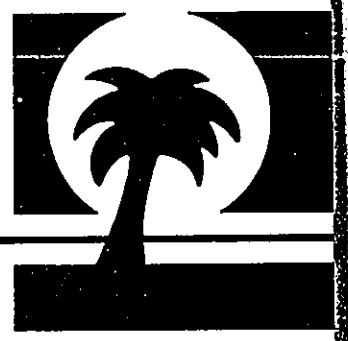
Coastal Ecosystems. The proposed development should not adversely affect water quality, existing and potential fisheries and fishing grounds, or wildlife habitats. Monitoring of water quality and marine life would insure the integrity of these resources.

Economic Uses. The mix of uses proposed in the master plan is intended to produce a suitable match between land uses and locational characteristics so that developments requiring proximity to the coast are given priority siting.

Coastal Hazards. No habitable development is proposed for areas susceptible to flooding from tsunami and high wave run-up.

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 Ooma II 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 B — Preliminary Engineering Utilities Report (M & E Pacific, Inc.)

Marine Water Quality

Appendix C — Marine Baseline Assessment (Steven Dollar, Ph.D.)
Appendix L — NELH Water Quality Data

Flora and Fauna

Appendix D — Biological Survey (Char and Associates)

Noise

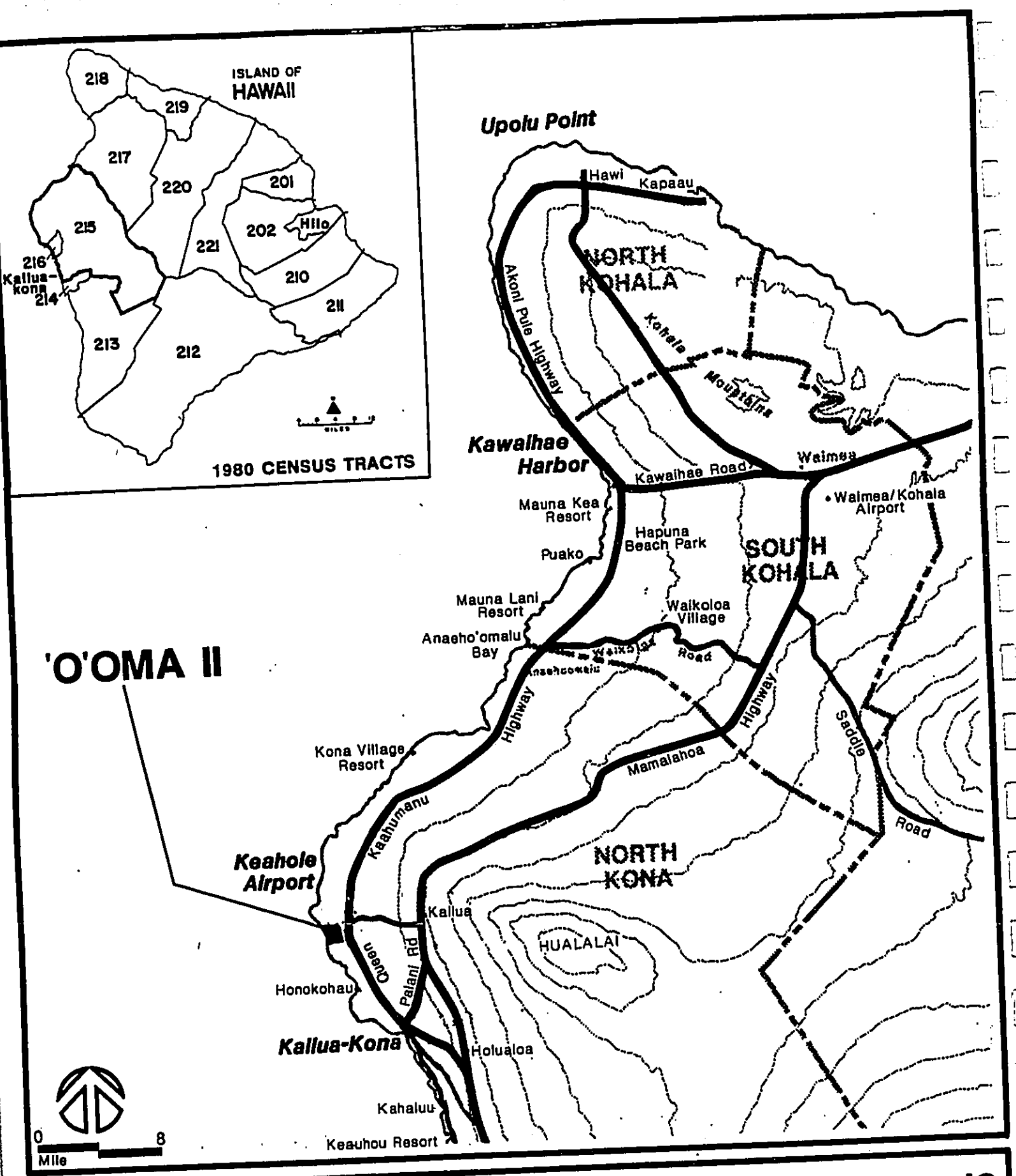
Appendix E — Aircraft Noise Exposure Maps (G. Bricken and Associates)
Appendix M — Noise Contour Set (G. Bricken and Associates)

Archaeology

Appendix G — Archaeological Reconnaissance (Chiniago, Inc.)
Appendix H — Archaeolgical Field Check (State Historic Sites Office)
Appendix I — Preliminary Report of Archaeological Survey and Testing (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. Anaeho'omalu Bay marks the district's northern boundary and Kealakekua Bay marks the southern boundary. The inland boundaries are defined



North Kona Region

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Figure: 10

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by the land masses of Mauna Loa and Hualalai. The North Kona Judicial District includes Census Tracts 215 (Kailua-Kona) and 216 (the remainder).

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 Kalaloa.

4.2 Geography and Climate

Coastal areas of North Kona have a semi-tropical, semi-arid climate. The average annual temperature is 75°F with an average high of 83°F and an average low of 67°F. Average annual precipitation in Kailua-Kona is 25 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).

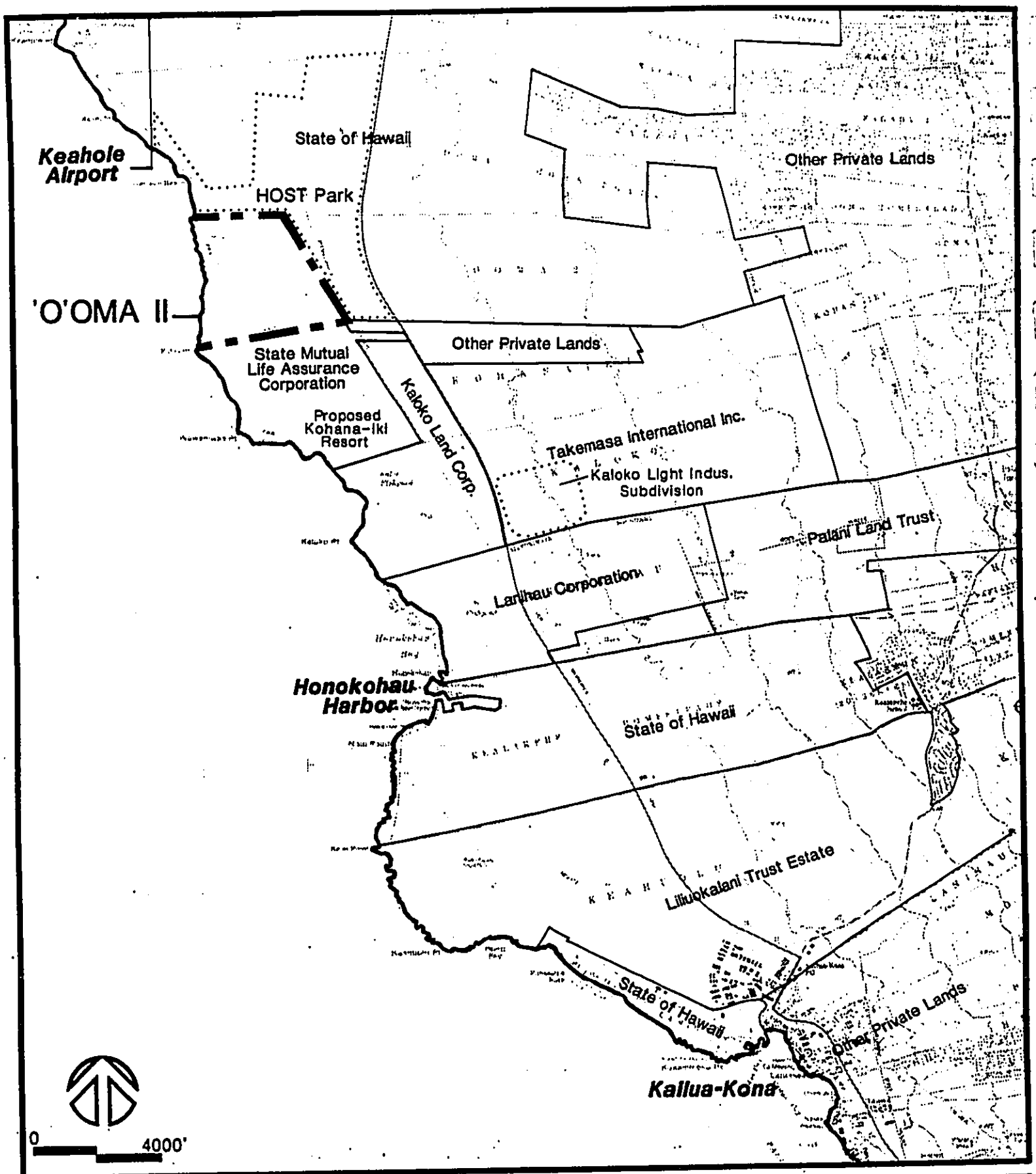
Impacts: No significant change in the site's macro (or regional) climate is anticipated. Modification of the micro (or site-specific) climate will result from the planting of shade trees and the construction of buildings that channel air flows. Equally important would be changes in people's perception 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 313.66 acres of open land situated just south of the Keahole Airport. The site is rectangular in shape with the major axis parallel to the coastline. The site is covered with lava and slopes gently upward from sea level to an elevation of approximately 85 feet at the southern-mauka corner, about three-quarters of a mile inland. The subject property is described for taxation purposes as Division 3, Zone 7, Section 3, Plat 09, Parcel 04 (TMK: 7-3-09:04).

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.



Land Ownership

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Figure: **11**

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The Keahole Airport (TMK 7-3-43: Por 03). The major land use in the area is the State-owned Keahole Airport, located less than one mile to the north and operated by the State Department of Transportation. Built in 1969 to replace the old Kona Airport, the Keahole Airport supports all interisland air carriers, air taxis, and freight operations for the West Hawaii region. Direct Mainland flights were introduced in 1983. The airport presently consists of a single 6,500-foot runway with associated terminal and parking facilities. In 1984 the airport experienced 83,320 aircraft operations and 1,427,432 passenger arrivals and departures (Hawaii Data Book, 1985).

NELH (TMK 7-3-43: 3, 4 and 5). Adjacent to the southern boundary of the Keahole Airport lies the 322-acre Natural Energy Laboratory of Hawaii (NELH), a publicly funded research facility which conducts research on Ocean Thermal Energy Conversion (OTEC) and related projects in aquaculture. It is currently the only facility in the world pumping deep, cold, nutrient-rich seawater ashore for use in OTEC, cold-water aquaculture, and related projects. Access to the NELH facility from the Queen Kaahumanu Highway is via a paved, two-lane road running around the southern perimeter of the airport runway.

HOST Park (TMK 7-3-09: Por 05 and 7-3-43: Por 03). Abutting the northern and eastern boundaries of the property is the 547-acre State-owned site of the proposed Hawaii Ocean Science and Technology Park (HOST Park). The Hawaii Technology Development Corporation, developer of the HOST Park, will provide the land and cold water infrastructure necessary for high-technology projects that have successfully completed the demonstration phase at the neighboring NELH and are ready to begin commercial operations. According to current plans, the Park would support "...a minimum of 14 sites ranging up to 40 acres in size which could be absorbed within a five to ten year period" (Helber, Hastert, Van Horn & Kimura, 1985). Access to the HOST Park will be via the existing NELH access road. Development is scheduled to begin in Fall 1986.

Kona Agricultural Park (TMK 7-3-43: Por 03). The State of Hawaii has developed the 206-acre Kona Agricultural Park to assist local efforts in crop diversification by leasing land to qualified applicants. The Park is located north of the subject property and mauka of the highway.

State Mutual Life Assurance Corp. (TMK 7-3-09: Por 03). Directly to the south lies a 470-acre parcel within the coastal area of the Kohanaiki ahupua'a. This property shares many similarities with the subject property. Both consist of open and unimproved lava land and lie makai of the Queen Kaahumanu Highway. For the most part, both parcels share the same topographical relief. The Kohanaiki property contains a popular beach, locally referred to as "Pine Trees Beach," and a number of anchialine ponds. A proposal to develop a resort community on the Kohanaiki property is being considered by the State Land Use Commission for a land use district boundary amendment and by the County Planning Department for a General Plan amendment.

Proposed Kaloko-Honokohau National Historical Park (TMK 7-03-9: 02 and 7-4-08: 10 and 25). The National Park Service is in the process of negotiating for the purchase of approximately 615 acres of privately-owned land situated approximately one mile south of the subject property. The proposed park would include the area makai of the Queen Kaahumanu Highway between the Kaloko

Fishpond and the Honokohau Small Boat Harbor. Major archaeological sites abound in this area, including a village complex, several heiaus, a holua, canoe landing, and many stone foundations.

Impact: Development of the Ooma II site, as proposed, will not affect the surrounding land uses significantly. The major uses to the north and east of the property are and will continue to be urban uses of State lands, i.e., NELH, HOST Park, and the Keahole Airport.

Cumulative Impact: The master plan contains land uses that are complementary to adjacent developments, the HOST Park in particular. If resort development on the Kohanaiki property proceeds as planned, there could be opportunities to develop shared facilities, such as the sewage treatment plant, electrical substation, and access road. There are no such plans at present, however.

Mitigation Measures: To maximize compatibility and coordination between the Ooma II 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

Direct access to the site is currently provided at two points: at the northern-makai corner and at the southern-mauka corners of the property. A coastal jeep trail runs along the makai frontage of the site with access to the jeep trail from the NELH access road. The second access point, located at the southern-mauka corner of the property, connects to the Queen Kaahumanu Highway via an unimproved easement 30 feet wide and approximately 1,600 feet long across the adjoining State-owned parcel. The inland access road also connects to the coastal jeep trail. Both of the trails through the subject property are considered to be in poor condition and use of four-wheel-drive vehicles is strongly recommended.

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 Ooma II. 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. Two beach parking areas will be provided, one at each end of the property.

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 relatively low degree of risk from volcanic action (Mullineaux and Peterson, 1974).

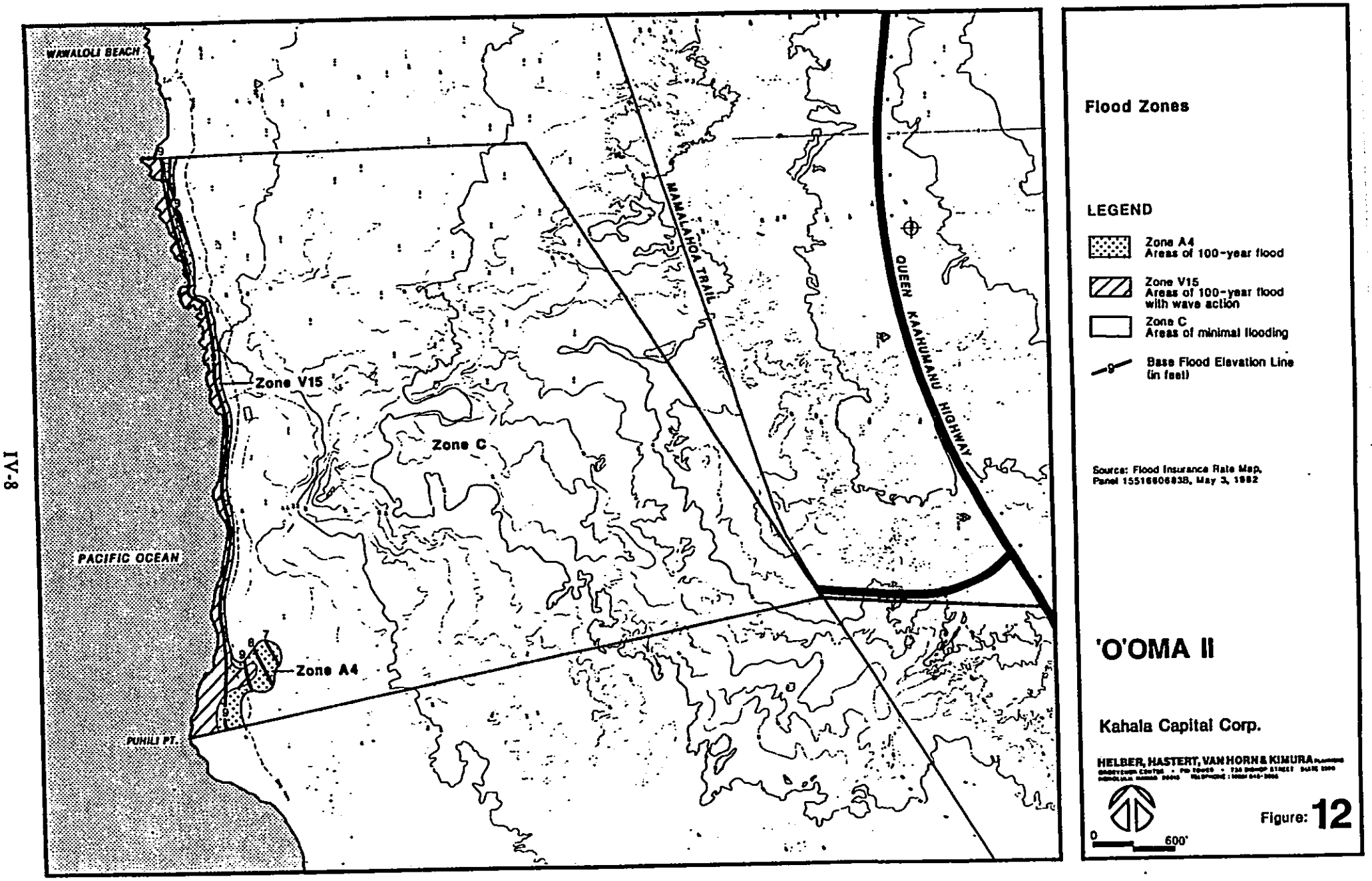
Seismicity. The entire island is susceptible to earthquakes originating in fault zones under and adjacent to it. Two fault zones have been identified within the Kona region: the Kealakekua and the Kaloho faults, both located in South Kona and well away from the subject property. The Big Island is classified as a Zone 3 area for the purpose of structural design. The classification system is based on a scale of 0 to 4, increasing in level of risk due to 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 (in the vicinity of the Puhi o Pele Cinder Cone, just makai of the Mamalahoa Highway), produced a lava flow which extended to the shoreline just north of Keahole Point.

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 may have been that of the Japan tsunami of 1896 at Keauhou, 18 msl. 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 makai of the beach trail except near Puhili Point where the boundary extends inland for approximately 500 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.


WAIWALOLI BEACH
PACIFIC OCEAN
PUHILI PT.
MAMALAHOA TRAIL
QUEEN KAAHUMANU HIGHWAY
Zone V15
Zone C
Zone A4
9
8
7
Flood Zones
LEGEND
Zone A4
Areas of 100-year flood
Zone V15
Areas of 100-year flood with wave action
Zone C
Areas of minimal flooding
Base Flood Elevation Line (in feet)
Source: Flood Insurance Rate Map, Panel 155166 0838, May 3, 1982
'O'OMA II
Kahala Capital Corp.
HELBER, HASTERT, VAN HORN & KIMURA
Figure: 12
0
600'

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).

The elevation of the Ooma II property ranges from sea level at the coastline to approximately 85 feet above mean sea level at the southern-mauka boundary. The land slopes gently, with average slopes ranging from 0 to 5 percent. Localized mounds and depressions, characteristic of lava flows, are present throughout the site.

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.

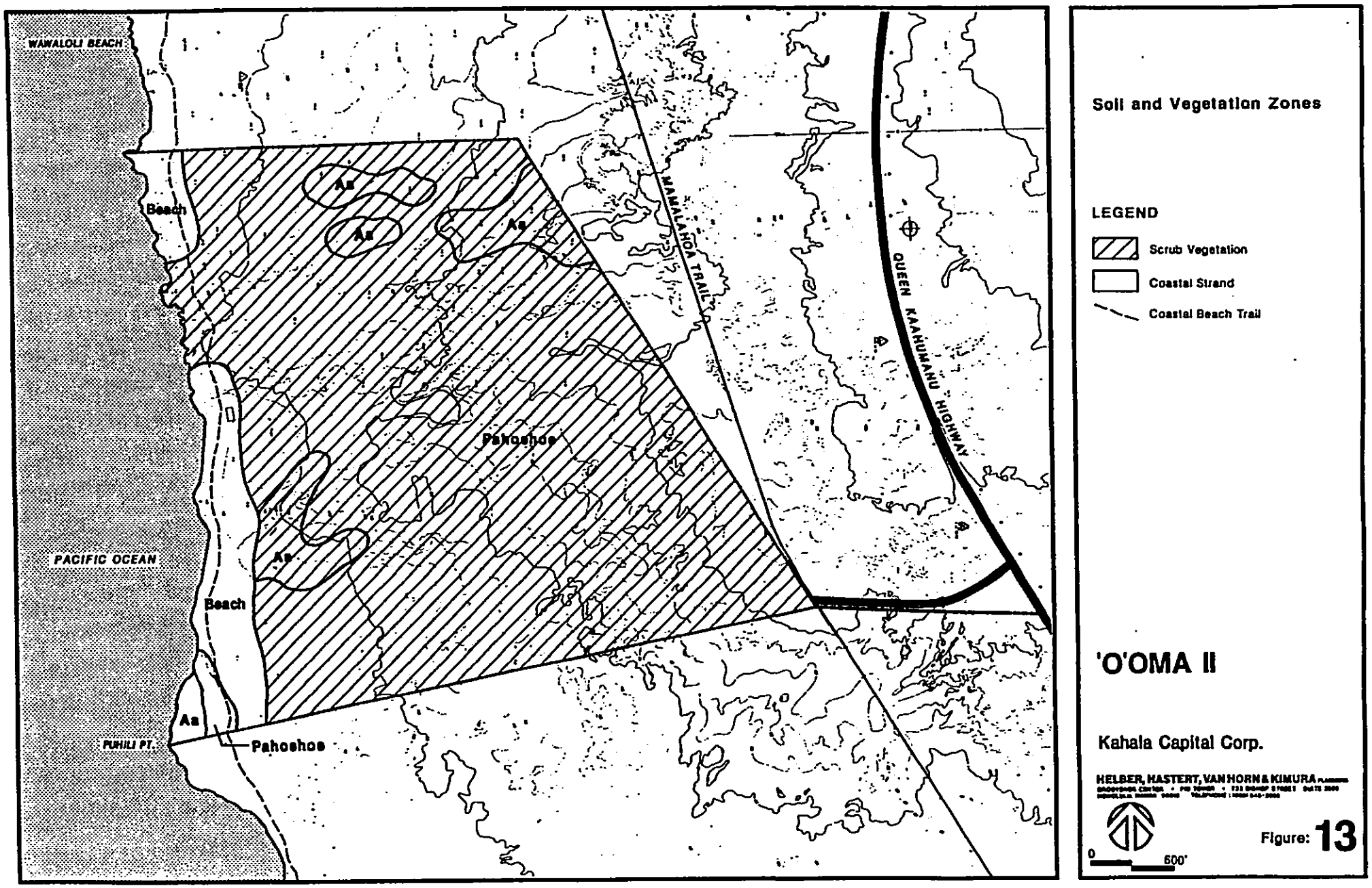
Mitigation Measures: To the extent possible, the preliminary land use plan sites future uses in areas with suitable physiographic features to take advantage of views provided by the limited variation in ground elevation and to minimize the need for large-scale reshaping of the underlying land form.

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. Figure 13 shows the distribution of land types on the Ooma II property. The predominant type is Pahoehoe lava which has a billowy, glassy surface that is relatively smooth, although the surface may be rough and broken in some areas, with hummocks and pressure domes. The second type consists of a'a lava flows that are scattered throughout the project area and are characterized by clinkery, hard, glassy pieces piled in tumbling heaps. The third land type includes the beach areas located along the coast. These are long, narrow, sloping areas of sand and cobbles varying in color according to the material from which they were formed. The white sand beaches fronting the project area are composed of coral and sea shells.

The Soil Survey indicates that the property is not suited for agricultural use. The two lava types listed above have a Capability Class Rating of VIIIs, defined as soils and land forms whose limitations preclude the cultivation of commercial plants. The beach areas have a rating of VIIIw, indicating agricultural use to be unsuitable because of water in or on the soil, which interferes with plant growth or cultivation.

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.


WAWALOLI BEACH
Beach
Aa
Aa
Aa
Aa
Pahoehoe
MAMALAHOA TRAIL
QUEEN KAAHUMANU HIGHWAY
PACIFIC OCEAN
Beach
Aa
Aa
PUHILI PT.
Pahoehoe
Soil and Vegetation Zones
LEGEND
Scrub Vegetation
Coastal Strand
Coastal Beach Trail
'O'OMA II
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HELBER, HASTERT, VAN HORN & KIMURA
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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 land evaluation ratings for this parcel fall between 14 and 17. Site assessment ratings are currently incomplete and have not been incorporated into the overall site evaluation system as yet.

Short-term Impacts: Construction activity will take place on a relatively flat surface, limiting the amount of earthwork required. However, much of the site is covered with pahoehoe 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 Ooma II 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.

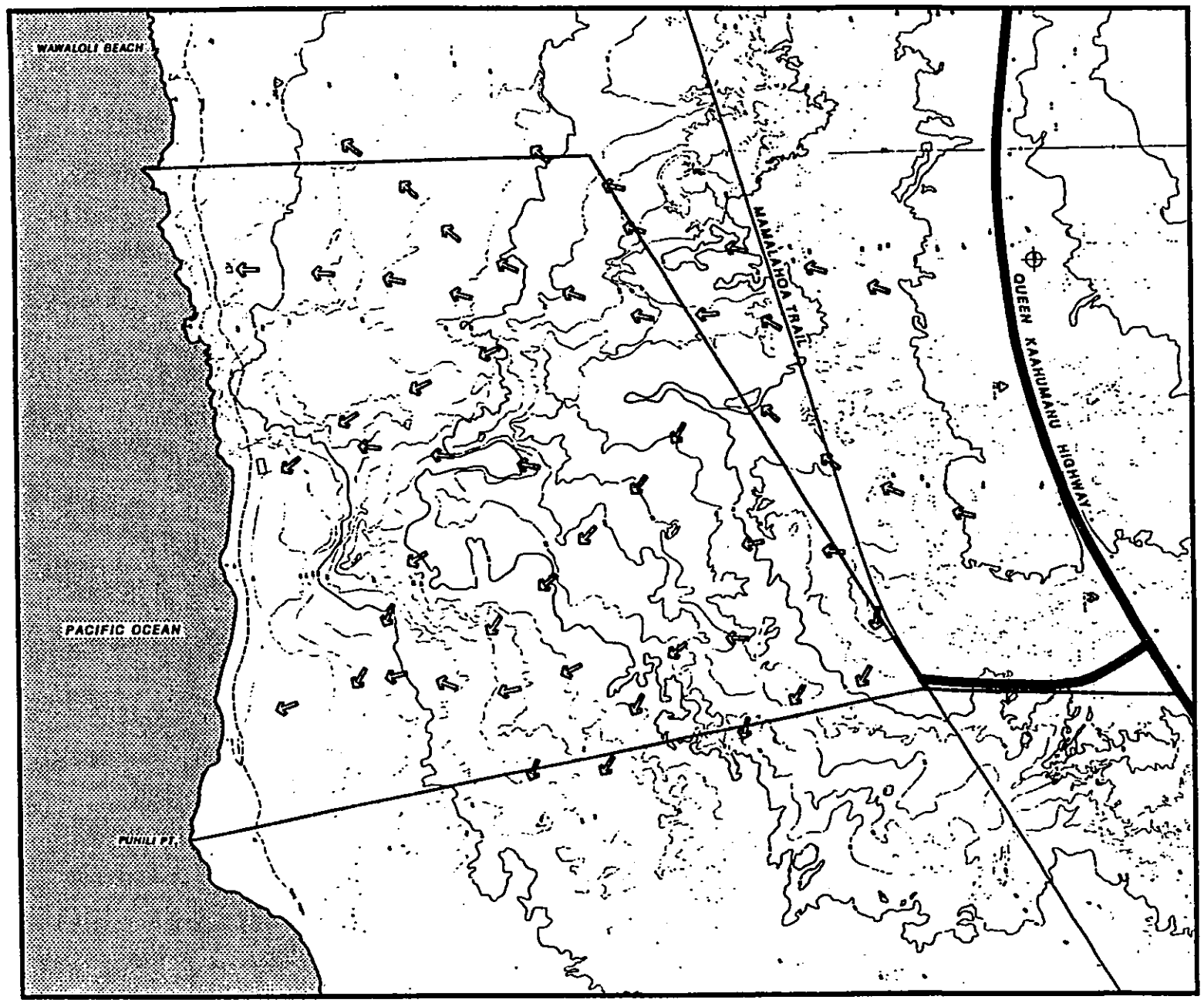
Mitigation Measures: The most important mitigative technique is the choice of grading scheme and the layout for the golf fairways and water features. Planned conformity between site design and the natural topography will minimize the amount of reshaping and filling needed.

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.

4.9 Hydrology

Water resources in the Kona region are primarily basal ground water. Due to the low levels of rainfall, the relatively high hydraulic conductivity of lava rock, and proximity to the coastline, water in the coastal region is expected to be brackish. Suitable potable water sources are expected to be found further inland at elevations of 1,200 feet or higher.

The existing Ooma II watershed contains an area of approximately 482 acres and extends from the western slopes of Hualalai to the coast. There are no perennial streams or well-defined water courses in the watershed due to a combination of meager rainfall and the lava landscape (see Figure 14). Storm water consists



Site Drainage

LEGEND

⇦ Drainage Path

~75~ Elevation Line

'O'OMA II

Kahala Capital Corp.

HELBER, HASTERT, VAN HORN & KIMURA

0 600'

Figure: **14**

primarily of sheet flows downward from the upper parts of the watershed to Queen Kaahumanu Highway. A man-made ditch on the mauka side of the highway conveys the run-off to culverts located to the north and south of Ooma II, discharging storm waters away from the project area.

Under existing conditions, a total run-off of 90 cubic feet per second (cfs) is estimated to enter the project site from the eastern and southern boundaries and 268 cfs of run-off is generated within the 314-acre project area. The Ooma II coastline receives 190 cfs of run-off from on-site areas and 4 cfs from off-site areas. The remaining 164 cfs of on- and off-site run-off flow across the property boundaries and into the adjacent HOST Park and Kohanaiki properties.

Impacts: Changes in land use based on the proposed Ooma II master plan are expected to increase storm run-off within the project site from 260 cfs to 450 cfs. The conceptual schema for a storm drainage system is discussed in Section 6.4, Storm Water Drainage.

Proposed drainage modifications would reduce sheet flow into the coastal area from 190 cfs to 37 cfs. This would result from concentrating the run-off to two points located at the northern and southern ends of the shoreline where the impacts of run-off to prime beachfront areas would be minimized.

Under existing conditions, drainage from a 147-acre portion of the Ooma II watershed finds outlet on the shoreline near the proposed HOST Park warm water intake pipes; however, impacts to this facility expected to be minimal and infrequent. The drainage area would increase to 209 acres under the modified drainage plan. The associated run-off is expected to increase from 400 cfs to 500 cfs, representing a 25 percent increase with a statistical probability of occuring once every one hundred years.

Soil erosion due to run-off will occur mainly when the soil layer is being placed over the lava rock. The worst scenario would occur when clearing or grading 20 acres at any one time, the maximum allowable by County codes. Under this condition, the Universal Soil Loss Equation yields an erosion rate of 50 tons per year in addition to existing potential erosion. The sedimentation hazard posed to coastal waters is also considered to be small according to the Hawaii Environmental Simulation Laboratory (HESL) criteria. The computed parameter was 800 compared with the standard allowable severity rating of 50,000.

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

- Minimize time of construction.
- Retain existing ground cover until just prior to construction.
- Construct drainage control features early in the development program.
- Use temporary area sprinklers in nonactive construction areas when ground cover is removed.
- Station water trucks on site during construction to provide immediate sprinkling, as needed.
- 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.

4.10 Shoreline and Near-shore Marine Environment

This section is based on a marine baseline assessment survey conducted by Steven Dollar, Ph.D. in July 1986. The purposes of the study were to identify resources that may be particularly sensitive to man-induced stresses (or may be particularly resistant) and 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 monitoring of these stations in the future.

Shoreline Area

The main structural feature of the approximately one-mile Ooma II shoreline is a basaltic ledge of pahoehoe lava interspersed with pockets of white calcareous sand. The intertidal platform, which is constantly subjected to the wash of waves is flooded in places to form tide pools. However, none of these pools appears to be separated from the ocean on a permanent basis so they do not constitute unique or rare habitats. The submerged portions of the intertidal pools are lined with various forms of encrusting red algae, and contain numerous sea urchins and juvenile reef fish. The seaward edge of the lava shoreline is composed either of basaltic boulder "benches" or vertical shoreline sea-cliffs two to five feet high. Access to the water from the basaltic bench is difficult, and potentially dangerous. The one exception is a small area at the southern border of the property where a small sandy beach reaches the waterline.

Off-shore Marine Environment

Water Quality. A comprehensive data set of surface water chemical parameters has been collected near the NELH site. The data set consists of weekly measurements spanning the last four years. In summary, surface waters near the Ooma II site contain relatively low concentrations of dissolved nutrients (nitrogen and phosphorous), but exhibit a natural cyclic variability that is apparently related to seasonal influences.

The near-shore waters are classified "AA" by the State Department of Health and can be considered pristine. Lack of suspended material results in extremely clear water. There are no streams entering the sea along the property's frontage, and ground water seepage of fresh water appears to be minimal.

Coral Community Structure. In general, the geologically young age of the island has resulted in undeveloped "coral reefs." Rather the majority of off-shore environments can be called "coral communities." 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.

Other Benthic Invertebrates. The major group of benthic organisms occurring on the Ooma II reefs, other than corals, are sea urchins and sea cucumbers.

Reef Fish Community. The reef fish community bordering the proposed Ooma II development can be grouped into six general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwelling fishes, swarming tetrodonts, and surge-zone fishes. Overall, the fish community at the Ooma II site is fairly typical of the assemblages found in Hawaiian reef environments. The reduced size of some food fishes, their tendency to avoid divers, and their general scarcity indicates that this area is subjected to a substantial, but not overwhelming, degree of fishing pressure. The scarcity of commercially valuable reef fishes also suggests that the community is somewhat affected by aquarium fish collectors.

Threatened or Endangered Species

Two species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The green sea turtle (Chelonia mydas) occurs commonly along the Kona Coast, and is known to feed on selected species of macroalgae. No turtles were observed along the Ooma II property during Dollar's survey, but several individuals were sighted to the south near the entrance of the Honokohau Small Boat Harbor.

Populations of endangered humpback whale (Megaptera novaeangliae) are known to winter in the Hawaiian Islands and have been sighted in off-shore waters in the vicinity of the project area 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.

Impacts: 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, especially in nutrient loads from sewage-laden irrigation and golf course fertilization; (3) shoreline modification including changing coastline access; and (4) changes in marine ecosystems.

Sedimentation. Increased sedimentation is not likely to produce a significant change in the coastal environment. The main reason for this is that the ground cover of land areas to be graded is raw lava that has not weathered to any appreciable extent and has little or no soil cover. When moved and crushed by bulldozers, a smooth surface of cobbles 1 to 4 inches in size generally results. Moreover, only a fraction of the wind-blown material would be carried in a westerly direction toward the ocean. As the wind-blown fraction would probably be in the silt-clay size range, this material is likely to remain in suspension for some time if entered the water column and unlikely to result in any measureable settlement in the near-shore marine environment.

Similarly, it is not expected that run-off during construction would increase oceanic sediment loads. Most of the rain water that enters the ocean as run-off appears to do so following percolation through the surface rock layers to the water table and subsequent ground water extrusion at the shoreline. Such ground water flow would not have the effect of transporting sediment to the ocean since the basal rock acts as a filter.

Increased Nutrient Loading. Operations of the Ooma II 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 Ooma II, 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 priodically made to the greens. Such small quantities do not appear to be of a magnitude great enough to leach through the soil and lava, to accumulate, and then produce a noticeable effect.

Shoreline Modification. Modification of one of the small existing beaches to improve access would probably entail removal of a section of the basaltic substratum, followed by deposition of sand to create an "artificial" beach. Observation of this type of construction at the Mauna Lani resort revealed that the initial grading and rock removal, accomplished by heavy equipment, resulted in temporary high turbidity plumes near the beach site. These plumes dissipated in less than 24 hours, and surveys of reef biota indicated that the increased sediment loading had no adverse effects on the community structure.

Effects to NELH. The high precision, surface water nutrient monitoring program being conducted at NELH could potentially be influenced by material input from the Ooma II site. This concern is amplified by the occurence of periodic strong northerly currents which could transport water from the development site past Keahole Point. Run-off from the golf course (i.e., treated sewage effluent) is the most likely source of spurious signal to the NELH data. However, such run-off is not likely due to the structural qualities of the basal lava rock and minimal sheet flow reaching the ocean.

The principal facility of the NELH program is a cold water intake pipe located at a water depth of about 1,900 feet off Keahole Point. It does not appear that any modification to the marine environment brought about by the Ooma II development could alter the chemical characteristics of the intake water.

Marine Ecosystems. In general, the off-shore reef areas adjacent to the subject property are constantly exposed to natural stresses, especially in the form of storm waves, that are the primary factor determining the make-up of the reef communities. The effects of natural phenomena probably are more influential (or destructive) than the incremental changes that could result from any development activity. If some unexpected event related to development occurs, the resulting

alterations to marine community structure probably would be negligible, 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.

Mitigation Measures: The baseline marine biological study has been implemented in such 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. 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. However, the unique situation presented by proximity to NELH/HOST Park is recognized and, therefore, discussions with these organizations have been initiated regarding the need to safeguard the quality of near-shore waters. Preliminary agreement has been reached to pursue a cooperative monitoring program so long as all affected parties share in the program costs and that those costs are not unreasonable. The program would essentially expand the monitoring procedures currently employed by NELH, with the NELH data set providing significant baseline information. The type of measurements included in this data set are in accordance with Department of Health standards. Further details, such as the location of monitoring sites, frequency of measurement, and particular data requirements, would be developed when more specific design and construction plans are available.

4.11 Flora and Fauna

Flora

A flora survey conducted in May 1986 inventoried a total of 51 vascular plant species (Char and Associates, 1986). Of these 31 species (61 percent) are exotic (or introduced), 18 species (35 percent) are native, and 2 species (4 percent) are of Polynesian introduction. Among the 18 native species, 10 are indigenous (occurring only in the Hawaiian Islands and elsewhere) and 8 are endemic (occurring only in the Hawaiian Islands). None of the native species is listed as endangered or threatened by the U.S. Fish and Wildlife Service.

Two broadly defined vegetation types are recognized on the Ooma II parcel. Scrub vegetation covers almost 95 percent of the project area. Strand vegetation occupies a narrow belt along the coast; however, the largest number of native species is found in this zone.

Strand Vegetation. A band of vegetation comprised primarily of beach naupaka (Scaevola taccada), three to six feet tall, is found along the coastal portion of the project area. The substrate varies from unconsolidated corraline sand to coral rubble, and, occasionally, pahoehoe flows. The band varies in width from as much as 300 feet to as little as 50 feet. In places where the strand is very narrow, the pahoehoe flows are found close to the beach; the beach naupaka occurs as scattered individuals in these areas and fountain grass (Pennisetum setaceum) is common, occupying even the sandy areas.

Where the strand vegetation is widest, beach naupaka forms almost solid strands. Clusters of tree heliotrope (Messerschmidia argentea), nine to fifteen feet tall, are scattered among the naupaka shrubs. Other herbaceous species in the strand are: nohu (Tribulus cistoides), pohuehue (Ipomoea brasiliensis), Bermuda grass (Cynodon dactylon), alena (Boerhavia diffusa), and the native poppy (Argemone glauca).

Scrub Vegetation. The scrub vegetation is comprised of a mixture of grass and shrub species on pahoehoe flows. Fountain grass is usually the most abundant species, especially in those areas of the project site closer to the shore. Further inland, however, large areas may be dominated by the native pili grass (Heteropogon contortus) or by a Natal redtop (Rhynchelytrum repens)-'uhaloa (Waltheria indica var. americana) association. Shrubs of 'ilima (Sida fallax) and indigo (Indigofera suffruticosa) may be locally common, especially in depressions in the pahoehoe flows. Widely scattered throughout the site are taller plants of kiawe (Prosopis pallida), Christmas berry (Schinus terebinthifolius), a'ali'i (Dodonaea sandwicensis), maiapilo (Capparis sandwichiana var. zoharyi), and noni (Morinda citrifolia). In some of the collapsed lava tubes, which are frequently encountered on the site, ferns such as kilau-o-pueo (Pteris vittata), 'iwa'iwa (Doryopteris decora), and swordfern or kupukupu (Nephrolepis multiflora) may be found, although their occurence on the site is not common.

The rough a'a flows support only a few plants, usually fountain grass, coat buttons (Tridax procumbens), and 'uhaloa.

Fauna

The vertebrate fauna is largely composed of introduced species. Nine bird species were observed during the May 1986 survey. Of these, seven are listed as foreign species, one is an indigenous species which leaves the islands when not breeding, and one species is a migratory winter visitor. The mongoose was the only mammalian species observed, although feral cat may also inhabit the area. No endangered wildlife species were observed. The Hawaiian Stilt or Ae'o (Himantopus himantopus knudseni) and the Hawaiian Hoary Bat (Lasiurus cinereus semotus), both endangered species, may fly over the project site, the latter probably feeds on insects along the coastal area during the evening and at night.

Two major faunal habitats are present in the project area. These correspond approximately to the vegetation types, but are less finely divided. The predominant scrub vegetation habitat was found to support low bird densities. One species, the Grey Francolin, was found on a more regular basis and presumably is able to utilize the available food sources more effectively than most other species.

Birds were more abundant in the coastal strand habitat, although it appeared that much of the activity was of a transient nature, as many species that fed there during the daytime hours roosted elsewhere at night. Beaches and sections of the rocky coastline makai of the strand form an important habitat for migratory shore birds. As the survey was conducted during a season when shore bird species are generally absent from the Hawaiian Islands, only one species, the Wanderling tattler, was found. However, two or three others (Bristle-thighed Curlew, Ruddy Turnstone, and Sanderling) would be expected in this area on a regular basis. The Pacific Golden Plover was observed on the adjacent Kohanaiki parcel.

Impacts: No endangered flora or fauna are known to inhabit the site. While the proposed development will result in the loss of vegetation, primarily the scrub community, and some wildlife habitat, it is expected to have only a minimal impact on the total island populations of the species involved.

Cumulative Impacts: Proposals to develop the HOST Park, Ooma II, Kohanaiki, and Kaloko-Honokohau could urbanize as much as 1,947 acres. Much of the land within these sites consists of the sparsely vegetated plain that is typical of the North Kona coast. In addition to the arid lava substrate ecosystem, however, there has been significant public interest in the unique ecosystem supported by anchialine ponds and wetlands in some of these areas. Prior to any public approval for development, it is likely that all projects on sites containing anchialine ponds will be required to develop some form of pond management program, although some loss of the ponds is anticipated. The Ooma II site does not contain any anchialine pond or any other body of standing water. Further, it is unlikely to provide an adequate substitute for the wetland habitats that are lost through development. In observing wildlife activity on the Ooma II site, biologists reported that most birds were seen passing through the area on their way to more preferred habitats that provided more food, water, and cover.

Mitigation Measure: Some of the native plant species found in the coastal strand, such as the naupaka, pohuehue, and hinahina (Heliotropium anomalum var. argenteum) could be incorporated into the development's landscape plans.

4.12 Noise

Aircraft Noise

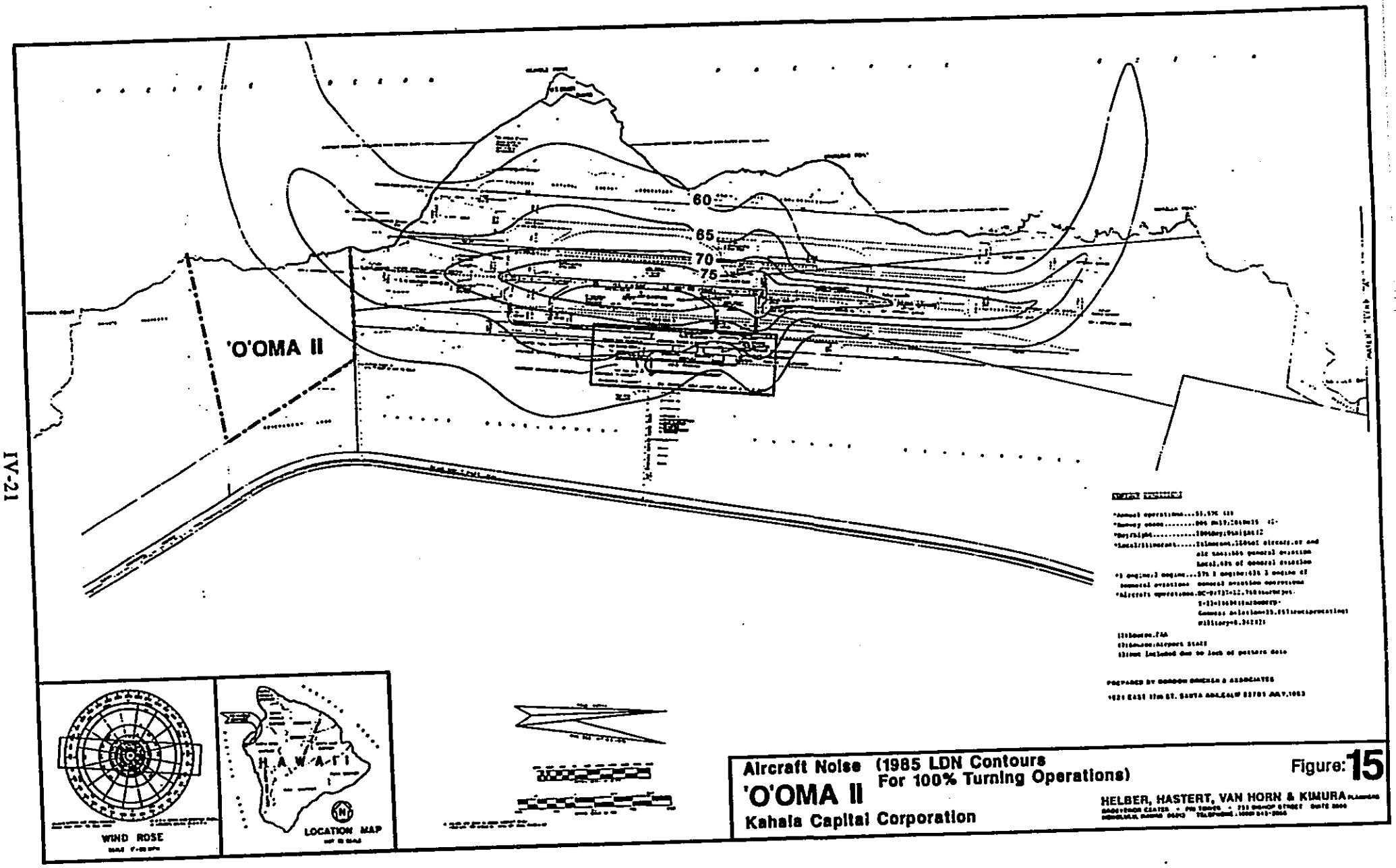
The major source of man-made noise affecting the subject property originates from air traffic operations at the Keahole Airport, located approximately one mile to the north. The majority of aircraft utilizing the airport (approximately 80 percent) land and take off on Runway 17, traveling in a north-south direction. Most of the commercial traffic leaving Keahole is bound for either Kahului or Honolulu. The normal flight pattern is a right turn out to sea shortly after takeoff. Commercial air tours, general aviation craft, and military training flights may continue in a southerly direction after takeoff, and, by flying over the subject property, have a greater impact on noise levels.

While people respond to the noise of single events, the long-range effects of prolonged exposure to noise appear to correlate best with *cumulative* metrics. "L_{dn}" is the Federal Aviation Administration's (FAA) standard metric for determining such exposure to noise. It measures average sound level in decibels for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the period 10 p.m. to 7 a.m. the next day local time. (U.S. Dept. of Transportation, 1985, Federal Aviation Regulations, Part 150, Section 7, Definitions). Existing aircraft noise exposure maps with continuous noise contours levels of L_{dn} 60, 65, 70, and 75 have been prepared, as shown in Figure 15 (Gordon Bricken and Associates, 1986). Given the level of air traffic in June 1985, and with 100 percent turning operations, L_{dn} 60+ and 65+ contours cross the northern portion of the property. While the contours give a general indication of relative noise levels, vegetation, topography, and the position of buildings or walls often affect the impact of noise on the human users at specific sites.

The contour lines were generated from the volume of Keahole Airport Operations in 1985 reported by the State Department of Transportation-Airports Division, shown in Table 6.

Of more importance for planning purposes are future noise impacts on the site due to projected increases in the volume of air operations. Noise contours for 1995 and 2005, as well as the data and assumptions used in the model to generate the contours, are contained in Appendix M of this document.

Figure 16 is a graphic representation of the information in Table 6. It shows an increasing level of air operations in the mid 1980s with the 1985 total only slightly higher than the level of operations in 1979. The recent resurgence of air traffic follows a lull in the early 1980s, bottoming in 1982, which reflected low visitor arrivals. Interestingly, air carrier traffic has registered the smallest amount of fluctuations in the 14-year observation period. The high operation years, 1979 and 1985, show several major differences that apparently correspond to trends in airport usage. First, flight operations were more evenly distributed among the four types of aircraft in 1985 than in 1979. Second, there was a lower proportion of general aviation traffic in 1985 compared to 1979, but the proportion of use by military and air taxi traffic has been increasing gradually since 1979.



Aircraft Noise (1985 LDN Contours For 100% Turning Operations)

'O'OMA II

Kahala Capital Corporation

Figure: 15

HELBER, HASTERT, VAN HORN & KIMURA

Table 6: Keahole Airport Operations

Year	Air Carrier	Air Taxi	General Aviation	Military	Total
1971	10,653	5,110*	9,734	1,635	27,132
1972	10,766	9.690	4,414	5,137	30,007
1973	12,484	11,502	6,305	7,955	38,246
1974	13,529	10,570	6,350	10,310	40,759
1975	12,554	10,446	7,462	10,160	40,622
1976	13,937	14,090	17,867	12,531	58,425
1977	15,109	15,084	40,019	13,404	83,616
1978	16,369	19,740	40,542	14,382	91,033
1979	15,602	18,088	49,299	12,246	92,235
1980	13,895	14,953	28,354	9,742	66,944
1981	12,681	14,633	22,415	7,758	57,488
1982	13,945	15,112	14,392	8,440	51,889
1983	15,621	22,731	17,732	10,497	66,581
1984	17,033	29,569	19,528	17,190	83,320
1985	**20,510**	**31,473**	**22,313**	**19,583**	**93,879**

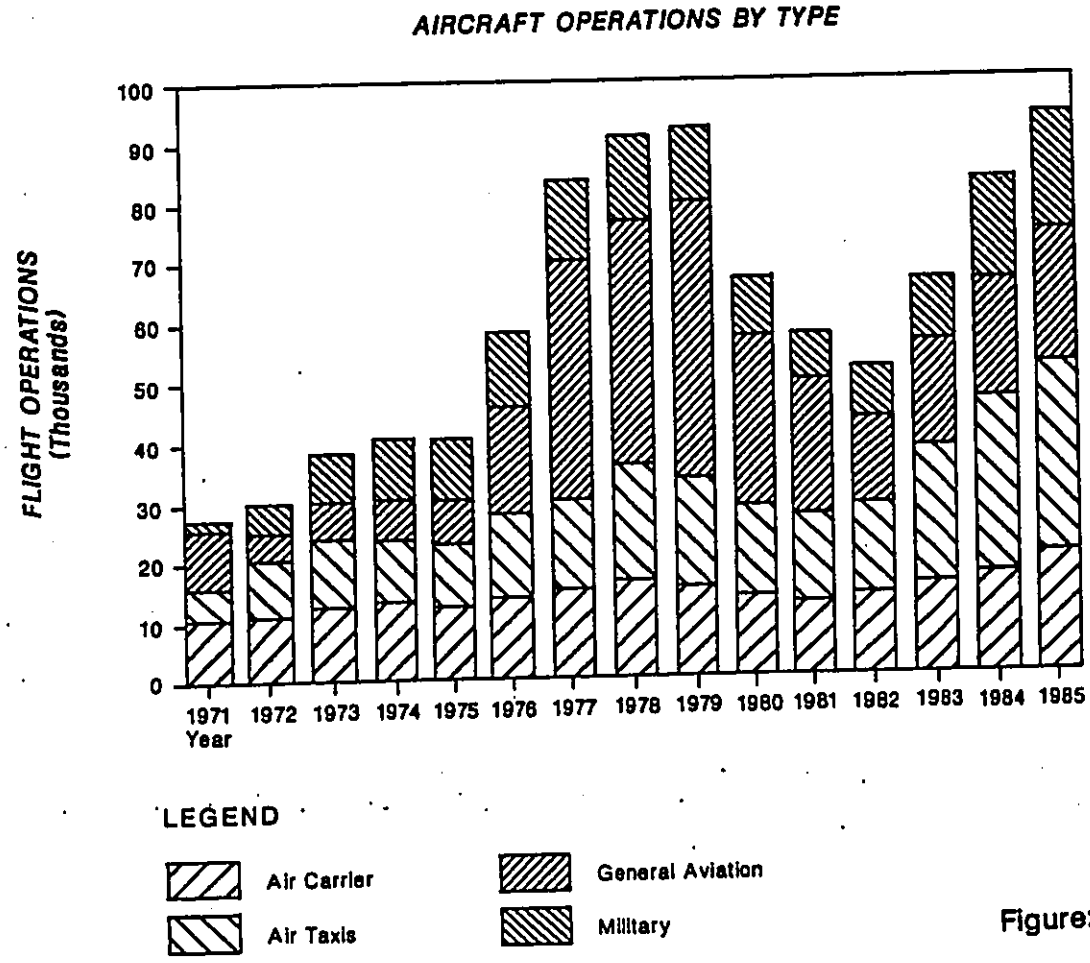


Figure: **16**

The FAA has identified land uses which are normally compatible with various levels of noise around airports. This information is summarized in Table 7. The FAA guidelines state that all land uses are considered compatible with noise levels less than L_{dn} 65 dB; however, local needs or values may dictate further delineation based on local requirements or determinations (U.S. Dept. of Transportation, 1985, Section A150.101).

An airport environs study for the Honolulu International Airport concluded: "It is generally accepted that residential development without special acoustical insulation is compatible with aircraft noise levels of L_{dn} 65 or lower, but this may not be true in Honolulu." (PMM, E-15). The same studied modified the FAA guidelines to reflect a lowering of acceptable residential acoustic environment from L_{dn} 65 to 60, unless additional noise level reduction is incorporated into the structural design and construction. The State Department of Transportation's suggested land use compatibility matrix is reproduced in Table 8.

Table 7: Land Use Compatibility* with Yearly Day-Night Average Sound Levels

Land Use	Yearly Day-Night Average Sound Level (L_{dn}) in Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N1)1	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing And Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

KEY TO TABLE

SLUCM	Standard Land Use Coding Manual.
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land used and related structures generally compatible; measures to achieve NLR or 25, 30, or 35 dB must be incorporated into design and construction of structure.

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Sourse: Federal Aviation Regulations, Part 150, Appendix A, Table 1, January 1985

Table 8: Suggested Land Use Compatibility Standards in Aircraft Noise Exposure Areas
(State Department of Transportation)

Land use	Below Ldn 60	Ldn 60 to 65	Ldn 65 to 70	Ldn 70 to 75	Ldn 75 to 80	Ldn 80 to 85	Over Ldn 85
Residential:							
Residential, other than mobile homes and transient lodgings	Compatible	Compatible[a]	NLR required[b]	NLR required[b]	Incompatible	Incompatible	Incompatible
Mobile homes	Compatible	Compatible[a]	Incompatible[b]	Incompatible[b]	Incompatible	Incompatible	Incompatible
Transient lodgings	Compatible	Compatible[a]	NLR required[b]	NLR required[b]	Incompatible	Incompatible	Incompatible
Public use:							
Schools, hospitals, and nursing homes	Compatible	Compatible[a]	NLR required[b]	Incompatible	Incompatible	Incompatible	Incompatible
Churches, auditoriums, and concert halls	Compatible	Compatible	NLR required[b]	NLR required	Incompatible	Incompatible	Incompatible
Governmental services	Compatible	Compatible	Compatible	NLR required[c]	NLR required[c]	Incompatible[c]	Incompatible[c]
Transportation	Compatible	Compatible	Compatible	Compatible[c]	Compatible[c]	Compatible[c]	Compatible[c]
Parking	Compatible	Compatible	Compatible	Compatible[c]	Compatible[c]	Compatible[c]	Incompatible
Commercial use:							
Offices, business, and professional	Compatible	Compatible	NLR required	NLR required	NLR required	Incompatible	Incompatible
Wholesale and retail--building materials, hardware, and farm equipment	Compatible	Compatible	Compatible	Compatible[c]	Compatible[c]	Compatible[c]	Incompatible
Retail trade--general	Compatible	Compatible	NLR required	NLR required[c]	NLR required[c]	Incompatible[c]	Incompatible
Utilities	Compatible	Compatible	Compatible	Compatible[c]	Compatible[c]	Compatible[c]	Incompatible
Communication	Compatible	Compatible	NLR required	NLR required	NLR required	Incompatible	Incompatible
Manufacturing and production:							
Manufacturing, general	Compatible	Compatible	Compatible	Compatible[c]	Compatible[c]	Compatible[c]	Incompatible
Photographic and optical	Compatible	Compatible	Compatible	NLR required	NLR required	Incompatible	Incompatible
Agriculture (except livestock) and forestry	Compatible	Compatible[a]	Compatible	Compatible	Compatible	Compatible	Compatible
Livestock farming and breeding	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Mining and fishing resources production and extraction	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Recreational:							
Outdoor sports arenas and spectator sports	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Outdoor music shells, amphitheaters	Compatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Nature exhibits and zoos	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible	Incompatible
Amusements, parks, resorts, and camps	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible
Golf courses, riding stables, and water recreation	Compatible	Compatible	Compatible	Compatible	Incompatible	Incompatible	Incompatible

Ldn = Yearly day-night average sound level in decibels.

Compatible = Generally, no special noise attenuating materials are required to achieve an interior noise level of Ldn 45 in habitable spaces, or the activity (whether indoors or outdoors) would not be subject to a significant adverse effect by the outdoor noise level.

NLR = NLR (Noise Level Reduction) is used to denote the total amount of noise transmission loss in decibels required to reduce an exterior noise level in habitable interior spaces to Ldn 45. In most places, typical building construction automatically provides an NLR of 20 decibels. Therefore, if a structure is located in an area exposed to aircraft noise of Ldn 65, the interior level of noise would be about Ldn 50, so an additional NLR of 5 decibels would be required if not afforded by the normal construction. This NLR can be achieved through the use of noise attenuating materials in the construction of the structure. If the structure is located in an area exposed to aircraft noise of Ldn 70, the interior level of noise would be about Ldn 45.

Incompatible = Generally, the land use, whether in a structure or an outdoor activity, is considered to be incompatible with the outdoor noise exposure, even if special attenuating materials were to be used in the construction of the building.

a. In climates where existing structures have thin, single-wall construction with minimal insulation, the Ldn 60 to 65 area may not be compatible without additional noise level reduction incorporated into the design and construction. However, it should be noted that in many urban areas, the ambient noise level may be above Ldn 65, so structures in the Ldn 60 to 65 must be evaluated on a case-by-case basis.

b. The land use is generally incompatible and should only be permitted in areas of infill in existing neighborhoods or where the community determines that the use must be allowed.

c. NLR required in offices or other areas with noise-sensitive activities.

Source: Peat, Marwick, Mitchell & Co., as derived from the U.S. Department of Transportation, Federal Aviation Administration, "Interim Federal Aviation Regulations, Part 150, Airport Noise Compatibility Planning," Table 2, January 26, 1981.

Source: Honolulu International Airport and Environs Study, 1981

Long-term Impacts: Different uses of the land have different sensitivities to noise and individuals may each have different perceptions of acceptable versus intruding levels of noise. Furthermore, the background or residual noise against which a specific noise is perceived varies both by location and by time of day. Aircraft noise can disturb activities such as conversation, sleep, and relaxation. And while it does not present any direct physical health danger to the vast majority of people exposed, it could present an annoyance problem. (U.S. Dept. of Transportation, 1976: 17).

Cumulative Impacts: Expansion of resort facilities on the Kona Coast would be viable only in response to greater numbers of visitors, most of whom will arrive and depart via Keahole Airport. The interrelationship between increased air traffic and demand for new resort areas, including Ooma II, is undeniable. From this perspective, an increase in Keahole airport operations is considered necessary for development of Ooma II. Projected levels of air traffic are being studied by the State's Keahole Airport master planning effort. The projections and ultimate impacts on the sonic environment will be evaluated by the Ooma II planning team as new information becomes available.

Mitigation Measures: One of the primary goals of Federal and State programs for planning airport systems is to provide for the reasonable coexistence between airports and their neighbors. Of the several noise abatement strategies commonly considered, the following appear to offer the greatest potential benefits in this situation. These measures are intended to suggest a package of actions that could be taken to address the overall noise issue.

Constructive use of planning and zoning. The land uses sited within the higher noise contours (L_{dn} 65+) are those considered less noise sensitive, such as beach access, recreation, and high-technology aquaculture. These uses are presently found in areas closer to the airport, i.e., NELH and Wawaloli Beach Park. The primary land uses within the 60+ contour are marine park/visitor center and golf course. The marine park is conceived as a lively area which itself would generate a fairly high level of noise, thereby masking aircraft noise.

Soundproofing. Certain types of structures, such as office buildings, hotels, conference facilities, and commercial areas are amenable to sound attenuation techniques that reduce the intrusive impacts of noise by blocking off noise paths or incorporating soundproofing materials and design. These techniques are commonly employed in airport hotels to achieve noise level reduction. Insulation is only a partial solution, however, since the outdoor environment is unchanged.

Modifications in air operations. Operational procedures for the control of aircraft departures and arrivals at airports includes several alternatives such as prescribing the takeoff and landing profiles and power settings, and the approach and departure paths. The viability of any specific recommendation is obviously related to wind vectors, runway length, aircraft performance and tolerance for crosswinds, and safety. However, within these parameters, there is often a significant range of acceptable options. The airport's location at Keahole Point, which extends into the ocean, is particularly conducive to routing landing and take-off paths over uninhabited areas, as permitted by meteorological conditions.

Modifications in aircraft. There is a possibility for reducing noise at its source through further advances in noise suppression technology. The effectiveness of this measure is limited by the turnover time required to replace an existing fleet with new generation aircraft. Moreover, the continued expansion of air travel could very well outweigh any gains from quieter engines or larger aircraft requiring fewer flights to handle the same number of passengers.

Airport expansion. Expansion of the Keahole facility in the future could reduce noise impacts to the benefit of surrounding lands. A longer runway would allow higher elevations over developed areas and lower thrust from reduced flap angle with increased landing speeds possible.

Construction Noise

Short-term Impacts: Construction is an inherently noisy activity. Peak noise levels will occur during excavation, foundation work, and concrete pours, particularly in the initial phases of construction. At present, residences and other noise-sensitive facilities are not located close enough to be adversely affected by outdoor construction noise. After portions of the project become operational, subsequent construction must not be disruptive of other ongoing activity.

Chapter 43 of Title 11, Administrative Rules for the State Department of Health sets standards for certain types of noise emissions, including those produced by construction activity and other fixed sources. It specifies maximum allowable levels of noise for each use zone established by County regulations. In addition, Chapter 200 of the State's Occupational Safety and Health Standards contains standards for occupational exposure to noise. When sound levels exceed the standards, the law requires employers to initiate administrative or engineering controls to lower noise to acceptable levels or to supply employees with protective hearing devices.

Vehicular Traffic Noise

Long-term Impacts: The segment of Queen Kaahumanu Highway between Keahole Airport and Kailua-Kona is the most heavily traveled; however, highway traffic noise is not expected to affect the project significantly even with future increases in traffic volumes. The property's eastern boundary is approximately 1,600 feet from the highway, and the closest habitable uses are approximately 3,000 feet away. Noise from on-site traffic is not expected to be significant because of low posted speed limits and the possible placement of speed bumps.

4.13 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 Ooma II development are smaller in scale than Kaupulehu and one can assume a corresponding degree of impacts. On the other hand, the Ooma II master plan includes light industrial and office uses that would lead to increased automotive emissions and also tend to concentrate pollutants during the peak traffic periods.

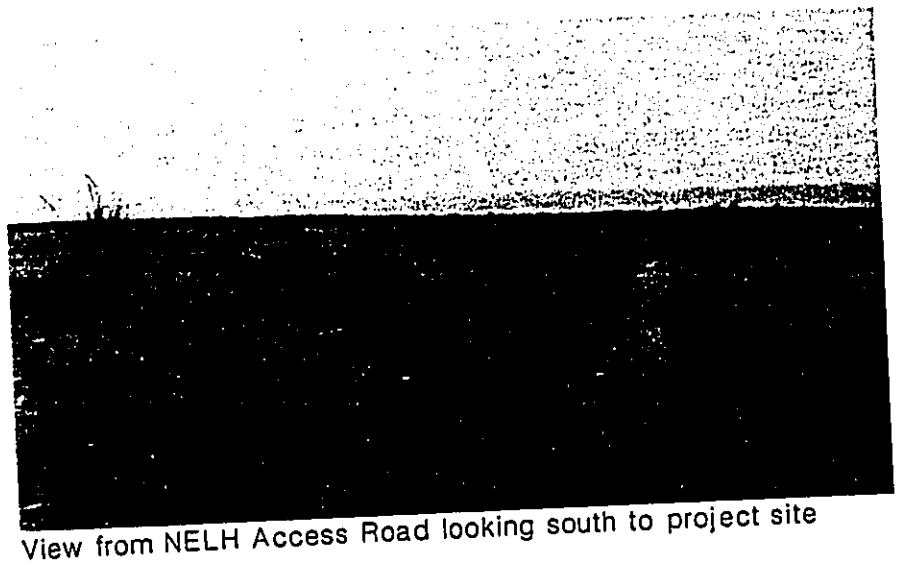
Cumulative Impacts: Air quality is especially susceptible to the impact of cumulative developments. Besides Ooma II, the Kona Agricultural Subdivision, Keahole Airport, NELH/HOST Park, proposed Kohanaiki Resort, and traffic generated by the respective activities, are existing and future contributors 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.

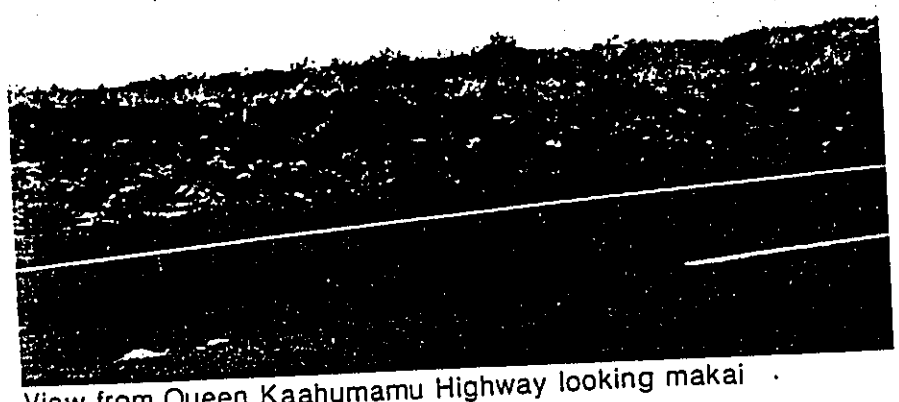
The strong land-sea breeze regime in the morning and late afternoon hours will help to dissipate increased automotive emissions at the beginning and end of the work day. In addition, road and intersection improvements should be designed to minimize automobile idling time. With the likely expansion of 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.

4.14 Visual Resources

The section of Queen Kaahumanu Highway directly mauka of the property is slightly depressed and the elevated terrain on the makai side blocks motorists views of the ocean. However, an unobstructed view of the coastline can be seen from portions of the higher elevation Mamahaloa Highway, as well as the upland residential subdivisions.



View from NELH Access Road looking south to project site



View from Queen Kaahumamu Highway looking makai to project site

Pahoehoe lava formations with darker outcrops of a'a constitute the dominant features of the existing landscape. The hardy fountain grass and other dryland grasses and shrubs are the typical plant species. A green belt made up of morning glory, naupaka, and beach heliotrope is found in a narrow band between the coastal and inland environments.

The coastal areas offer views of panoramic scope and high contrast, with the aquamarine Pacific waters on the makai side and Hualalai providing a dramatic backdrop on the mauka side. Portions of the NELH facility that are visible from the property and departing aircraft turning out to sea after take off give the landscape an urban flavor.

Long-term Impacts: The landscape of the property will be irretrievably altered from its present natural state to man-made one. The development is not expected to interfere substantially with the line of sight from Queen Kaahumanu Highway because of slope gradients that obscure the view. However, the development will be visible from higher elevations, from the air, and from off-shore.

Cumulative Impacts: At least two proposals on adjoining properties, Ooma II and Kohanaiki, are being considered for resort-oriented development. A third resort in the Kaloko-Honokohau area south of Kohanaiki is already recognized by the County, but this area is also being considered for acquisition by the National Parks Service. Possible urbanization of the Kona shoreline from Keahole Point to the Honokohau Small Boat Harbor would significantly alter the visual character of the coast. Unlike oceanfront resort development in Kailua-Kona, however, the proposed developments would have a much greater shoreline set back and are lower in density.

Mitigation Measures: The development will conform to any County ordinance that regulates permissible building heights, bulk, and set backs. An aestheticllay pleasing architectural design, complemented by landscaping would also lessen the impact on coastal view planes. Ocean views from public rights-of-way will not be blocked since all construction will be sited mauka of the existing coastal jeep trail. Although detailed site plans have not been developed, low-rise, low-density construction is envisioned to retain the open, unrestricted character of the Kona Coast and to maintain makai-mauka view corridors to the extent possible.

4.15 Land Use

Development of the Ooma II property will result in a fundamental change in land use from open, undeveloped land to a mix of urban land uses. The high-technology aquaculture area and office park are important components of the project, and the inclusion of these uses creates a unique, integrated package unlike other resort-only development proposals.

Cumulative Impacts

[The following discussion focuses on Ooma II's 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 9 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 9 is the proposal for Kaloko-Honokohau due to possible acquisition by the National Parks Service. Table 10 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 9: 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 10: 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 9 shows 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 10 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. Expansion of the Kohala resorts and development of Mahukona is projected to add 7,490 hotel units and 9,350 condo units.

If all of the hotel units are constructed as planned, the West Hawaii room inventory would increase triple. Assuming no further hotel construction anywhere other than in West Hawaii, the Big Island's tourism plant would boast some 17,450-18,400 rooms.

Clearly, the cumulative impact of the Kona and Kohala 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 11 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 11: 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

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

Substantial increases in visitor accommodations are required 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. 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. Yet while the demand for new visitor units is almost certain, the extent of future demand is variable. The potential availability of large increments of new hote units in South Kohala, in addition to those proposed for North Kona, augur for keen competition between the two regions and the individual resort areas. Only the optimistic scenario could "absorb" all hotel units currently proposed for construction. The proposed supply of condo units greatly exceeds even the optimistic scenario.

It should be noted that the County's projections of visitor units show estimates of potential future growth, rather than demand for visitor units that must be satisfied. At the same time, the projections establish a context for which public policies are fashioned and implemented.

The County's land use allocation schedule sets limits on the allowable acreages for particular types of development. 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 alone would 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 supporting new hotel construction 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 projects such as Ooma II.

4.16 Historic and Archaeological Resources

Six surveys have been done in coastal Ooma II: (1) a brief reconnaissance by Reinecke (1930), (2) an inventory of several known sites by the Department of Land and Natural Resources staff (DLNR, 1971-72), (3) an intensive survey of larger sites by Cordy (1975, 1981), (4) a reconnaissance survey of the project site by Barrera (1985), (5) a field check by Cordy (1986), and (6) an archaeological survey and field testing by Rosendahl (1986).

Site Patterning

Three environmental zones relevant to archaeological work have been identified in the area around Keahole Point (the four Kalaloa and two Ooma ahupua'a).

(1) Coastal Zone

Elevation 0-20 feet
0-150 feet from the shore (0-150 feet)
Low pahoehoe with some sand beaches
Some shoreline vegetation

(2) Barren or Transitional Zone

Elevation 20-430 feet
150 feet-1.5 miles from shore
Pahoehoe with pockets of a'a with no soil
Vegetational changes from barren to grass to lantana

(3) Upland Forest Zone

Elevation 430-3,400 feet
1.6-3.7 miles from shore
Rough a'a and soil terrain
Vegetational transition from koa haole and Christmas berry to large forest trees

The Ooma II property falls in the coastal and barren-transitional zones. In some of the previous archaeological surveys the coastal and inland areas have been delineated by drawing an imaginary line 600-800 feet from the shoreline, elevations ranging from 20 to 30 feet.

Coastal Zone. The coastal concentration of sites extends inland into a small portion of the barren zone. At least 22 permanent house sites have been identified in the Keahole Point area, including eight sites in Ooma II. Sites interpreted as temporary dwelling areas, such as caves and C-shaped shelters, are also common and tend to be located just behind the coastal zone in the initial fringes of the

barren zone. There are two large, solitary structures in the coastal zone that have been interpreted as heiau (Sites D15-18 and D15-19, discussed below).

Barren Zone. From the 20-foot elevation contour inland, the site density is extremely low. Sites consist of a few makai-mauka trails, the early historic Mamalahoa Trail, which runs parallel to the shore, and a few C-shaped enclosures and caves along the Trail, and cairns.

Background

The earliest dates for permanent housing and settlement in the Ooma II ahupua'a is 1430 A.D. (Cordy, 1985: 37). Current evidence suggests that the bulk of the permanent population was on the coast with most fields located in the upland forest with trails (and associated shelters) connecting the two areas. Temporary habitations are also present on the coast; however, it is uncertain if the sites were used by people who lived permanently inland, by people who lived outside the area, or by people residing within the area on the shore.

Two large structures in Ooma II (D15-18 and D15-19) may be heiau which operated at the community level for local and national purposes. D15-19's occupation is dated to A.D. 1590-1720. There is record of Puhili, a high priest for Ooma and the Kohanaiki ahupua'a to the south. As no heiau of large size is present on the coast in Kohanaiki, it has been conjectured that perhaps ceremonies for the two Oomas and Kohanaiki were performed at the Ooma II heiau.

Besides major religious structures, several smaller structures associated with local residence groups have been identified. Structures larger than dwellings but associated with dwellings and not approaching major heiau size, have been have been interpreted as men's houses. These often have upright basalts, coral, or other remains associated with religion.

Site Identification

A total of 254 archaeological features at 72 sites have been recorded to date within the Ooma II project area. Twenty-five formal/functional types were identified among the 254 features. The features most frequently encountered were cairns (45), cave shelters (29), and platforms (27).

Site Significance Assessment

The significance of cultural remains can be defined in terms of potential scientific research, intepretive, and/or cultural value. Future research at Ooma II is expected to find significant new data for further examination of topics such as cultural history, past lifestyles, and cultural processes. Sites with potentially significant information content are: Sites D15-1 through D15-8, T-31, T-39, and T-48. Interpretive value was evaluated based on site integrity, site function, and site information. Three sites have been identified as having high interpretive potential: D15-1, D15-4, and D15-19. A fourth site with high interpretive potential is T-15, an extensively modified sinkhole with a faced well, pavement, walls, and modified overhangs.

Sites with potentially high cultural value are those with traditional uses and have significant meaning in the context of a traditional way of life. Three sites within the project area have previously been identified as having high cultural value as religious structures: D15-18, D15-19, and D15-4. Other sites with high cultural value are burial mounds or platforms.

Impact: Most of the identified archaeological sites are located within 600-800 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 12 summarizes general significance assessments and recommended general treatments of sites in the Ooma II development area. This assessment has been reviewed by the State Historic Preservation Office and has received their concurrence. At this time, further data collection is recommended for 19 sites which have archaeological information of high research value: D15-1 through D15-8, D-18, D-19, T-14, T-15, T-17, T-48, T-61 to T-63, T-67, and T-68. Further investigations may involve accurate locational plotting; detailed plan mapping, written descriptions and photographs; collection of portable remains; subsurface testing of sites with apparent excavation potential; and/or subsurface testing to determine the presence of absence of buried deposits.

Preservation with some level of interpretive development is recommended for five sites that are relatively well preserved and are good examples of specific site types: D15-1, D15-4, D15-18, D15-19, and T-15.

Preservation "as is," with no further work or minimal further data collection is recommended for four sites (T-13, T-20, T-21, and T-31) and recommended provisionally for another six sites (D15-3, D15-8, T-14, T-48, T-62, and T-63).

Several of the sites are burials or potential burials. If preservation is not feasible, data collection would have to be conducted. Reburial of skeletal remains according to appropriate State Health Department regulations and procedures is recommended after completion of proper scientific study.

Historic preservation planning will be further refined as detailed site plans are developed and building sites are identified more precisely. The developer will continue to maintain his coordination with the State Historic Preservation Office and the Hawaii County Planning Department.

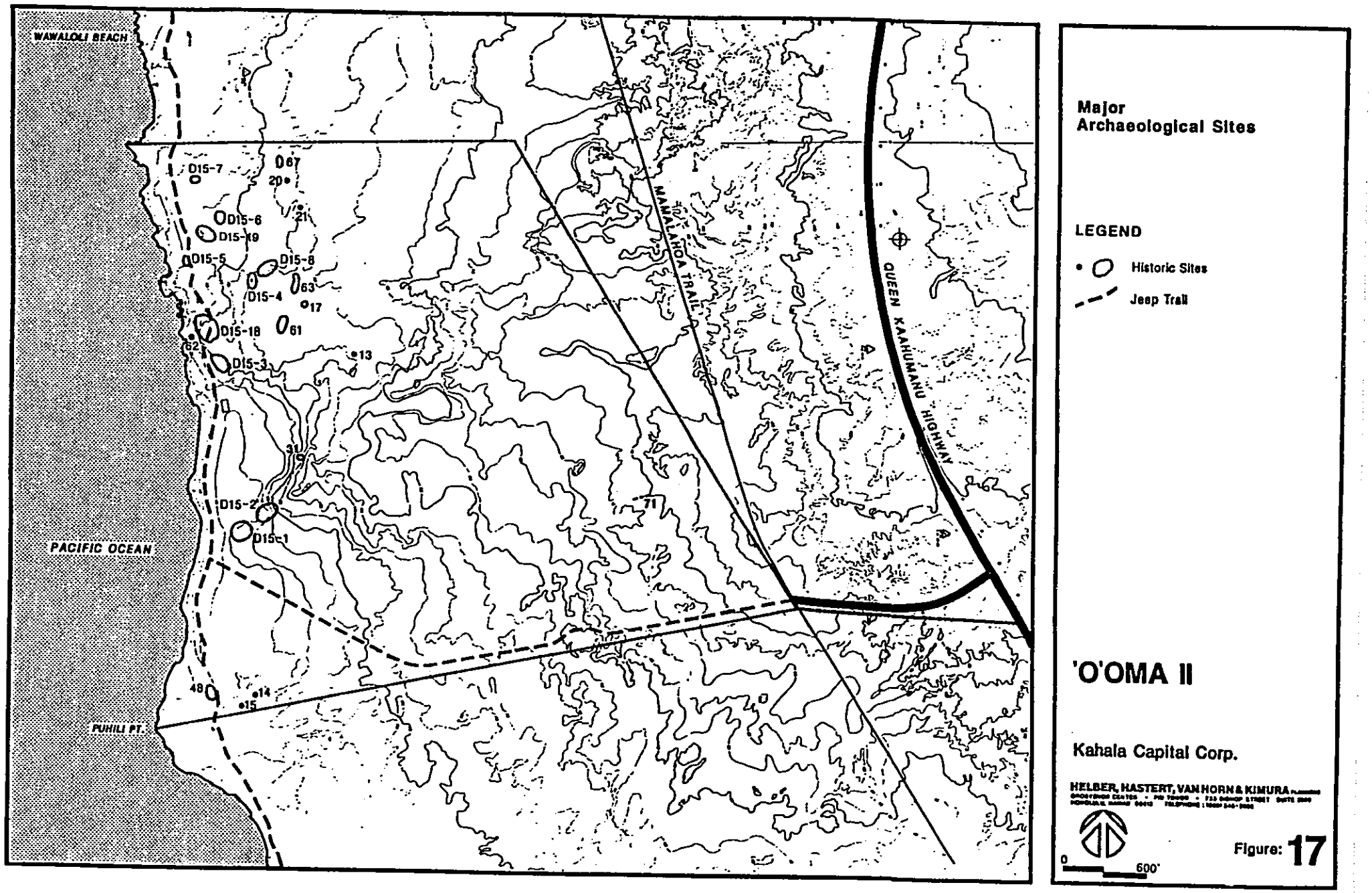

WAWALOLI BEACH
PACIFIC OCEAN
PUHILI PT.
D15-7
D15-6
D15-19
D15-5
D15-8
D15-4
D15-18
D15-3
D15-2
D15-1
67
20
21
63
17
61
62
13
31
71
48
9
14
15
MAMALAHOA TRAIL
QUEEN KAAHUMANU HIGHWAY
Major
Archaeological Sites
LEGEND
Historic Sites
Jeep Trail
'O'OMA II
Kahala Capital Corp.
HELBER, HASTERT, VAN HORN & KIMURA
0
600'
Figure: 17

Table 12: Historic Sites Assessment

Site or Feature No.	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
D15-2	+	-	-	-	+	-	-	-
D15-5	+	-	-	-	+	-	-	-
D15-6	+	-	-	-	+	-	-	-
D15-7	+	-	-	-	+	-	-	-
T-17	+	-	-	-	+	-	-	-
T-61	+	-	-	-	+		-	-
T-67	+	-	-	-	+	-	-	-
T-71	+	-	-	-	+	-	-	-
Subtotal: 8	8	0	0	0	8	0	0	0

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);
C=Culturally significant (PHRI=cultural value).

Recommended General Treatments:

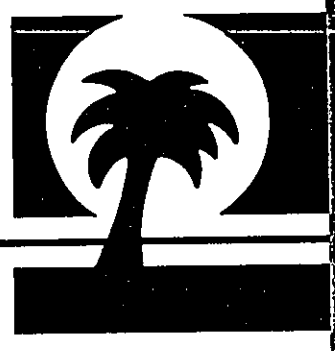
FDC=Further data collection necessary (intensive survey and testing, and possibly subsequent data recovery/mitigation excavations);
NFW=No further work of any kind necessary, sufficient data collected, archaeological clearance recommended, no preservation potential (possible inclusion into landscaping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

Table 12 *(continued)*

Site or Feature No.	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
T-48	+	–	–	*	+	–	–	*
D15-3	+	–	–	*	+	–	–	*
D15-8	+	–	–	*	+	–	–	*
T-14	+	–	–	*	+	–	–	*
T-62	+	–	–	*	+	–	–	*
T-63	+	–	–	*	+	–	–	*
Subtotal: 6	6	0	0	6	6	0	0	6
T-15	+	–	+	–	+	–	+	–
Subtotal: 1	1	0	1	0	1	0	1	0
D15-1	+	–	+	+	+	–	+	–
D15-4	+	–	+	+	+	–	+	–
D15-18	+	–	+	+	+	–	+	–
D15-19	+	–	+	+	+	–	+	–
Subtotal: 4	4	0	4	4	4	0	4	0
T-13	+	–	–	+	–	–	–	+
T-20	+	–	–	+	–	–	–	+
T-21	+	–	–	+	–	–	–	+
T-31	+	–	–	+	–	–	–	+
Subtotal: 4	4	0	0	4	0	0	0	4
All others	–	+	–	–	–	+	–	–
Subtotal: 49	0	49	0	0	0	49	0	0
Total: 72	23	49	5	14	19	49	5	10

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

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 Ooma II master plan. 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 F *Public Cost-Benefit Study (Hallstrom Appraisal Group, Inc.)*

5.1. Economy

Through the early years of statehood, agriculture, specifically diversified agriculture, formed the economic base of the region. However, the importance of diversified agriculture to the district has been eclipsed by the growth of the visitor industry and associated service-related jobs. In 1950, 52 percent of the employed persons in Kona listed farm laborer, farm manager, or farmer as their occupation. By 1980, only 8.2 percent of the labor force held agriculturally related jobs (Kona Regional Plan, 1983). Today tourism is the primary economic activity of the North Kona district, supplanting agriculture as the number one revenue-generating activity. In 1970 there were approximately 1,752 visitor accommodation units in the Kona area, representing 50 percent of the Big Island's visitor units. By 1980, the Kona area supported a total of 3,774 visitor units, increasing by an average growth rate of 8 percent per year. Currently, there are approximately 4,990 transient units available in North Kona, comprising well over half of the island's total inventory.

Other local service industries, such as retailing, real estate, and financial services, have benefited from the income introduced by the expanding visitor industry. Property values in general have increased significantly over the past decade, the result of the increased demands of capital from the visitor, resident and retiree populations. This sharp rise in land prices has created concern in the agricultural community; however, larger markets and better public services have off-set some of these difficulties.

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 Employment

In 1980, Census records indicated that there were 10,115 persons 16 years of age and over residing in the North Kona district. Of these, 7,292 (72 percent) were in the civilian labor force and approximately 379 (about 5.2 percent) were unemployed, leaving a total of 6,913 employed persons. This compares with an unemployment rate of almost 7 percent for the county as a whole during the same period (Table 13). By 1983, the disparity between the unemployment rates in the North Kona District and Hawaii County had grown substantially with the North Kona rate at 6.7 percent and the Hawaii County rate at 9.1 percent. As of June 1985, the Hawaii County unemployment rate stood at 9.8 percent, much higher than the state-wide average of 5.7 percent.

The Kona labor force is characterized by a high level of service employment and low level of manufacturing jobs, as compared to the county as a whole.

Table 13: Labor Force Characteristics: North Kona (1980)

	North Kona		Hawaii County	
Labor Force Status	Number	%	Number	%
Persons 16 years and over	10,115		67,205	
Civilian labor force	7,292		41,006	
Unemployed	379		2,856	
Total Employed Persons	6,913		38,150	
Occupation and Selected Industries				
Managerial and professional	1,462	21	7,648	20
Technical, sales and administrative	1,948	28	9,956	26
Service occupations	1,486	21	6,283	16
Farming, forestry and fishing	491	7	3,927	10
Precision, production, craft and repair	839	12	4,848	13
Operators, fabricators and laborers	687	10	5,488	14

Source: *1980 Census.*

Short-term Impact - Construction Employment: The number of construction employees is estimated on factors for full-time equivalent (FTE) labor per constructed unit. Table 14 shows a rough projection of the number of construction jobs that would be generated under the development scenario shown. It should be remembered that construction jobs are of limited duration and that each "job" is represented as FTE per year. For example, a two-year hotel construction project would actually employ an estimated 300 persons for two years.

Table 14: Estimated Direct Construction Employment

Development	Person-years Per Unit	No. of Units	Estimated Employment
Hotel	1.00	600 rooms	600
Apartment	1.05	300 units	315
Commercial/Office	10	40 acres	400
Industrial	.5	50 acres	25
Infrastructure*			710
Total			**2,050**

* Infrastructure employment based on estimated cost of $37.5 million and employment multiplier of .019 jobs per $1,000 of construction cost. Includes golf course.

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

Indirect and Induced Construction Employment. Creation of 2,050 FTE construction jobs will stimulate the purchase of additional goods and services. The State Department of Planning and Economic Development estimates that 1.4 additional FTE jobs are created for every FTE position in the construction industry.

Long-term Impact - Operational Employment: The proposed development will create a significant amount of long-term employment growth in the Kona region. It is first necessary to estimate the number of direct jobs that will be created by the development. Each of the employment-generating land uses is identified in Table 15. Employment multipliers are then applied to each of the land uses to derive the total number of direct, FTE jobs that would be created. Multipliers of 1.2 and 0.2 FTE positions per hotel and multi-family residential unit, respectively, were applied to the number of units to arrive at an estimate of direct employment that can be attributed to these land uses (Peat Marwick Mitchell, 1985; Anderson, et al. 1975).

The 18-hole golf course and clubhouse is expected to provide a total of 55 FTE positions. The commercial activities, including the clubhouse and the office park, are estimated to generate 1 employee per 200 square feet of floor area, resulting in

15 FTE for the clubhouse and 250 FTE for the office park. (The office space projection is especially conservative since 50,000 square feet of leasable area for the 20-acre site converts to a floor area ratio [FAR] of 5.7 percent, whereas a FAR of roughly 25 percent is the norm for low-density office developments.) An employment ratio of 1 employee per acre was applied to estimate the FTE positions generated by the HOST Park expansion area, and 3 employees per acre was the ratio used for the marine park.

A total of 1,195 direct FTE positions would be created assuming full and intensive development; of this, approximately 70 percent are involved in resort-oriented operations and approximately 30 percent in high-technology and support operations.

Table 15: Long-term Employment

Land Use	Employ. Unit	Multiplier	Direct Employ.	Indirect/ Induced Employ.	Total Employ.
Resort Hotel	600 rooms	1.2/room	720	144	864
Resort Condo	300 units	0.2/unit	60	12	72
Golf Course	18 holes	N.A.	40	8	48
Clubhouse	3,000 SF.	1/200 SF	15	3	18
High Tech	50 acres	1/ac.	50	10	60
Office Park	50,000 SF	1/200 SF	250	50	300
Marine Park	20 acres	3/ac.	60	23	83
Total			1,195	250	1,445

Source: *Helber, Hastert, Van Horn and Kimura, Planners.*

In order to claim the indirect and induced components of regional employment growth, a regional multiplier of 0.2 has been applied to the number of direct jobs (Peat, Marwick, 1985; Anderson, etal, 1975). This amount is added to the total number of direct jobs to arrive at overall employment growth. Total employment growth is estimated at approximately 1,445 FTE positions at full project build-out.

The creation of additional job opportunities is expected to have a positive effect on household incomes as shown in Table 16. Income from the construction phase is estimated at $72.3 million. Recurring income to households from the operations phase is estimated at $29 million annually.

Table 16: Employment and Income

Job Type	No.	Percent	Avg. Salary (1984 dollars)	Income ($ mil.)
Construction				
Direct	2,050	--	$26,560	54.4
Indirect	820	--	$21,900	17.9
Operations				
Skilled/Prof.	299	25	$30,000	9.0
Semi-skilled	478	40	$20,000	9.5
Unskilled	418	35	$15,000	6.3
Sub-total	1,195	100		24.8
Indirect	250	--	$16,880	4.2

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

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 and high technology aquaculture industries; (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.

5.3 Population

The 1980 U.S. Census reported a resident population of 13,748 persons in the North Kona District (Table 17), of which almost half (44 percent) resided in the town of Kailua-Kona. Resident population in the North Kona area increased almost threefold (285 percent) between 1970 and 1980, an increase of approximately 11 percent per year. These annual rates of growth are significant when compared to the population growth of the county as a whole (3.7 percent) and the entire state (2.3 percent) for the same period. Population projections prepared for the market study (Appendix A) indicate a 1990 resident population of 25,000 persons, increasing to 32,500 in 1995. Although this projection acknowledges a slowing of the growth rate experienced during the previous decade (from 11 percent to approximately 6 percent annually), the region will continue to be one of the fastest growing areas of the state.

Table 17: Historic and Projected Population Growth
North Kona

	1970	1975	1980	1985	1990	2000
Resident Population	4,832	8,440	13,748	18,000	25,000	32,500
Average Annual Change (%)	.86%	14.93%	12.58%	6.19%	7.78%	6.00%

Source: *Hallstrom Appraisal Group, Inc.*

Impact: The demand for employees is likely to increase population to the extent that workforce requirements exceed the number of unemployed or underemployed persons in the existing labor pool, and in-migration is required to fill vacant positions. The resident population required to supply the manpower needed can be estimated by applying the average labor force participation rate for the Kona area (72 percent) to the number of jobs that will be created. For an estimated 1,445 new jobs, a community of approximately 2,007 persons would theoretically be needed to support everyday operations..

According to the 1980 Census, North Kona's labor force participation rate was the highest on the island. Therefore, a smaller than normal base population would be required. Evidence of an increasingly transient and mobile population corresponding to a younger population profile was also documented in the 1980 Census for North Kona. North Kona residents were found to be less likely than other Big Island residents to live in family households, reflecting a large cohort within the workforce that still have not begun to form households.

The requirements of resort-oriented activities and the job opportunities created tend to attract large numbers of labor market entrants who may be local residents or in-migrants. Unlike the typical resort development, however, the Ooma II project has the potential to offer a more diverse range of technical and administrative jobs with the inclusion of areas for high-technology aquaculture and offices.

In addition to increases in the resident population, the development can be expected to increase *de facto* population levels. Assuming an average of 1.9 persons per unit for the hotel rooms and 2.7 persons per unit for the resort condominiums (Peat Marwick Mitchell, 1985), and also assuming an average occupancy rate of 90 percent for the resort hotel and 70 percent for the multi-family units, approximately 1,600 visitors (1,026 visitors in the hotel, 567 persons in the multi-family units) would be accommodated by the project on the average day. Adding to this the 1,445 direct jobs estimated previously, the average daily census of the project site would be approximately 3,040 persons. This figure is an average daily estimate and does not reflect the seasonal variation which inevitably occurs in the Hawaii visitor industry. Also excluded are day visitors to the marine park, visitor center, and golf course.

5.4 Housing

Housing in the Kona area has undergone a dramatic growth cycle following the expansion of the visitor industry. Table 18 shows that the stock of year-round housing units nearly tripled between 1970 and 1980 (249 percent). The 1980 Census revealed strong growth in owner-occupied housing (382 percent) with a smaller increase in renter-occupied housing (148 percent).

Table 18: Selected Housing Characteristics
North Kona (1980)

	1980 Number	%	1970-80 Change
Year round housing units	6,842	100.0	249%
Owner-occupied	3,082	44.7	382%
Renter-occupied	1,968	28.5	148%
Vacant	1,848	26.8	182%

Source: *1980 Census; Kona Regional Plan.*

The 1980 Census reported a 27 percent vacancy rate for North Kona. However, after subtracting an estimated 2,000 resort condominiums from the stock of residential housing, a vacancy rate of approximately 9 percent is obtained "which is in keeping with the residential vacancy rate of the County as a whole." (Kona Regional Plan, 1983). In 1980, approximately 39 percent of the households in Kona were renting their homes. This compares to 39 percent county-wide and 52 percent state-wide during the same period.

Impact: The proposed development will have a significant impact on the demand for housing in the Kona area. A number of methodologies are available to predict employment-induced housing demand. All methodologies attempt to identify both those employees drawn from off-island locations and those employees drawn from on-island locations, but which subsequently form new households in response to their new employment. Each of these methodologies is based on different assumptions concerning two components of housing demand: (1) the make-up of the labor force potentially seeking housing (i.e., percentage of available labor, percentage currently housed in the area, percentage turnover from within/without the region, and percentage off-island inmigrant); and, (2) projections of household size.

To initiate a starting point for public consideration, a preliminary housing impact analysis has been prepared utilizing some of the more commonly used assumptions on labor force composition and household size. This is not intended to be a

definitive statement on employment-induced housing demand, which can only be determined at a later stage when there is a clearer picture of project needs.

Direct employment-induced housing demand is estimated by dividing the total number of FTE positions calculated above (1,145 jobs) by an average household size of 1.45 persons per household. (Managerial employees projected at 1.0 employees/household, other employees projected at 1.5 employees/household. Ten percent of the jobs are estimated to be managerial, 90 percent are all other jobs). This figure (1,660) is then adjusted to reflect that segment of the labor force that is not currently housed in the community, here estimated at 25 percent based on studies of other resort developments in the West Hawaii area (Peat Marwick, 1984, 1985). The projected demand is for approximately 415 additional housing units. In comparison, the General Plan proviso concerning employee housing states: "Employee housing shall be provided at a maximum ratio of one employee unit to every two hotel units," which would indicate an upper limit of 300 employee housing units.

The 1980 Census found housing costs to be higher in North Kona than anywhere else in the county. The median value of a home in North Kona was $114,000 compared to $70,300 for the county. The median monthly rent was $331 in North Kona compared to $223 per month for the county overall. The impact of housing costs have a disproportionate affect on younger households that have not accumulated equity.

Mitigation Measures: Close cooperation will be maintained between the developer of the Ooma II property and County and State housing officials to ensure that employee housing needs are met. 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.

5.5 Fiscal Impacts

A study of potential public costs and benefits prepared by The Hallstrom Appraisal Group, Inc. concluded that the "subject resort/high-tech development would prove advantageous to Hawaii County, and the North Kona community by increasing diversified employment opportunities, tax revenues, and shoreline access, at relatively small cost to the County budget or the quality of the Keahole Point-Kailua corridor. The income generated by the increased tax structure would more than offset any required public expenditures, and would prove to be a strong utilization of existing infrastructure and facilities." (Hallstrom Appraisal Group, Inc., 1986: 28). The study provides a starting point for quantifying the order of magnitude difference between public outlays and public financial benefits.

Potential Public Costs

Six areas were identified where enhanced services or infrastructure facilities might be required at a cost to the community: police protection, fire protection, water service, access from existing roadways, availability of parks, and public education. The analysis did not include indirect costs resulting from public services to employees of the development. All monetary figures are represented in current dollars.

Police Protection. Expected urbanization of the corridor from Keahole Point to Kailua-Kona is expected to require one full-time equivalent (FTE) position consisting of five individual patrolmen working in three daily shifts throughout the week. The prorated share of the Ooma II development was estimated at one-fourth the cost of 1 FTE or $52,000 annually, increasing to one-half of 1 FTE or $105,000 upon full build-out of the project.

Fire Protection. No appreciable increase in expenditures by the County was forecast for the initial phase of development. Assuming that a co-operative auxiliary fire station (similar to the station at Mauna Lani) is constructed by the developer of Ooma II and surrounding projects, the County could incur start-up costs of approximately $420,000, a share of which would be ascribed to each participating developer. The co-operative would also share in the estimated $502,000 annual operating expenses.

Water Service. Should the project seek to join the County water system, the developer would have to fund the cost of any transmission line improvement to transport the water to the site and to store it. It is assumed that the individual unit hook-up costs currently estimated at approximately $4,000 per unit would offset any source (well) development costs. Therefore, there would be no additional costs to the County.

Road Access. The financial responsibility for improving the access, including turn pockets and acceleration-deceleration lanes, lies entirely with the developer and not with any governmental agency.

Public Coastal Access. The County will not incur any additional expense as a result of the development of the beach parking areas and appurtenant facilities. All capital and maintenance costs will be borne by the developer.

Public Education. Land uses contained in the proposed development are not expected to domicile a significant number of school-aged children. No need for expansion of existing school facilities is foreseen.

Potential Public Revenues

Public revenues will be generated through four types of taxes. Property and excise taxes will constitute the majority of revenues, with employee income taxes and other taxes providing substantial but secondary revenues. Some of the assumptions used in the fiscal impact study differ from the assumptions used for various calculations in this document. However, the disparities include overestimates and underestimates that roughly cancel the gross effects. The study's projection of approximately $5.7 million in stabilized contributions upon full development of the project is believed to be a reasonable "ballpark" estimate. This amount can be divided between $2.5 million to the County and $3.2 million to the State. In addition, some $4 million in tax revenues would be generated through economic multipliers in the community and the higher level of activity in the economy overall.

5.6 Community Concerns

Resident attitudes toward new development in general and resort-oriented development in particular is a complex subject, yet one that is an important part of the public policy-making process. Several surveys, including the State Department of Planning and Economic Development's 1977 Hawaii State Plan survey, have indicated a favorable attitude towards tourism as a means of generating employment.

Resident and employee attitudes can enhance or detract from the success of the Ooma II development. Therefore, it is important for the developer to remain cognizant of community concerns, such as changes in lifestyle and standard of living, erosion of the "aloha spirit," loss of access to traditional recreational areas, increased competition for public facilities and services, increased cost of living and property values, and crime.

CHAPTER VI

CHAPTER VI

IMPACT ON PUBLIC FACILITIES AND SERVICES

This chapter describes the existing conditions of public facilities and utilities in the Ooma II 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	Preliminary Engineering Utilities Report (M&E Pacific, Inc.)
Appendix F	Public Cost-Benefit Study (Hallstrom Appraisal Group, Inc.)

6.1 Transportation Facilities

Roadways

Two major roadways serve the North Kona area: Queen Kaahumanu Highway (FAP 19) 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.

Impact: Trip Generation

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 conceptual 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."

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 5,000 external vehicle trips per day with the hotel facilities responsible for almost 60 percent of this volume. Off-site patrons of the golf course and clubhouse, marine park/visitor center, and office park 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.

Peak Hour Traffic. 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 5,000 vehicle-trips, the morning peak flow is estimated at 375 vehicles per hour, while the afternoon peak flow is estimated at 525 vehicles per hour. Studies prepared for the NELH/HOST Park project estimate that 11 percent of its traffic will be distributed north of the project with the balance distributed south towards Kailua-Kona (Traverse Group, Inc., 1985).

Table 19: Traffic Generation

Land Use	Units	Trips/ Day	Ratio	Total Trips
Hotel	600 rooms	5.5/room	90% occup.	2,970
Resort Condo	300 units	6.0/unit	70% occup.	1,260
Golf Course	18 holes		100/18 holes	100
Marine Center	60 emp.	2.0/emp.	90% w/ car	120
Hi-Tech Aquaculture	50 emp.	2.0/emp.	90% w/ car	100
Office Park	250 emp.	2.0/emp.	90% w/ car	450
Total				**5,000**

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

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. Table 20 shows highway traffic counts taken near the subject property.

Table 20: Highway Traffic Counts
Queen Kaahumanu Highway, Count Station 8-P
A&B, South of Keahole Airport Road

		Southbound	Northbound	Total
24-Hour Average	1976	1594	1581	3175
	1978	2304	2233	4537
	1980	2107	2113	4220
	1982	2707	2549	5256
	1984	3484	3607	7091
1984 Peak Hours				
6:15 a.m. - 7:15 a.m.	146	337	483	
10:00 a.m. - 11:00 a.m.	225	332	557	
3:30 p.m. - 4:30 p.m.	365	229	594	

Traffic volumes appear to be influenced by air traffic at Keahole Airport and, more generally, by the performance of the tourism industry. In the early 1980s, when the volume of air traffic dipped, highway counts (1978-80) also showed a slight decrease. More recently, the 24-hour traffic count has been increasing at slightly under 20 percent annually. Current traffic volumes for the highway segment near the subject property indicate peak flows of 594 vph during the afternoon rush hour (State Dept. of Transportation, Highways Division). By the year 1991, traffic volumes are estimated to be 146 percent of the volumes counted in 1984, while 1996 volumes are projected to be 178 percent of 1984 volumes.

Cumulative Impacts: Successful development of the three adjoining projects: Kohanaiki resort (projected 8,640 vpd; 906 peak vph), Ooma II (projected 5,000 vpd; 525 peak vph); and HOST Park (projected 3,820, vpd; 795 peak vph) could increase traffic volumes enough to exceed the existing highway design capacity during peak hours. At that time, additional lanes would be needed between Kailua-Kona and Keahole Airport.

Mitigation Measures: A comprehensive traffic study will be prepared when more detailed site plans are available. It is likely, however, that the "T" intersection of Queen Kaahumanu Highway and the Ooma II access road will require one or more of the following improvements:

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

The additional turn lanes may require signalization of the intersection for adequate control of vehicular movement.

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

Keahole Airport

Located approximately one mile north 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 Ooma II 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.

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 three 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 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).

Kawaihae Deepwater Port. Located approximately 25 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

Water resources in the Kona area are essentially limited to ground water. Although dike-impounded ground water is believed to exist deep within the volcanic rift zones of Hualalai and Mauna Loa, technological and economic constraints currently prohibit exploitation. Basal ground water reserves occur throughout the Kona region and comprise the major domestic water resource. The salinity of the ground water, or the degree of seawater intrusion, varies with the

distance to the coast and the basal water recharge capacity of the local rainfall. "The observed distribution range of seawater intrusion and mixing as indicated by the brackish qualities of several wells in the Kona region, is .75 and 3.4 miles inland. However, this range cannot be considered absolute in that the locations of existing wells along the coast is sporadic, and that the chloride content of such well-waters is highly variable. The degree of salt water intrusion is greatest along the southwest flank of Hualalai near Kailua Village and least along the southwest slopes of Hualalai and Mauna Loa just makai of the high rainfall belt between Kahaluu and Keei" (Kona Regional Plan, 1982).

Potable Water

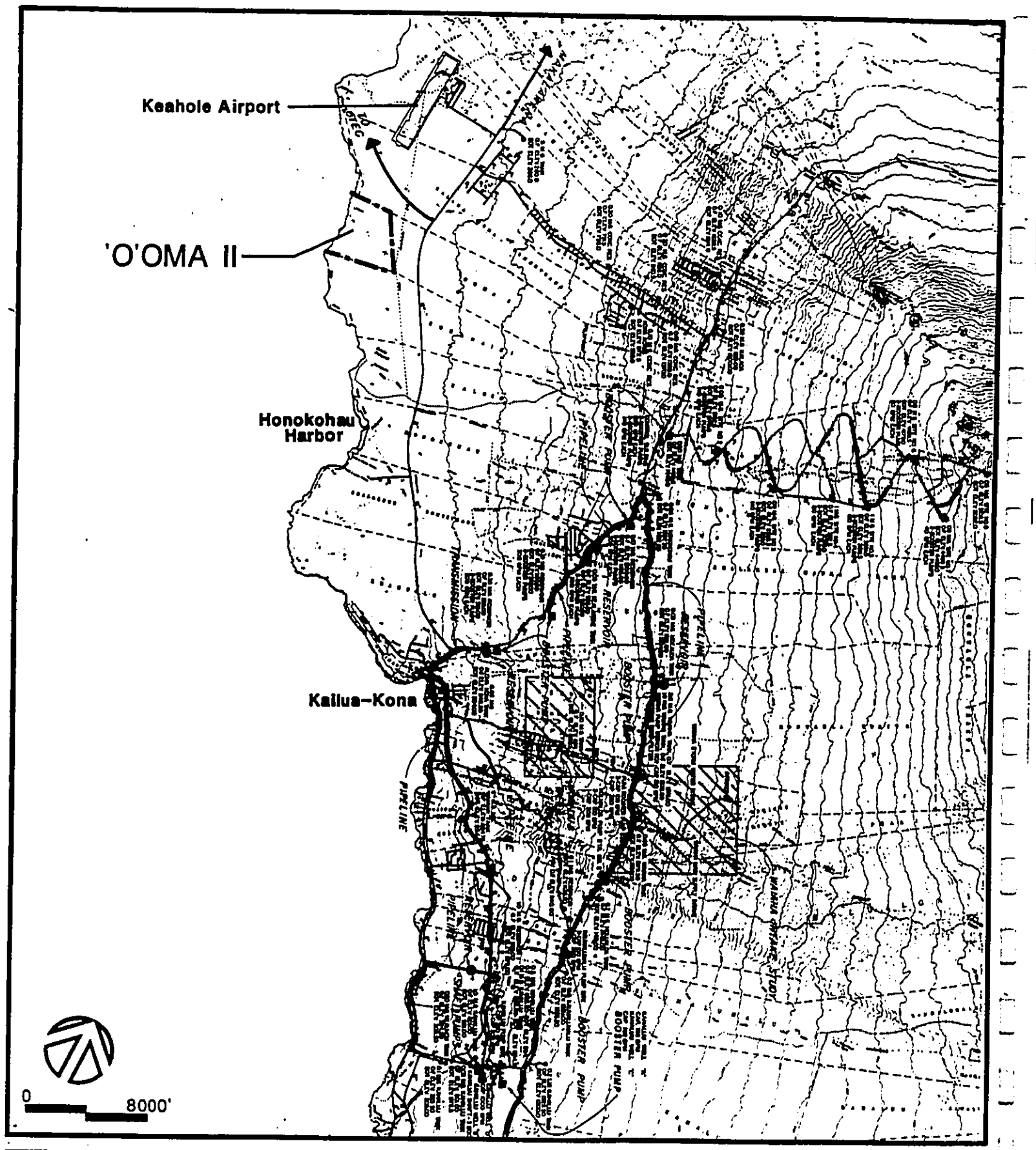
The Hawaii County Department of Water Supply maintains the North Kona system, serving the area between Keahole Airport to the north and Kealakekua to the south. The system is supplied by four wells and a shaft located at Kahaluu, situated between Kailua and Keauhou Bay at the 600-foot level, 1 to 1-1/2 miles inland from the coast (see Figure 18). A 16-inch transmission main runs north; however, the pipe size decreases to 12 inches beyond the Honokohau Small Boat Harbor. The transmission line terminates at a 0.3-million-gallon reservoir which stores water for the airport complex and is located directly mauka of the airport.

The Hawaii Water Resource Plan estimates ground water resources in the Kona area to total 100 million gallons per day (MGD). The existing Kahaluu system capacity has an estimated capacity of 8.4 MGD (cumulative "safe capacity" based on breakdown of one pump). Pumpage projections have indicated that the safe capacity may be reached by 1990. In light of the region's considerable aquifer, water availability in Kona appears to be one of source development and transmission capacity, rather than one of source availability.

Impact: Based on accepted per capita water usage factors, projected water demand for the Ooma II development is shown in Table 21.

The proposed development will require a significant draw on the water system. Using a maximum water demand per resort hotel/multi-family unit of 600 gallons per day (based on 100 percent occupancy), it is estimated that the resort development will need approximately .58 MGD of potable water. The potable water needs of non-domestic users are expected to be .33 MGD. Golf course and irrigation requirements are expected to be .34 MGD. 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.

Cumulative Impacts: Development of a new water agreement among a consortium of developers or a new private water source 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.



North Kona Water System

'O'OMA II

Kahala Capital Corporation

Figure: **18**

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Table 21: Estimated Water Demand

Use	Gallons Per Day (GPD)
Hotel	386,000
Multi-family Residential	193,000
Office Park	42,000
Marine Park	72,000
High-tech Aquaculture	208,000
Golf Course	313,000
Clubhouse	3,000
Beach Parking	1,000
Open Space	29,000
Total Average Demand	**1.25 MGD**

Based on:
600 gal/unit
13 gal/capita/day for staff
120 gal/capita/day for high-tech staff
3,000 gal/acre/day for clubhouse, office park
4,000 gal/acre/day for irrigation

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 water agreement is the most probable alternative for the Ooma II project. The County would be responsible for easement acquisition, as well as design and development; funding would be provided by the participating developers. Potable water wells would have to be drilled above the 1,200-foot elevation. Well(s) and appurtenant pumping, storage, and transmission facilities would require off-site land acquisition and easements.

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 municipal water supply for domestic consumption, except as needed to supplement recycled wastewater.

Sea Water

Development of new sources of warm and cold sea water to supply high-technology aquaculture operations would be expensive. A more viable alternative is to buy into the existing NELH/HOST Park system. The estimated 2.90 MGD of cold water and 11.58 MGD of warm water for Ooma II aquaculture activities represents approximately 10 percent of the expected HOST Park sea water requirements.

6.3 Wastewater Treatment and Disposal

Domestic Wastewater

Two methods of liquid waste disposal are used in the Kona area: private cesspool and municipal and private treatment plants. The primary method of domestic sewage treatment and disposal continues to involve the use of private cesspools. This disposal method is becoming increasingly problematic due to the permeability of the underlying lava substrate and the propensity of wastes to seep through the strata causing contamination of potable ground water sources and the adjacent coastal waters.

In addition to private cesspools, two sewage treatment systems are currently operating in the Kona area: the Keauhou Resort system and the Kailua-Kona municipal system. The Kamehameha Investment Company constructed the Keauhou sewerage system in the early 1970's in conjunction with the resort developments in the Keauhou Bay area. Sewage flows from the developments are channeled to the Heeia STP facility for treatment, after which it is used to irrigate the resort golf course. The collection system is maintained by the resort developers while the Heeia STP is operated by the County.

The Kailua municipal sewer system is one of five municipal sewer systems operated by the County of Hawaii. Built in the mid 1960's, the collection system involves 14,000 feet of sewer lines, six sewage pump stations, and one treatment plant located in the Kailua Village Industrial Area. The system is presently operating near capacity (0.50 to 0.65 MGD). The STP utilizes a "rapid bloc" treatment process which produces both secondary treated effluent for irrigation use at a nearby County park, and dried sewage sludge for use as fertilizer by local farmers (Kona Regional Plan, 1982).

Plans are currently under way to construct a second, much larger, sewage treatment plant on State-owned land adjacent to the southern boundary of the Honokohau Small Boat Harbor. The facility, estimated to cost $26 million, will include an ocean outfall as the primary method of waste disposal. The new system will incorporate the existing collection system of the Kailua-Kona sewage system and would expand service to areas between Kailua Town and the Keahole Airport. The Keahole Airport is currently serviced by a prefabricated extended aeration treatment plant.

Impact: Estimated generation of domestic wastewater from the Ooma II development is .30 MGD (Table 22).

Cumulative Impact: Impact on the County is expected to be minimal as developers of newly urbanized areas would be required to install sewage collection and treatment systems of sufficient capacity to handle projected loads.

Table 22: Estimated Wastewater Flows

Use	Gallons Per Day (GPD)
Hotel (600 rooms)	100,700
Golf Course	500
Clubhouse	16,200
Beach Parking Restrooms	1,000
Multi-family Residential (300 units)	65,600
Office Park	3,300
Marine Park	64,000
High-tech Aquaculture	23,000
Open Space	0
Total Average Flows	**274,300***

Based on: 80 gal/capita/day, 11 gal/capita/day for employees
1.9 capita per hotel room
2.7 capita for multi-family residential unit
15 capita per acre for office park
40 capita per acre for marine park and clubhouse
460 gal/acre/day for high-tech aquaculture

* 1,250 gal/acre/day to be added for infiltration/ inflow below 15-foot elevation

Mitigation Measures: Two alternative actions are being considered for wastewater treatment: (1) single centralized treatment facility; and (2) individual treatment facilities for each land use area as development occurs. There are also two alternatives for the disposal of the treated effluent: (1) golf course pond storage and irrigation; and (2) injection into deep wells. All wastewater pumping stations and treatment facilities would be located as far from the shoreline as practical and would be located above the 15-foot elevation to reduce the potential for ground water contact.

Irrigation of golf course fairways, as currently proposed, appears to have the least effect on the ground water lens due to contaminant removal as the treated effluent percolates through the soil and lava. Human contact with aerosols from effluent irrigation would be minimized by planting buffer zones to be irrigated with fresh water; use of low trajectory sprinklers or downward spray nozzles; avoiding irrigation during windy periods; and irrigating at night.

Sea Water Disposal

Impact: Approximately 5 MGD of sea water would be discharged from Ooma II aquaculture operations, based on the HOST Park generation rate of 2.2 gpd per square foot.

Cumulative Impact: The estimated quantity of sea water wastes generated by Ooma II is approximately 3 percent of the ultimate HOST Park generation rate. Development of the Ooma II aquaculture area, therefore, would not produce a significantly greater impact than the HOST Park alone.

Mitigation Measure: Alternatives for disposal of spent sea water include the following: (1) cooperation with the HOST Park to share the use and cost of a sea water disposal facility; (2) shallow surface trench disposal; (3) large-diameter, deep, gravity-injection wells; and (4) injection wells. Evaluations of the proposed HOST Park and NELH facilities found sea water disposal originally recommended off-shore discharge; however, the HOST Park's current choice for disposal of sea water is a system of on-land shallow trenches. Independent development of a sea water disposal system may be economically unfeasible for the relatively small quantity of sea water discharge expected from the Ooma II high-technology area. Therefore, opportunities for joint development and cost sharing with HOST Park will be explored.

6.4 Storm Water Drainage

The existing Ooma II watershed contains an area of approximately 482 acres and extends from the western slopes of Hualalai to the coast. There are no perennial streams or well-defined water courses in the watershed. A total of 90 cubic feet per second (cfs) enters the project site from the eastern and southern boundaries and 268 cfs of run-off is generated within the project area. The Ooma II coastline receives 190 cfs of run-off from on-site areas and 4 cfs from off-site areas. The remaining run-off flows across the northern and southern boundaries into the adjacent properties.

Impacts: The change in land use effected by the Ooma II development, particularly the increase in impervious surfaces, is expected to increase storm run-off within the site from 260 cfs to 450 cfs. The overall drainage scheme would protect developed areas by intercepting storm run-off from open and off-site areas through a network of cut-off swales and ditches, inlets, and drain pipes located within the road right-of ways. The use of unlined channels, wherever possible, would allow infiltration of run-off into the porous lava rock and thus minimize flows at the discharge points.

The main discharge points are coastal outlets located at the north and south ends of the property. Run-off would also be allowed to drain naturally by sheet flow into the ocean, by percolation into the soil, and into a series of dry wells. The modified drainage plan is designed to preclude "downstream flooding" of adjacent properties and is not anticipated to have a significant adverse effect on the environment. All drainage improvements will be designed and built to County standards.

Cumulative Impact: The Ooma II watershed is relatively well contained. The project would not be affected by future urbanization of upslope areas because of the interceptor ditch located mauka of the highway which diverts the run-off and discharges it away from the site.

6.5 Solid Waste Disposal

The County operates 28 solid waste transfer stations chutes at 21 locations around the island, including the new Kailua transfer station which is scheduled to open in mid September 1986. Refuse collected at these stations is transferred to one of the two active landfill sites: Hilo or Kailua-Kona (Kealakehe). 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.

The Kailua Landfill, which presently serves the North and South Kona solid waste district, is expected to reach capacity in 1990. This landfill would then be closed and a new landfill would be opened at Puu Anahulu. Refuse from the Ooma II development would be accepted by the municipal landfill; however, collection and transfer would require the use of private collection companies.

Impact: Estimated populations are based on an average occupancy rate of 90 percent for the 600-room hotel and 70 percent for the 300-unit multi-family residences. Applying a solid waste generation rate of 7.41 pounds per capita per day (lbs/cd) for 1990 and 9.96 lbs/cd for the year 2000, the Ooma II development would yield refuse on the order of 7.25 tons/day (T/d) for the initial phase of development and 17.34 T/d as the project reaches build-out. Projected solid waste generation rates for the refuse district are 726 tons/week (T/wk) in 1990 and 1,282 T/wk for the year 2000. The computed results for the project are, therefore, approximately 7.0 and 9.5 percent of the quantities projected for the entire refuse district in 1990 and 2000, respectively.

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 require the construction of a new landfill or significantly shorten the landfill's projected lifespan.

Solid waste generation would also create additional traffic. Assuming that a private collection company has a typical 40-cubic yard container for waste collection, an average of five trips every three days would be required to haul the projected solid waste quantities during the initial phase, increasing to four trips per day with full development. Should County-operated collection and transfer be employed, the number of trips generated would decrease to an average of one trip every two days initially and one trip per day with full development. The marginal addition of truck traffic would not significantly compound the increase in automotive traffic discussed above.

Mitigation Measure: Due to the proposed residential condominium units within the Ooma II development, the location of a transfer station in the vicinity should be considered. The transfer station would provide a safer and more convenient means for the community to dispose of refuse on an individual basis. Residential condominiums and homes are also proposed in the neighboring Kohanaiki development. Construction of a new transfer station would also benefit Kohanaiki who could share the cost of construction with Ooma II and Kohanaiki. The facility could then be dedicated to the County who would assume operation and maintenance costs.

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 mauka of Queen Kaahumanu Highway. Present electrical generation capacity is 127 MW, with 102 MW peak demand.

Impact: An estimated requirement of 7 MVA 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. The substation would be located mauka of Queen Kaahumanu Highway and two 12.47-KV distribution lines would run under the highway to the Ooma II property. The substation would require land acquisition and PUC approval. 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 the long-term potential of the Ocean Thermal Energy Conversion (OTEC) process, will help to lessen the consumption of petroleum, a non-renewable resource.

Telephone

Existing telephone service to the surrounding area is provided by Hawaiian Telephone Company. The closest existing facilities are located approximately 100 feet mauka of Queen Kaahumanu Highway. Available telephone trunk capacity out of Kailua-Kona would be sufficient for the needs of the Ooma II development.

Impact: A substation site would also be required for telephone service for the development. An underground cable under Queen Kaahumanu Highway would carry the system to an on-site Hawaiian Telephone substation. Existing telephone customers would not experience any adverse effect since excess telephone capacity is available.

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.

Cable Television. Anticipated population levels in the initial phases of the project are insufficient to warrant expansion of cable television service to the Ooma II 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.

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.

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

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

Impact: A public cost-benefit study prepared by the Hallstrom Appraisal Group, Inc. concluded that one full-time patrolman position (consisting of 5 individual officers working in three daily shifts throughout the week) would be more than sufficient to meet the initial needs of the project and that an additional one-half position would be required in later stages. This increase would equate $52,000 annually, increasing to a stabilized level of $105,000 annually. Taxes generated by the development are expected to off-set the incremental increase in the County's budget.

Cumulative Impact: A secondary impact of the project is to increase in the *de facto* off-site population with possible lowering of the service currently experienced by Kona residents (slower response time, for example). 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 2,010, the project generate demand for 7 additional authorized police personnel.

Mitigation Measure: The hiring of private guard service has become a common practice. The benefit of a private security unit would be to prevent crimes from happening 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

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. The Kailua-Kona Station is located on Palani Road above the Queen Kaahumanu intersection approximately 8 miles from the Ooma II site (approximate response time of 10 minutes). It is presently composed of 1 engine company and 1 ladder company with a staff of 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 existing Kailua Fire Station is operating near capacity and would not be able to meet the added demand of the Ooma II project and other development proposals that will increase population and real property in the region. The existing need for enhanced service has raised the prospect of constructing a new station house, possibly at Kealakehe.

The County Fire Department also points out that fire insurance premiums for improvements increase dramatically as the distance between a structure and the fire station increases, especially outside a five-mile radius.

Mitigation Measure: The public cost-benefit study for Ooma II suggests the possibility of funding a new station through an agreement similar to the one recently concluded between the County and a cooperative of South Kohala resort developers. In this case, a fire station was funded and constructed on donated land at Mauna Lani and equipped and operated with County funds.

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 Kealakekua. 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.

Impact: 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. Most of the people in the development will be transients or employees. Resident population associated with the multi-family units is expected to number approximately 600, resulting in slightly more than 2 additional hospital beds.

6.10 Schools and Libraries

Schools. The North Kona District is serviced by three public schools and two private schools (Table 23). 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.

Libraries. The North Kona region is currently served by three public libraries (Table 24). Plans are currently under way to build a permanent Kailua-Kona Library once a site has been located.

Table 23: Kona Schools

District	School	Location	Grades	Enroll.
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*	Kailua-Kona	1-8	18
	International 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 24: Kona Libraries

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

Source: *Department of Education*

Impacts: The development of the proposed project is not expected to increase the demand for educational or library services in the Kona area; however, this may be a secondary impact of a larger workforce.

6.11 Recreational Facilities

The North Kona district contains approximately 45.6 miles of shoreline, including 18 miles or 39 percent that are under public ownership. There are 24 access points along the 45.6-mile length, or an average of 1 access for every 1.3 miles. Many of the public accesses are located from Kailua to Keauhou Bay, also the the most urbanized stretch of the coast.

The recreational amenities presently afforded by the subject property are limited to the coastal areas. The West Hawaii Coral Reef Inventory has identified coastal uses to include shore fishing, throw netting, aquarium fish collecting, and diving and snorkeling (Nolan and Cheney, 1981). The shoreline is also frequented by beachcombers and persons passing through the area (via the unimproved coastal trail) to access the popular bathing and surfing area known as "Pine Trees Beach," located directly south of the subject property. The beaches fronting the site and surrounding areas, (including Wawaloli Beach, a beach park with minimal facilities near NELH), are not considered good swimming beaches because of the steep underwater drop off and the lack of a suitable sand covered bottom.

Impact: Development of the proposed project will improve beach access, currently limited to unpaved and seasonally unstable beach trails. The proposed land use plan provides paved parking areas adjacent to the beaches located at both ends of the property.

Cumulative Impact: The prospect of contiguous oceanfront development between Keahole Point and the Honokohau Small Boat Harbor should provide considerably greater public access to this segment of the coast assuming current County policies persist.

Mitigation Measures: As noted previously, the proposed development includes provision for continued and improved public access, including paved roads, beach parking, and restroom/shower facilities. 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 Anaeho'omalu 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 Ooma II 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 Ooma II. 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.

---

* In addition to the alternatives discussed in this section, a land exchange involving a portion of the Ooma II property and adjacent State lands has been proposed. This proposal is discussed further in Appendix J. Appendix K shows a preliminary land use plan based on a reconfigured Ooma II parcel. Because the Hawaii County General Plan amendment pertains to the existing Ooma II property, the land exchange has not been posed as an alternative development scheme within the context of this EIS.

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 314 acres, Ooma II 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 Ooma II in a less competitive position compared to existing major resort areas that incorporate larger acreages.

Moreover, reservation of a greater number of acres for resort hotel and condominium uses would require a trade-off in the diversity of uses that have been planned. The overall project would be more heavily oriented toward resort development, rather than the balanced profile currently offered.

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 Ooma II, similar guest accommodations would have to be provided together with a substantial amount of recreational facilities. The office park, marine park, and high-technology industrial 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. Development of the high technology area and marine park are basically incompatible with the retreat resort, unless extensive landscaping is installed to buffer the uses. A retreat resort would also be more sensitive to the ambient noise level than a festival use such as a marine park.

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, feasiblity 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 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.

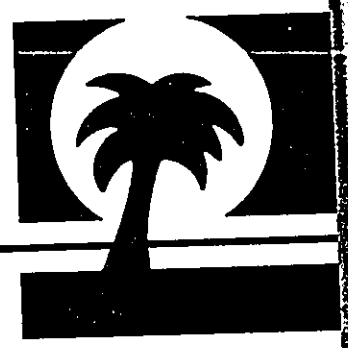
The "no action" alternative would not materially degrade the environment beyond that which would otherwise occur in the absence of the project. However, this alternative has an opportunity cost since economic benefits, as well as any positive resource management programs that might be established in 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 Ooma II development will involve the irretrievable loss of certain environmental and fiscal resources. The cost of using these resources, however, should be evaluated in light of recurring benefits to the residents of the region and the County, and the alternative of taking no action.

Development of transient accommodations and the marine park/visitor center, as set forth in the master plan, will commit oceanfront land to urban development. Once development has been initiated, it would not be possible to reverse the process without expending substantial public funds to demolish the physical plant and to replace jobs and income. Given the lack of major economic development alternatives and the need to provide long-term job opportunities, development of this project appears justified.

The overall development will urbanize approximately 314 acres at Ooma II. Construction of buildings and other man-made amenities will narrow the range of future non-urban uses for this site, although lack of suitable on-site resources mean that no agriculturally productive land will be taken out of the inventory. On the other hand, the master plan provides some 50 acres for potential high-technology aquaculture development. The proximity of NELH and availability of the nutrient-rich growth medium give the Ooma II property a unique site advantage for this use.

Resort hotels, condominiums, offices, aquaculture, and recreational facilities 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 180 acres or more than one-half of the parcel. 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 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.

Development of a successful mixed use area is dependent on its close relationship with the ocean. With proposals for other resort development to the south of the property and high-tech industrial development to the north of the property, Kona residents may perceive this segment of the coast in jeopardy of being committed to private uses. However, it is not the intent of the subject project to prohibit public use and enjoyment of the beaches or coastal resources. The resort development will comply with shoreline setback requirements and will provide public right-of-way accesses thereby promoting interaction between local residents and visitors in a recreational setting.

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 Ooma II property to be well endowed with physical attributes that are desirable both as amenities in a multi-use, marine-oriented community and for their own sake. These include pristine near-shore waters 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 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 property, personal, 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: historic preservation program (data recovery, salvaging, and preservation), marine baseline assessment for future monitoring efforts, and improved shoreline access and public parking. With the exception of aquaculture, 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 Ooma II-project was published in the OEQC Bulletin on May 8, 1986. The thirty-day review period, announced in the OEQC Bulletin, ended on June 7, 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 addition of an office park and marine park/visitors center and a reduction in condominium units and acreage). The earlier plan was revised subsequent to the EISPN, in part, because of discussions with government officials and community members during the consultation process.

" * " 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
* Natural Energy Laboratory of Hawaii

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

* Mr. Bill Graham
* 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

Mark H. Hastert, AICP	Principal-in-charge and Project Manager
Nancy I. Nishikawa, AICP	Principal DEIS Author and Project Planner
Thomas A. Fee, AICP	Project Planner
Toshiko Matsushita	Graphic Artist

Subconsultants

Hallstrom Appraisal Group, Inc.	Market Study Highest and Best Use Analysis Public Cost-Benefit Analysis
Chiniago Inc.	Archaeological Reconnaissance Survey
Paul H. Rosendahl, Ph.D., Inc.	Historic Preservation Assessment
Char and Associates	Biological Survey
M & E Pacific, Inc.	Preliminary Civil Engineering
Gordon Bricken and Associates	Aircraft Noise Exposure Analysis
Steven J. Dollar, Ph.D.	Marine Assessment

CHAPTER XI

CHAPTER XI

COMMENTS AND RESPONSES RECEIVED DURING PREPARATION OF THE DEIS

Twenty-one letters were received 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
Natural Energy Laboratory of Hawaii

County Agencies

Department of Parks and Recreation
Department of Public Works
Department of Water Supply
Fire Department
Planning Department
Police Department

Public Utilities

Hawaii Electric Light Company, Inc.
Hawaiian Telephone Company

Individuals/Community Organizations

Mr. Bill Graham
Sierra Club, Moku Loa Group

RECEIVED AS FOLLOWS

HELBER
HASTERT
VAN HORN
& KIMURA
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Richard H.
VAN HORN
AICP., AIA
Glenn T.
KIMURA
Associates
Nancy I.
NISHIKAWA
AICP.
Thomas A.
FEE
AICP.

16 May 1986

O'oma II Resort
North Kona, Hawaii
Environmental Impact Statement
Preparation Notice (EISPN)

Dear

The official preparation notice (EISPN) for the proposed O'oma Resort was published in the May 8 edition of the OEQC Bulletin (copy enclosed). The 30-day review period for written comments to the EISPN is June 7.

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 impacts, 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

Nancy I. Nishikawa

Encl.

XI-3

Contact: Cedric Takamoto
Dept. of Accounting and General Services, Public Works Division
P.O. Box 119
Honolulu, Hawaii 96810

Deadline: June 7, 1986.

O'OMA II, RESORT/MIXED USE DEVELOPMENT, NORTH KONA, HAWAII, Kahala Capital Corporation/County of Hawaii Planning Dept.

The project site, comprised of approx. 313.66 acres, is located on the west coast of the island of Hawaii, North Kona Judicial District, O'oma second ahupua'a. The property is identified as TMK: (3rd division) 7-3-9:4. The entire area is being requested for a General Plan amendment from the existing Conservation and Open land use designations to Open, Intermediate Resort, Medium Density Urban, and Industrial designations. The north and east boundaries of the project site abut the proposed Hawaii Ocean Science and Technology (HOST) Park. The Pacific Ocean is to the west of the site. The area south of the site is undeveloped. O'oma II is just south of Keahole Airport and six mi. north of Kailua-Kona town. The master plan for the entire project site consists of a resort hotel, resort condominiums, golf course, high-tech. industrial area, and other uses.

Table 5: PRELIMINARY LAND USE SUMMARY

Land Use	Gross Acreage	Density (Net)	Units
Resort Hotel	30 ac.	20/ac.	600
Resort Condo.	60 ac.	10/ac.	600
Golf Course	130 ac.		
High-Tech Area	30 ac.		
Beach Park/ Prk./Open/Roads	43 ac.		
TOTAL	313 ac.		1,200

An EIS will be required because of the following:

1. The proposed action may involve an irrevocable commitment of resources;
2. The proposed action may invo substantial secondary impacts, su 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
5. The proposed action may affect coastal water quality.

Contact: Mark Hastert
Helber, Hastert, Van Horn and Kimura, Planners
Grosvenor Center, PRI Tower
733 Bishop St., Ste. 2590
Honolulu, HI 96813

Deadline: June 7, 1986.

CENTRAL OAHU DEVELOPMENT PLAN AMENDMENT APPLICATION FROM AGRICULTURE TO VARIOUS USES AT WAIAWA RIDGE, OAHU, The Gentry Companies/City and County of Honolulu, Dept. of General Planning

Previously published April 23, 1986.

Contact: Fred Rodriguez
Environmental Communications, Inc.
P.O. Box 536
Honolulu, HI 96809

Deadline: May 23, 1986.

NEGATIVE DECLARATIONS

The following are Negative Declarations or determinations made by proposing or approving agencies that certain proposed actions will not have significant effects on the environment and therefore do not require EISs (EIS Rules 11-200-11). Publication in the Bulletin of a Negative

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

O'OMA II
NORTH KONA, HAWAII

I. IDENTIFICATION OF APPLICANT

A. Applicant

Kahala Capital Corporation

B. Consultant for EIS

Helber, Hastert, Van Horn & Kimura, Planners
Grosvenor Center, PRI 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. AGENCIES CONSULTED IN PREPARING ASSESSMENT

A. County Agencies

1. Hawaii County Planning Department
2. Hawaii County Office of Housing and Community Development

IV. PROJECT DESCRIPTION

A. Location and Ownership

The project site, comprised of approximately 313.66 acres, is located on the west coast of the island of Hawaii, North Kona Judicial District, O'oma second ahupua'a. The property is identified as tax map key (3rd Division) 7-3-09: 04. The entire area is being requested for a General Plan amendment from the existing Conservation and Open land use designations to Open, Intermediate Resort, Medium Density Urban, and Industrial designations.

The north and east boundaries of project site abut the proposed Hawaii Ocean Science and Technology (HOST) Park. The Pacific Ocean is to the

west of the site. The area south of the site is undeveloped. O'oma II is just south of the Keahole Airport and six miles north of Kailua-Kona town.

The subject property is owned in fee by Kona Oceanfront Properties, a Hawaii partnership, and Norbert A. Schlei, and is held in trust by American Trust Company of Hawaii, Inc.

B. Conceptual Plan

1. Land Use

The master plan for the entire project site consists of the following land uses:

(a) Resort Hotel (30 acres). One hotel site located several hundred feet inland from the shoreline. Total of approximately 600 units.

(b) Resort Condominiums (60 acres). Approximately 600 units in four areas interspersed throughout the golf course. Proposed density is a maximum of 10 units per acre.

(c) Golf Course (130 acres). One 18-hole golf course and a golf clubhouse located near the center of the property. It is envisioned that the clubhouse would contain a mix of commercial enterprises, including a restaurant/coffee house and pro shop.

(d) High-technology Industrial (50 acres). Provision of approximately 50 acres for expansion of aquaculture and other high-technology uses related to development of the HOST Park.

(e) Other (43 acres). The balance of the project area will be used for a public beach park, roads, parking, a sewage treatment plant, utility easements, and open space.

2. Public Facilities

(1) Water. It is estimated that the fully developed resort project will require approximately 0.6 mgd of potable water, supplied by the municipal system.

(2) 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.

(3) Electrical System. Electrical power is to be acquired from HELCO through the island-wide power grid.

(4) Drainage. A drainage system will be designed and constructed in accordance with County standards.

(5) Transportation and Public Access. Access to the proposed development will be provided via a road constructed from the Queen Kaahumanu Highway across the southern boundary of the HOST

Park property. All interior roadways will be built to County standards.

C. Phasing

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

V. DESCRIPTION OF AFFECTED ENVIRONMENT

A. Topography

The project site consists primarily of lava formations sloping gently from the shoreline to an elevation of about 85 feet above mean sea level at the southern-mauka boundary. On average, slopes on the project site range from 0 to 5 percent.

B. Flora and Fauna

The project site is characterized by a desert-like appearance with vegetation consisting primarily of sparse, dry grasses and herbs. 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. Historic and Archaeological Resources

A preliminary archaeological reconnaissance survey located a number of small sites, such as stone mounds and crude shelters, toward the mauka portion of the property, and larger structures, such as caves and habitations with middens, closer to the shoreline. The sites were evaluated for their significance from the standpoint of research, as well as their interpretive and cultural value.

D. 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. Water depth along this part of the coastline increases rapidly with distance from shore, making it an ideal environment for ocean thermal energy conversion (OTEC) development and related projects at the Natural Energy Laboratory of Hawaii (NELH) and proposed HOST Park. On the other hand, the beaches fronting the site, including Wawaloli Beach, are not considered good swimming beaches because of the steep underwater drop off and lack of a suitable sand-covered bottom. The coastal area is, however, frequented by local fishermen and beachcombers and persons gaining access to a bathing and surfing area known as Pine Trees Beach, located just south of the subject property.

VI. SUMMARY OF MAJOR IMPACTS AND MITIGATION MEASURES

A. Coastal Resources

1. Shoreline. Construction of permanent structures will be in conformance with State and County shoreline setback regulations, which will minimize the hazard of possible tsunami inundation and provide 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. A public park with parking and beach right-of-way is planned.

B. Flora and Fauna

To date, no endangered flora or fauna 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, and water features associated with the golf course may increase habitat areas.

C. Archaeological Sites

An archaeological survey has been prepared for the site and additional work may be conducted as part of 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.

D. 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 1,130 jobs. Total regional resident population growth of approximately 2,140 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.

VII. 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 1:31 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.

VIII. 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

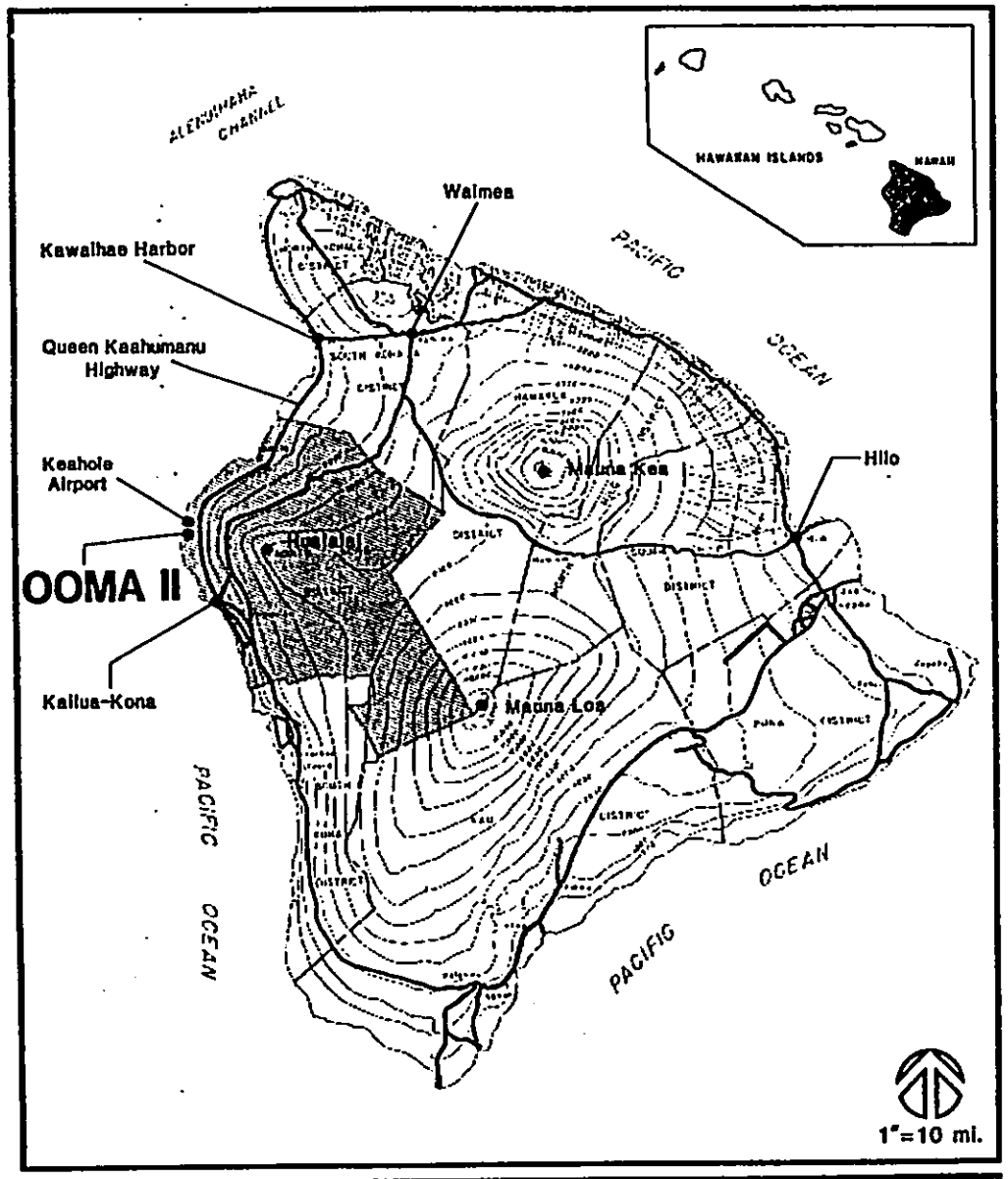
E. Community Organizations

IX. 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 "O'oma II: General Planning and Environmental Considerations" (Helber, Hastert, Van Horn & Kimura, Planners, April 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.



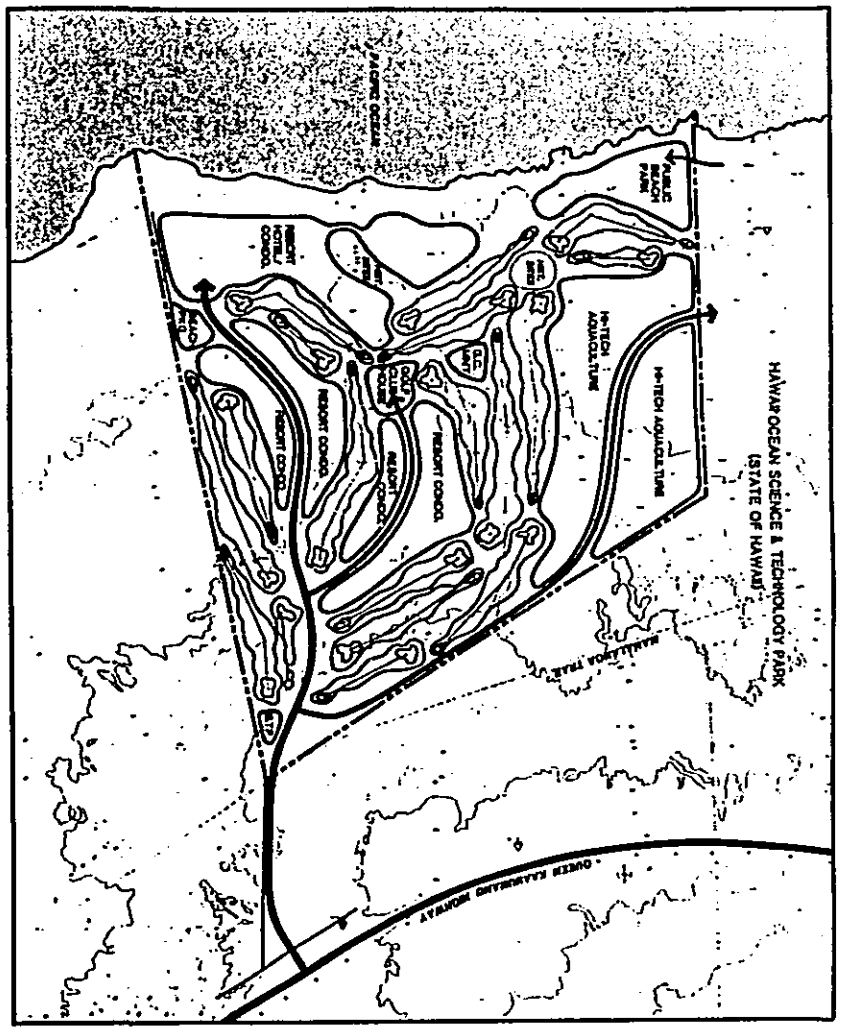
Project Location Map

OOMA II

Kahala Capital Corporation

Figure: 1

HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

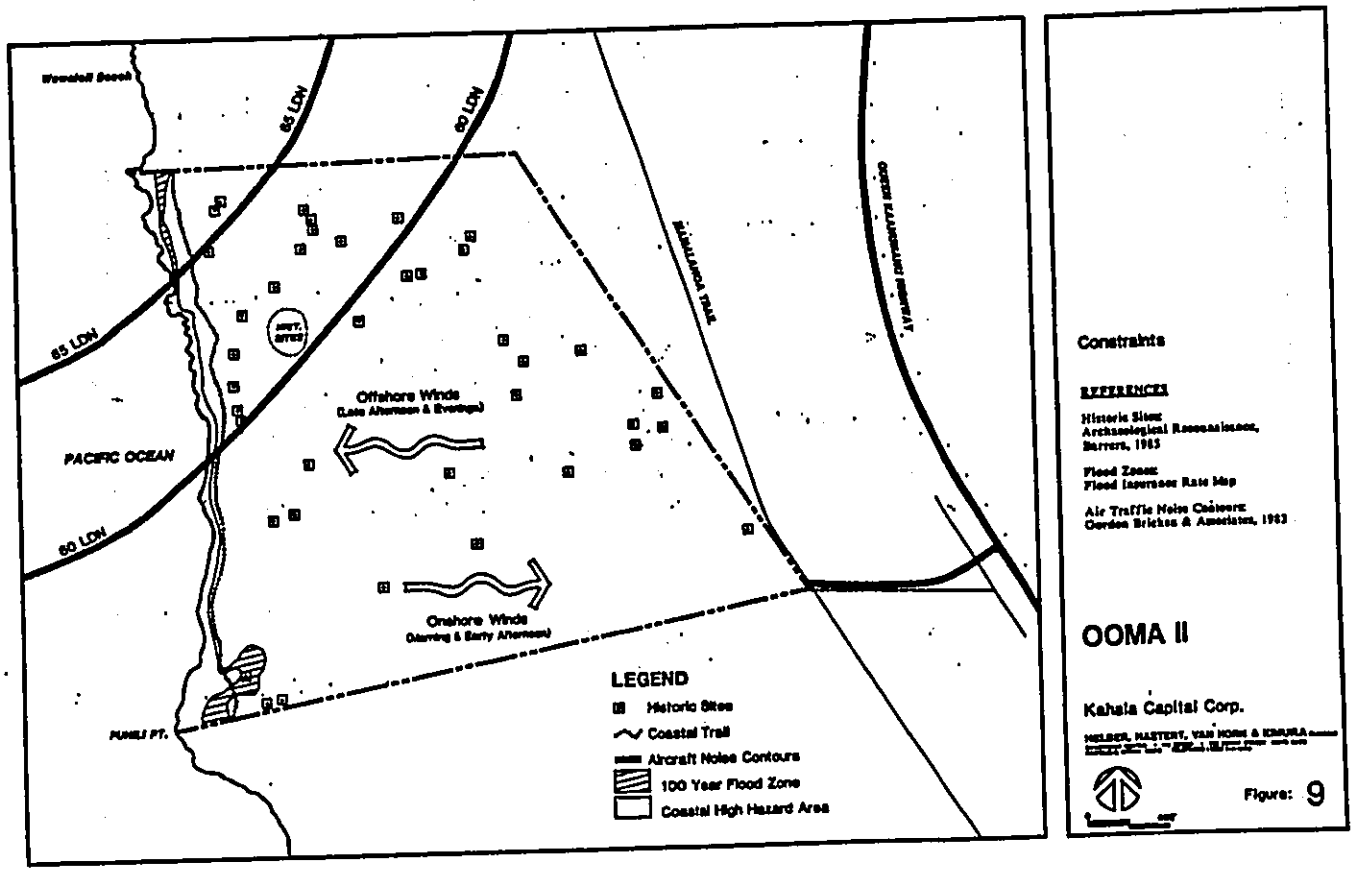


OOMA II

Kahala Capital Corp.

Preliminary Land Use Plan

Figure: 10


Waiakoli Beach
65 LDN
60 LDN
65 LDN
60 LDN
PACIFIC OCEAN
PUHELI PT.
HWY. 570
Offshore Winds
(Late Afternoon & Evenings)
Onshore Winds
(Morning & Early Afternoon)
KAUMALAPAU TRAIL
QUEEN KAAHUMANU HIGHWAY
LEGEND
Historic Sites
Coastal Trail
Aircraft Noise Contours
100 Year Flood Zone
Coastal High Hazard Area
Constraints
REFERENCES
Historic Sites:
Archaeological Reconnaissance,
Barrera, 1983
Flood Zone:
Flood Insurance Rate Map
Air Traffic Noise Contours:
Gordon Bricken & Associates, 1983
OOMA II
Kahala Capital Corp.
Figure: 9

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. BOX 50004
HONOLULU, HAWAII
96850

June 5, 1986

Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn
& Kimura, Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813

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

Dear Ms. Nishikawa:

Subject: EIS Preparation Notice for O'Oma II Resort, North Kona, Hawaii

We reviewed the subject document and offer the following comments:

The environmental impact statement should address what steps will be taken to control dust during grading and construction. If soil is to be brought in for landscaping purposes, the steps to be taken to prevent wind and water erosion during stockpiling, spreading, and while vegetation is being established, should also be discussed.

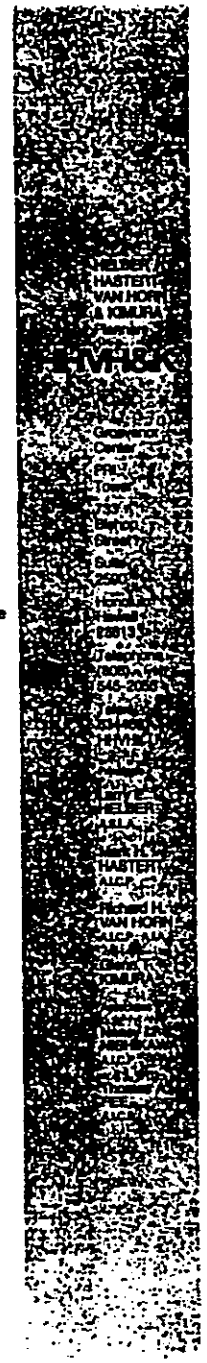
We also recommend that an irrigation system be established on the site before any of the above actions are taken to reduce blowing soil and to allow successful establishment of vegetation.

Thank you for the opportunity to review the document.

Sincerely,

RICHARD H. DUNCAN
State Conservationist

X-9



10 June 1986

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

Dear Mr. Duncan:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

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

Your comments regarding measures to control wind and water erosion and recommendation for successful establishment of vegetation on the property have been noted and will be addressed in the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF:

June 6, 1986

RECEIVED
JUN 11 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn
& Kimura
733 Bishop Street
Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Nishikawa:

Thank you for the opportunity to review and comment on the EIS Preparation Notice for O'oma II Resort, North Kona, Hawaii. The following comments are offered:

a. A Department of the Army permit may be required. Suggest coordination of plans with Operations Branch (phone: 438-9258).

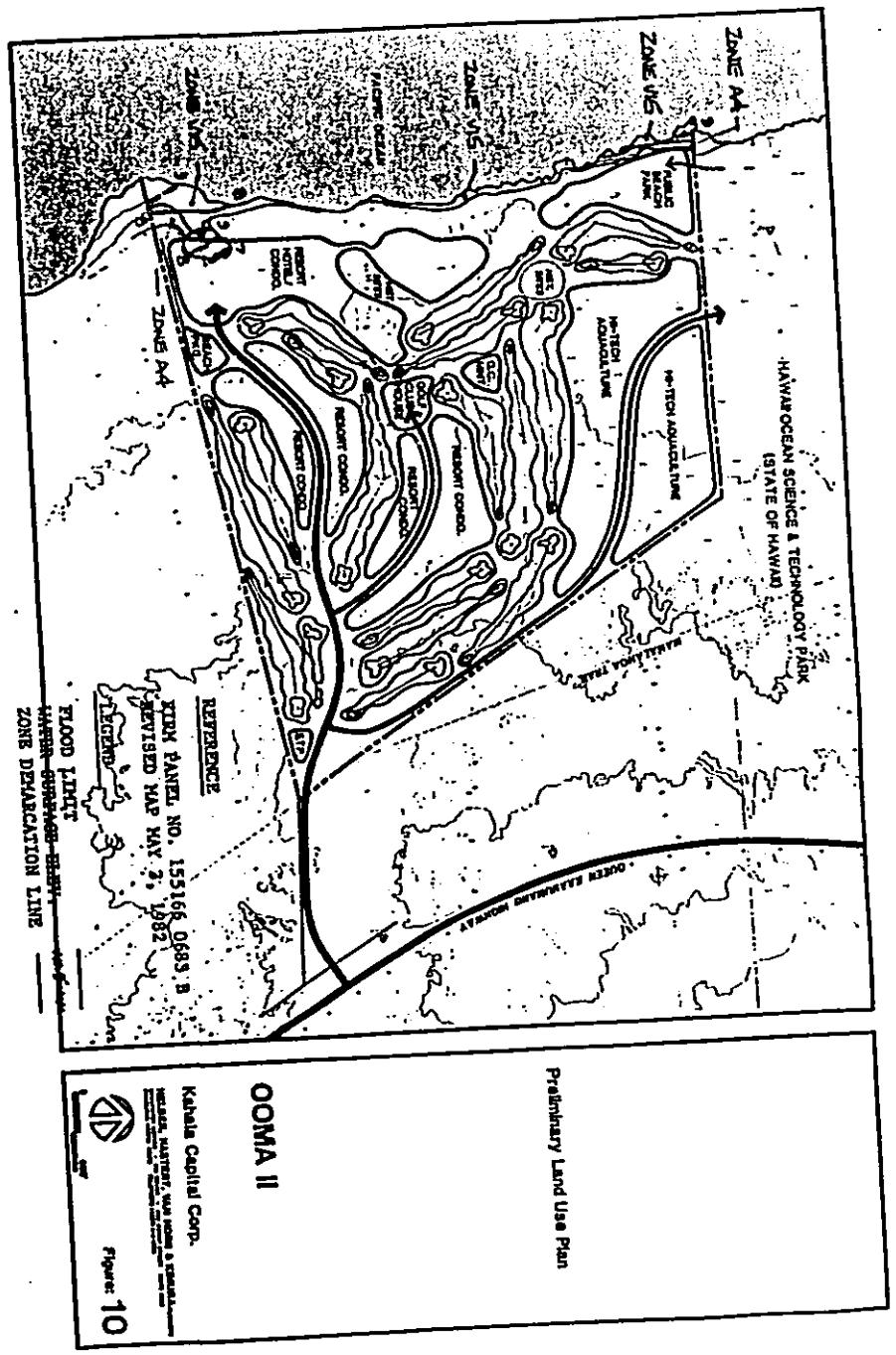
b. The parcel is affected by tsunami inundation as shown on the attached sheet. Tsunami inundation water surface elevations range from 7-9 feet mean sea level along the coast. The proposed resort/condo development for the southwest portion of the parcel will be the most affected.

c. The report, Aquatic Survey of the Kona Coast Ponds, Hawaii Island by John Maciolek and Richard Brock, indicates that six (6) small anchialine ponds exist at the project site. The EIS should discuss whether these ponds will be filled and what impacts may occur.

Sincerely,

Kisuk Cheung
Chief, Engineering Division

Attachment



HELBER
HASTERT
VAN HORN
& KIMURA
Planners

HHM&K

Grosvenor
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PFI
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96813
Telephone
(808)
545-2055
Telex
634488
HHMK UW

Larry E.
HELBER
A.S.L.A.

Mark H.
HASTERT
A.I.C.P.

Richard H.
VAN HORN
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.

19 June 1986

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

Dear Mr. Cheung:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 6 June 1986.

We appreciate the information on tsunami inundation and the identification of flood zones on the O'oma II preliminary land use plan. The issue of natural hazards, including tsunami inundation and flooding will be addressed further in the Draft EIS.

The report, Aquatic Survey of the Kona Coast Ponds, Hawaii Island by John A. Maciolek and Richard E. Brock (1974), mentioned in your letter remains one of the most comprehensive studies of anchialine ponds to date. The study identified six small ponds in Kalaoa-O'oma I and 29 ponds in Kohanaiki, ahupua'a to the north and south, respectively, of the site. However, no ponds were identified within O'oma II (copy of map enclosed).

We have also discussed the likelihood of finding ponds in O'oma II with Dr. David Ziemann, who conducted a helicopter survey of ponds in this vicinity at 2'+ tide in late May. He is not aware of any ponds in the O'oma II project area. Ground level evidence has been provided by a flora and fauna survey, portions of which were conducted at high tide in May 1986. The investigators did not see any water exposures nor representative wetlands plant or wildlife during their field work. The findings of the flora and fauna survey will be reported in greater detail in the Draft EIS.

The information from these three qualified sources is consistent and, we feel, a sufficient basis on which to determine that no anchialine ponds are located on the project site. Nevertheless, should there be any evidence to the contrary, the subject will be studied fully.

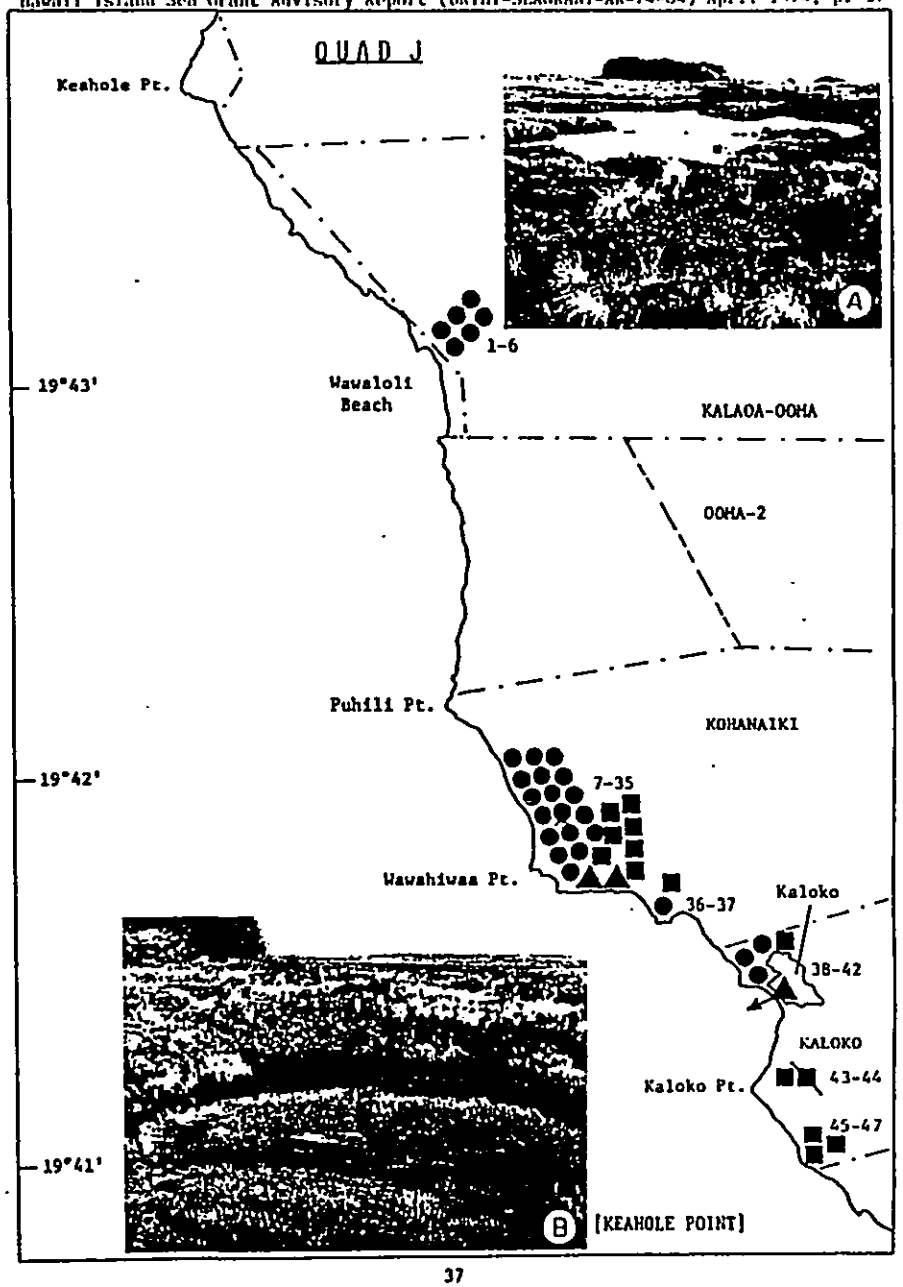
If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

Maciolek, John A. and Brock, Richard E. Aquatic Survey of the Kona Coast Ponds, Hawaii Island Sea Grant Advisory Report (UNIHI-SEAGRANT-AR-74-04) April 1974, p. 37



37

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

June 4, 1986

Mr. Mark Hastert
Helber, Hastert, Van Horn
and Kimura, Planners
Grosvenor Center, PRI Tower
733 Bishop St., Suite 2590
Honolulu, HI 96813

RECEIVED
JUN - 1986
HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

Dear Mr. Hastert:

SUBJECT: O'oma II, Resort/Mixed Use Development,
North Kona, Hawaii

This responds to your request for HUD comments on the Environmental Impact Statement Preparation Notice (EISPN) for the subject project.

We understand that the 313 acre project will include a 600 unit resort hotel; a 600 resort condominum; a 130 acre golf course; 50 acres in HI-tech land uses that are related to the development of the Hawaii Ocean Science and Technology (HOST) Park. Regional employment is also expected to increase by approximately 1,130 jobs.

In view of the 1,130 jobs created by the project the housing needs of the persons filling those jobs should be discussed.

If HUD assistance is proposed, you may contact Frank Johnson at 546-5570.

Sincerely,

Calvin Lew
Director, Community
Planning and Development

cc:
D. James, 9CE

HELBER HASTERT VAN HORN & KIMURA Planners HHVH&K

10 June 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:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS prepration notice for the subject project by letter dated 4 June 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.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P.O. BOX 50167
HONOLULU, HAWAII 96850

ES
Room 6307

JUN 4 1986

RECEIVED
JUN 5 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn
& Kimura Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Re: O'oma II, Resort/Mixed Use Development, North Kona, Hawaii

Dear Ms. Nishikawa:

Thank you for soliciting our comments on the Environmental Impact Statement Preparation Notice (EISPN) for the O'oma II Resort, North Kona, Hawaii. As we discussed in our April 22, 1986 meeting with Messrs. Hastert and Fee regarding the resort development at Kohanaiki, South Kohala, the Service's principal concerns are project related impacts upon endangered waterbirds, migratory shorebirds, coastal water quality and anchialine pond ecosystems. No anchialine ponds within the O'oma II ahupua'a have been studied, therefore we recommend that a careful inspection of the property be performed during high (spring) tides to identify any ponds within the proposed development boundaries to determine their habitat area, and evaluate their biota.

In accordance with the Service's National Mitigation Policy (46 FR 7644-7663), we have classified anchialine ponds in Hawaii as Resource Category 1; they are of high habitat value to their indigenous aquatic biota and are scarce on both a national and ecoregion basis. These ponds are known to provide feeding and loafing habitat for the endangered Hawaiian stilt and duck, and for a host of migratory shorebirds.

It is Service policy that any loss or degradation of these important national resources is unacceptable. As such, it is the goal of the Service to insure that no loss of natural anchialine pond habitat occurs. Therefore, we will recommend denial of any County, State, or Federal permits for filling or destructive alteration of anchialine ponds. Should any such ponds be identified within the O'oma II development boundaries, we recommend that they remain undisturbed.

Please do not hesitate to contact us if we can be of further assistance.

Sincerely yours,

Ernest Kosaka

Ernest Kosaka
Project Leader
Office of Environmental Services

cc: RD, FWS, R1 (ARD-HR)
CE, PODED-PV
EPA, SFO
NMFS-WPPO
DLNR

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

HELBER
HASTERT
VAN HORN
& KIMURA
Planners
HHVH&K
Grosvenor Center
PPII Tower
733 Bishop Street
Suite 2590
Honolulu
Hawaii
96813
Telephone
(808)
545-2055
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634468
HHVHK UW
Principals
Larry E. HELBER
A.S.L.A.
Mark H. HASTERT
A.I.C.P.
Richard H. VAN HORN
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.

19 June 1986

Mr. Ernest Kosaka, Project Leader
Office of Environmental Services
Fish and Wildlife Service
300 Ala Moana Boulevard
P.O. Box 50167
Honolulu, HI 96850

Dear Mr. Kosaka:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

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

In light of growing public awareness and appreciation of anchialine ponds and the ecosystem they support, this environmental feature has been of concern throughout the planning process for the O'oma II resort. Although ponds have been found in various locations along the Kona Coast, we have concluded that they are not present on the project site. Aquatic Survey of the Kona Coast Ponds, Hawaii Island by John A. Maciolek and Richard E. Brock (1974), one of the most comprehensive studies of anchialine ponds to date, identified six ponds in Kalaoa-O'oma I and 29 ponds in Kohanaiki, ahupua'a to the north and south, respectively, of the site. However, the study did not identify any ponds in O'oma II (copy of map enclosed).

We have also discussed the likelihood of finding ponds in O'oma II with Dr. David Ziemann, who conducted a helicopter survey of ponds in this vicinity at 2'+ tide in late May. He is not aware of any ponds in the O'oma II project area. Ground level evidence has been provided by a flora and fauna survey, portions of which were conducted at high tide in May 1986. Investigators did not see any water exposures nor representative wetlands plant or wildlife during their field work. The findings of the flora and fauna survey will be reported in greater detail in the Draft EIS.

The information from these three qualified sources is consistent and, we feel, a sufficient basis on which to determine that no anchialine ponds are located on the project site. Nevertheless, should there be any evidence to the contrary, the subject will be studied fully.

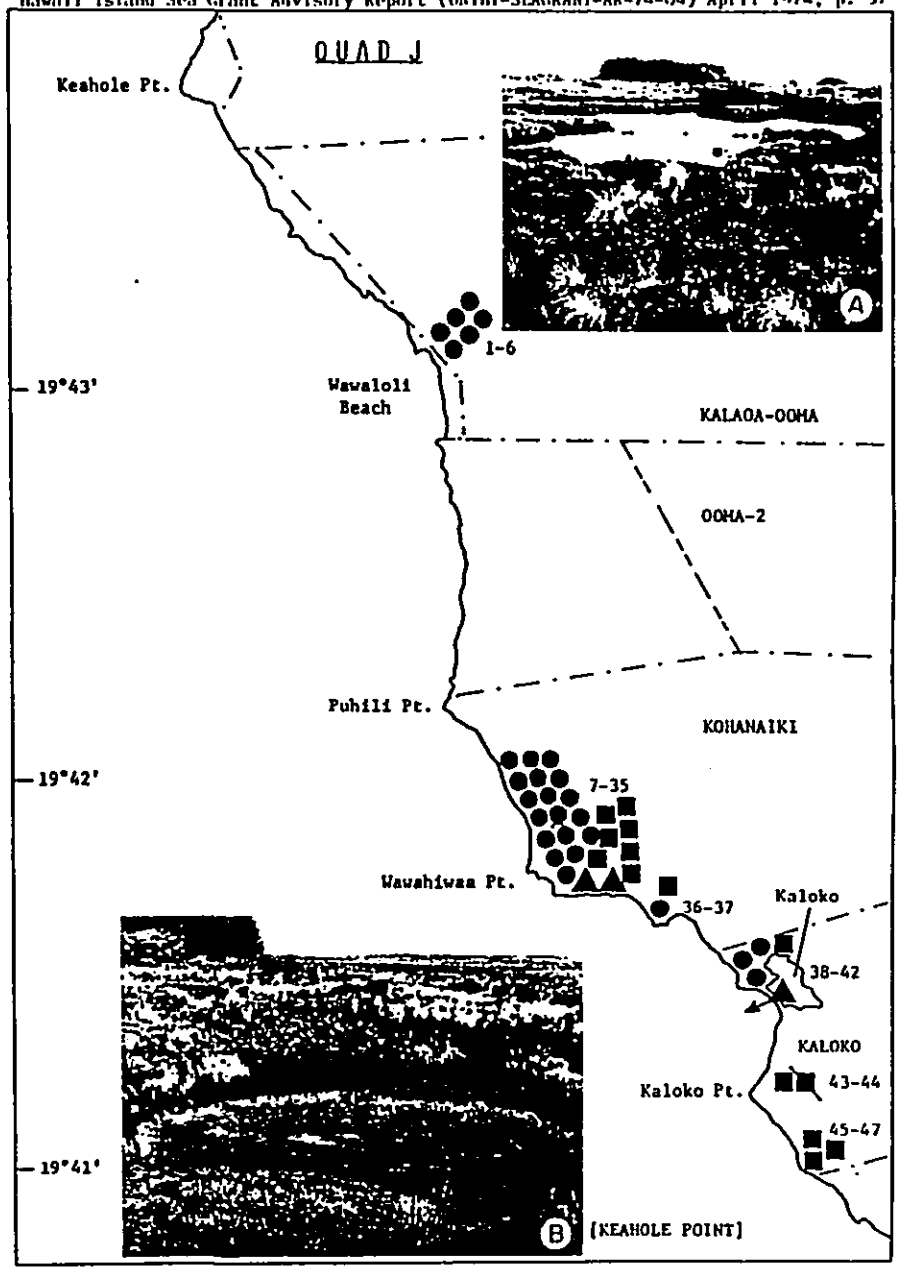
If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

Maciolek, John A. and Brock, Richard E. Aquatic Survey of the Kona Coast Ponds, Hawaii Island Sea Grant Advisory Report (UNIHI-SEAGRANT-AR-74-04) April 1974, p. 37



37

GEORGE R. ARIYOSHI
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

May 30, 1986

Ms. Nancy I. Nishikawa
Halber, Hastert, Van Horn and Kimura
Grosvenor Center, PRI Tower
733 Bishop St., Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Nishikawa:

Subject: Environmental Impact Statement Preparation Notice
O'oma II Resort
Kahala Capital Corporation
TMK: 7-3-09: 04 North Kona, Hawaii
Acres: 313.66

The Department of Agriculture has reviewed the subject assessment and offers the following comments.

The Draft Environmental Impact Statement should identify the source(s) of potable water and the quantity of irrigation water necessary for the golf course. Any adverse impacts on agriculture in the region caused by the withdrawal of groundwater should be described.

Thank you for the opportunity to comment.

Jack K. Suwa
JACK K. SUWA
Chairman, Board of Agriculture

cc: OEQC

RECEIVED
JUN 3 1986
HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

HELBER HASTERT VAN HORN & KIMURA Planners HHVHK Grosvenor Center PRI Tower 733 Bishop Street Suite 2590 Honolulu Hawaii 96813 Telephone (808) 545-2055 Telex 454-8086 HHVHK UW Fax (808) 521-9886 Cable HELBERT HONOLULU Mark H. HASTERT AICP Richard H. VAN HORN AICP, AIA Dennis Y. KIMURA Nancy I. NISHIKAWA AICP Thomas A. FEE AICP

10 June 1986

Mr. Jack K. Suwa
Chairman, Board of Agriculture
P.O. Box 22159
Honolulu, HI 96822-0159

Dear Mr. Suwa:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 30 May 1986.

A preliminary environmental assessment, which accompanied a request to amend the Hawaii County General Plan, estimated water demand to be .6 MGD based on a usage rate of 500 gallons per day for the 1,200 hotel/condo units (at 100 percent occupancy). Our engineering consultants will further refine projections of the project's domestic and irrigation water requirements and will consult County officials to determine mutually beneficial means of providing water to the site, including identification of source(s). Their findings will be presented in the Draft EIS. The EIS will also include a discussion of any impacts generated by the proposed water system.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

GEORGE R. ARIYOSHI
GOVERNOR

FRANCIS M. HATANAKA
SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

June 3, 1986

RECEIVED
JUN - 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Ms. Nancy Nishikawa
HHVH&K
Grosvenor Center, PRI Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Nishikawa:

Our review of your O'oma II Resort development in North Kona indicates that the enrollment impact from the proposed 600-unit resort condominium project will be negligible.

The project is located in the attendance areas of the following schools:

Kealakehe Elementary (K-5)
Kealakehe Intermediate (6-8)
Konawaena High (9-12)

Please keep us informed of any changes to your development plan.

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

Sincerely,

Francis M. Hatanaka
Superintendent

FMH:jl

cc OBS
K. Mizuba, Hawaii Dist.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

HELBER, HASTERT, VAN HORN & KIMURA, Planners
HHVH&K
Grosvenor Center, PRI Tower, 733 Bishop Street, Suite 2590, Honolulu, Hawaii 96813, Telephone (808) 545-2055
Larry E. HELBER, AICP, AIA
Mark H. HASTERT, AICP
Richard H. VAN HORN, AICP, AIA
Glenn T. KIMURA
Nancy I. NISHIKAWA, AICP
Thomas A. FEE, AICP

10 June 1986

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

Dear Mr. Hatanaka:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 3 June 1986.

The information contained in the letter regarding preliminary enrollment impacts and schools in the attendance area will be included in the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

XI-16

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

LESLIE S. MATSUBARA
DIRECTOR OF HEALTH

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

In reply, please refer to:
EPHSO

June 19, 1986

Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn
& Kimura, Planners
Grosvenor Center, PRI Tower
733 Bishop St., Suite 2590
Honolulu, Hawaii 96813

RECEIVED
JUN 23 1986
HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

Dear Ms. Nishikawa:

Subject: O'oma II Resort, North Kona, Hawaii, Environmental Impact Statement Preparation Notice (EISPN)

Thank you for allowing us to review and comment on the subject proposal. We provide the following comments for your consideration:

1. Municipal drinking water and wastewater treatment systems or their equivalents are recommended as the most appropriate alternatives because of the magnitude of the proposed project. The projected concern is the maintenance of the water quality of the receiving waters.

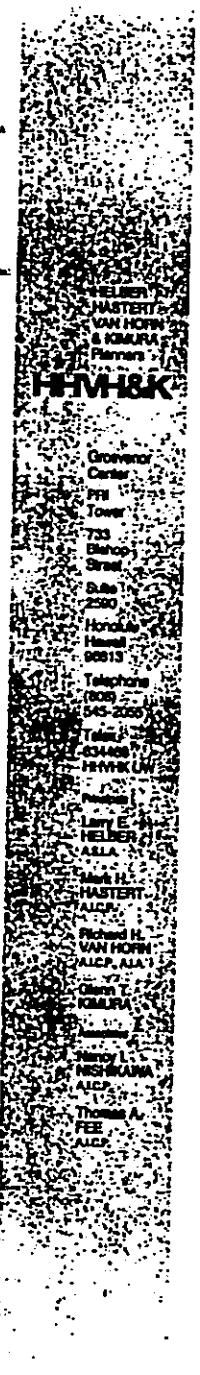
2. The EIS notice indicates that resort condominiums will be located along the open space corridors of the golf course fairway that will be irrigated with the treated wastewater. This will create health and safety concerns if spray irrigation is to be used. Some type of buffer area should be addressed, taking into consideration the degree of wastewater treatment, wind speed, and direction if spray irrigation is to be used and perhaps incorporating drip irrigation along the fringe areas of habitation.

3. Provisions for the expansion of aquaculture and other high-technology development does not address wastewater disposal. Potential industrial waste discharges may require separate treatment from the proposed domestic wastewater system. Nearshore disposal of wastewater, into Class AA waters, is prohibited by Chapter 11-54.

Sincerely,

JAMES K. IKEDA
Deputy Director for
Environmental Health

cc: DHO, Hawaii



26 June 1986

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

Dear Mr. Ikeda:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

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

Our engineering consultants are presently looking into the most viable means of providing both water and sanitary sewage services to the O'oma resort. Their analyses and findings will be included in the Draft EIS. One of the criteria for evaluating alternative wastewater disposal systems is relative impacts on the quality of Class AA near shore waters. The related issue of wastewater disposal from possible tenants in the high-technology industrial area will also be addressed in the Draft EIS.

Health and safety concerns raised by the use of treated wastewater for irrigation will be addressed more specifically when detailed landscape plans are drawn. However, our conversations with landscape architects reveal that avoidance of overspray is a standard practice, whether the irrigation water is fresh or treated. This can be achieved by choice of irrigation equipment and their placement, or as suggested by your letter, through landscaped buffers around inhabited areas which do not require spraying.

If there are additional concerns, please do not hesitate to contact us.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
EDGAR A. HAMABU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

JUL 09 1986

DOC. NO.: 1219B

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

Dear Ms. Nishikawa:

Thank you for the invitation to participate in the consultation phase of the EIS for O'oma Resort in North Kona, Hawaii for a General Plan amendment from Conservation and Open Land Use to Resort, Medium Density Urban, and Industrial for approximately 313 acres.

In response, we offer the following comments:

The subject proposed site located adjacent to the Hawaii Ocean Science and Technology park is proposed to be developed into resort hotels-condominiums and other resort related facilities in close proximity to the shoreline. It should be noted that there are several other resort related developments proposed all along this West Hawaii coastline.

We suggest that the EIS describe thoroughly the activities planned, aquatic resources on the project site(s) and in adjacent 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 uses should be detailed also.

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 landfills, soil erosion, urban contaminants, landscaping and agriculture chemicals, construction materials, petroleum products, etc.

We understand you are consulting with our Historic Sites Office to incorporate their concerns.

Thank you for your consideration of our concerns.

Very truly yours,

SUSUMU ONO, Chairperson
Board of Land and Natural Resources

HELBER
HASTERT
VAN HORN
& KIMURA
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HHVH&K
Grosvenor Center
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HHVHK UW
Principals
Larry E. HELBER
A.S.L.A.
Mark H. HASTERT
A.I.C.P.
Richard H. VAN HORN
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.

14 July 1986

Mr. Susumu Ono, Chairman
Board of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Ono:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 9 July 1986 (your Doc. No. 1219B).

The Draft EIS will address in greater detail the concerns raised in the letter, which issues include the following: (1) potential impacts of development on trails and customary patterns of public access to and use of the shoreline; (2) effects on the coastal brackish water lens from possible withdrawal for irrigation purpose; and (3) effects on coastal resources from wastewater disposal and run-off from the property. We are also continuing to work with the Historic Sites Office to address their concerns regarding archaeological and historic remains.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

GEORGE R. ARIYOSHI
GOVERNOR
KENT M. KEITH
DIRECTOR
MURRAY E. TOWILL
DEPUTY DIRECTOR
LINDA KAPUNIAI ROSEHILL
DEPUTY DIRECTOR

DIVISIONS
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION
ENERGY DIVISION
FOREIGN TRADE ZONE DIVISION
LAND USE DIVISION
PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION
OFFICES
ADMINISTRATIVE SERVICES OFFICE
INFORMATION OFFICE

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST, HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 • TELEX: 723250 HIDPED

Ref. No. P-4294

June 6, 1986

RECEIVED
JUN 11 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

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

Dear Mr. Hastert:

Subject: Environmental Impact Statement Preparation Notice for O'oma II, Kahala Capital Corporation, North Kona, Hawaii

We have reviewed the subject environmental impact statement preparation notice (EISPN) and offer the following comments.

1. The draft EIS should include a discussion of the need for the proposed development relative to future tourism growth, need for hotel/resort condominium units in relation to the existing and proposed supply of units in the Kona region, and the segment of the market that the proposed development will serve.

2. The Hawaii Ocean Science and Technology Park (HOST Park) and the Keahole Airport are adjacent to the proposed development. The project plans to incorporate some HOST Park activities into its master plan. The Keahole Airport is only 1/2 mile from the proposed project. The draft EIS should discuss the impacts on a resort development in close proximity to industrial and airport facilities.

3. The HOST Park and Natural Energy Laboratory of Hawaii activities are both reliant on contaminant free, nutrient rich, deep ocean water. However, the upper layer of warm water is also used for mixing. The EISPN notes that coastal water quality is one of the major impacts of the proposed project. The draft EIS should further detail all of the items discussed in Section VI.A.2 of the EISPN and not just the "possible effects of increased runoff." Special attention should be given to the possible effects on the NELH and HOST Park activities, if water quality is affected.

4. The EISPN indicates that the beaches fronting the property "are not considered good swimming beaches." The marketability of a resort without a swimming area should be discussed in the draft EIS.

5. The draft Kona Regional Plan states that the Kona water system is overcommitted. Given the cost of developing new water sources and integrating them with the water distribution system, it appears that the

availability of additional water commitments will be limited for the foreseeable future. The draft EIS should discuss the availability of water for the proposed development as well as the impacts on water commitments for the "significant increase in resident/local population" and the "significant demand for housing in Kona" that are likely to occur as a result of developing the proposed project.

6. The draft Kona Regional Plan revisions dated November 1983, states that housing problems are perceived to be the most serious problem area for Kona. This is especially true in relation to the development of affordable housing stock. The draft EIS should discuss the impacts of the proposed project on housing demand.

7. The draft EIS should address how the proposed development will meet the appropriate objectives and policies and priority directions 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.

   The North Kona coast is known to support several endangered and threatened species. Because the subject project is one of several resort developments currently proposed for the region, the EIS should discuss the project's impact as well as the cumulative impacts of development upon these endemic species.

8. In addition, the draft EIS should list the permits required for the proposed development and time frame for development.

9. A proposed resort development consisting of approximately 470 acres by Kona Beach Development Venture, L.P., is currently seeking a land use boundary amendment from the Land Use Commission immediately to the south of O'oma II (Docket No. A86-599). The draft EIS should discuss the impacts of these adjacent resorts on the airport, HOST Park and other land uses in the area.

Thank you for the opportunity to review and comment on the subject document.

Very truly yours,

Kent M. Keith

cc: Planning Department
County of Hawaii
Office of Environmental Quality Control

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& KIMURA
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VAN HORN
AICP, AIA
Glenn T.
KIMURA
Associates
Nancy I.
NISHIKAWA
AICP
Thomas A.
FEE
AICP

19 June 1986

Mr. Kent M. Keith, Director
Department of Planning
and Economic Development
State of Hawaii
P.O. Box 2539
Honolulu, HI 96804

Dear Mr. Keith:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 6 June 1986 (your Reference No. P-4294).

The Draft EIS will address in greater detail the concerns raised in the letter. Those issues include the following: (1) marketability of additional hotel and resort condominium units in relation to the existing and proposed supply of units in the Kona region, (2) relationship to surrounding and nearby uses, including, industrial and airport facilities and other resort development, (3) availability of water for the proposed development, (4) demand for affordable employee housing, and (5) impacts on endemic plant and wildlife, particularly species that are listed as endangered or threatened.

We have contacted Mr. Jack Huizingh, Executive Director of NELH to discuss their particular concerns regarding nearshore water quality. We discussed the types of baseline environmental data required and the need for a program to monitor relative changes in key water quality indicators. The findings of our marine baseline assessment will be included in the Draft EIS.

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.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

GEORGE R. ARIYOSHI
GOVERNOR

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

WAYNE J. YAMASAKI
DIRECTOR

DEPUTY DIRECTORS
JONATHAN K. SHIMADA, Ph.D
WALTER T.M. HO
CHERYL D. SOON
ADAM D. VINCENT

IN REPLY REFER TO

STP 8.1383

June 5, 1986

RECEIVED
JUN 16 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Ms. Nancy I. Nishikawa
HHVH and K
Grosvenor Center, PRI Tower
Suite 2590
733 Bishop Street
Honolulu, Hawaii 96813

Dear Ms. Nishikawa:

EIS Preparation Notice (EISPN)
O'oma II Resort, North Kona, Hawaii

Due to the limited information provided, we find that a Traffic Analysis Impact Report will be needed for us to complete our review of the subject development proposal.

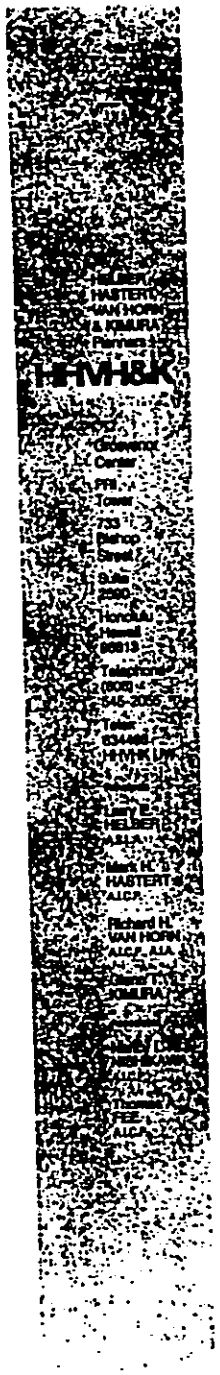
Notwithstanding, a review of the more detailed EISPN and the maps which accompanied your letter revealed that intersection improvements will be required on Queen Kaahumanu Highway. The developer shall bear the cost for planning and constructing a fully channelized intersection for the resort's access onto the State highway. In addition, all the development's utility lines and conduits within the State highway right-of-way shall be placed underground. The detailed construction plans for the intersection improvements and all other work within the State highway right-of-way must be submitted to our Highways Division for review and approval.

We are also concerned that aircraft noise may have a significant impact on the resort development because of its proximity to Keahole Airport. Since no discussion or information was presented on this aspect except for the noise contour map provided, a noise impact study should be conducted and the results submitted for our review.

Thank you for coordinating this matter with us.

Very truly yours,

Wayne J. Yamasaki
Director of Transportation



10 June 1986

Mr. Wayne J. Yamasaki, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Yamasaki:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 5 June 1986 (your reference number STP 8.1383).

A traffic impact analysis will be prepared for the proposed development to determine probable impacts on the Queen Kaahumanu Highway. Plans for channelization of turning movements at the main intersection and any other work within the State highway right-of-way will be submitted to the Highways Division for review and approval.

Potential aircraft noise exposure and related impacts will be addressed in an aircraft noise analysis and assessment to be included in the Draft EIS. Mr. Herb Kido of the Airports Division has been contacted and will be informed of our progress.

If you have any additional concerns, please do not hesitate to contact us.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

The Natural Energy Laboratory of Hawaii

June 12, 1986

Nancy I. Nishikawa
Helber, Hastert, Van Horn & Kimura, Planners
733 Bishop Street Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Nishikawa:

Kent M. Keith has forwarded to us a copy of O'oma II Resort, North Kona, Hawaii Environmental Impact Statement Preparation Notice. We at the Natural Energy Laboratory of Hawaii (NELH) will be pleased to assist as requested.

Our primary interest will be to assure that the EIS addresses preservation of the quality of the coastal waters upon which the ongoing research and development at the laboratory depends. Please feel free to contact me to discuss NELH concerns involving the proposal development.

Best regards,

Jack P. Huizingh
Executive Director

cc: Kent M. Keith
Dr. Tom Daniel (w/EISPN)

RECEIVED
JUN 1 . 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

220 South King Street, Suite 1280 • Honolulu, HI 96813 • (808) 546-7017
P.O. Box 1749 • Kailua-Kona, HI 96745 • (808) 329-7341

HELBER HASTERT VAN HORN & KIMURA Planners
HHVH&K
Grosvenor Center
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Mark H. HASTERT AICP
Richard R. VAN HORN AICP, AIA
Glenn T. KIMURA
Nancy I. NISHIKAWA AICP
Thomas A. FEE AICP

19 June 1986

Mr. Jack P. Huizingh
Executive Director
The Natural Energy Laboratory of Hawaii
2220 South King Street, Suite 1280
Honolulu, HI 96813

Dear Mr. Huizingh:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our preparation notice for the subject project by letter dated 12 June 1986. As I mentioned in our telephone conversation on June 17, the Draft EIS will address water quality issues based on a marine baseline assessment that will be conducted shortly.

The information you provided on environmental data kept by the NELH is appreciated and I will forward it to our water quality consultant. It is our intent to establish a sound basis for monitoring relative changes in key nearshore water quality indicators and marine biological communities.

If you have any further concerns, please do not hesitate to contact us.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

Dante K Carpenter
Mayor

Eugene N Tiwanak
Managing Director

Patricia G Engelhard
Director

Ronald Okamura
Deputy Director

DEPARTMENT OF PARKS & RECREATION
COUNTY OF HAWAII

May 21, 1986

Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn & Kimura, Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Subject: EIS Preparation Notice for
O'oma II Resort, North Kona, Hawaii
TMK: 7-3-09:4

Dear Ms. Nishikawa:

Reference is made to the proposed public beach park located on the NW corner of the site and access to this facility. The preliminary land use plan (figure 10) shows access being gained from a coastal trail paralleling the shoreline and no apparent access from the roadway servicing the Hi-Tech Aquaculture area. The narrative portion of the report (Public Access, page 4) does, however, mention that "A public park with parking and beach right-of-way is planned." This would indicate that vehicular access to or near the park is planned.

We would appreciate clarification of this item when preparing the EIS document and also the opportunity to review detailed plans of the park and access as the project progresses.

Thank you and if any questions should arise regarding our comments, please do not hesitate to contact this office.

Sincerely,

Patricia Engelhard
Director

PE:GM:ai

RECEIVED
MAY 23 1986
HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

• 25 AUPUNI STREET • HILO HAWAII 96720 • TELEPHONE 961-8311

10 June 1986

Ms. Pat Engelhard, Director
Department of Parks and Recreation
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Ms. Engelhard:

It was a pleasure to meet you and Parks Planner, Glenn Miyao, on Wednesday, June 4.

As we mentioned during our meeting, public beach access points are planned at the north and south ends of the property. Parking areas provided at these locations are expected to be terminuses for vehicular traffic, although pedestrian movement along the shoreline will be permitted. Access from the highway to the southern parking area is via the project's internal roadway system. The unimproved road from the highway to the Natural Energy Laboratory of Hawaii (NELH) is currently used for coastal access. Use of this road is intended to provide a connection between the highway and the driveway into the northern parking area on the O'oma II property. We will be contacting officials of the HOST Park and NELH to discuss plans for the existing access road. The Draft EIS will contain a detailed discussion of public beach access.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

DANE K. CARPENTER
Mayor

HUGH Y. ONO
Chief Engineer

BRUCE C. McCLURE
Deputy Chief Engineer

DEPARTMENT OF PUBLIC WORKS

COUNTY OF HAWAII · 25 AUPUNI STREET · HILO, HAWAII 96720 · TELEPHONE (808) 961-8321

June 5, 1986

RECEIVED
JUN 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

MS NANCY I NISHIKAWA
HELBER HASTERT VAN HORN & KIMURA PLANNERS
733 BISHOP STREET SUITE 2590
HONOLULU HI 96813

SUBJECT: O'OMA II RESORT, EISPN
North Kona, Hawaii

The following are individuals to contact to discuss the project further:

1. Engineering & Surveys — Robert Yanabu
2. Traffic Services — Richard Nishimura
3. Waste Management — Harold Sugiyama
4. Building — Herbert Hayama

HUGH Y. ONO
Chief Engineer

DEM:aa

HELBER HASTERT VAN HORN & KIMURA Planners

H·H·M&K

10 June 1986

Mr. Hugh Y. Ono, Chief Engineer
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Ono:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project. At your suggestion, we will be contacting shortly those individuals identified in your June 5 letter.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

25 AUPUNI STREET • HILO HAWAII 96720

May 22, 1986

RECEIVED
MAY 29 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn & Kimura
Grosvenor Center, PRI Tower
733 Bishop Street, Suite 2590
Honolulu, HI 96813

ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE
O'OMA II RESORT
TAX MAP KEY 7-3-9:4

Based on the prevailing water situation in the area, water is not available for the proposed development. Additional source and transmission facilities are required to be constructed.

H. William Sewake
Manager

QA

...Water brings progress...

HHVH&K

10 June 1986

Mr. H. William Sewake, Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Sewake:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 22 May 1986.

In response to your comment regarding the absence of water service to the proposed development, our engineering consultants will be contacting your agency to obtain current information on the prevailing water situation in the North Kona area and to discuss alternative means of providing water for domestic and irrigation use. A discussion of proposals for the project's water system, as well as the interrelationships with a regional water system, will be contained in the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

DANTE K. CARPENTER
MAYOR

HAWAII COUNTY FIRE DEPARTMENT
466 KINOOLE ST. HILO, HAWAII 96720
PHONE: 935-2978

FRANCIS E. SMITH
FIRE CHIEF

DON COLOMA
DEPUTY FIRE CHIEF

May 21, 1986

Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn & Kimura
Planners
Grosvenor Center
PRI Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Ms. Nishikawa:

Subject: O'oma II Resort, North Kona, Hawaii
Environmental Impact Statement Preparation Notice

In response to your request dated May 16, 1986, Captain Ward Taira, officer in charge of the Fire Prevention Bureau, is designated as your contact person. Please direct all inquiries to him. He can be reached at 961-8331, or all correspondence may be sent to him at Hawaii County Fire Department, 466 Kinoole Street, Hilo, Hawaii 96720.

Sincerely,

DON COLOMA
DEPUTY FIRE CHIEF

DC/mo

cc: Capt. W. Taira

RECEIVED
MAY 23 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

HELBER, HASTERT, VAN HORN & KIMURA
Planners
HHVH&K

10 June 1986

Mr. Don Coloma, Deputy Fire Chief
Hawaii County Fire Department
466 Kinoole Street
Hilo, HI 96720

Dear Deputy Chief Coloma:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 21 May 1986.

At your suggestion, we will be contacting Captain Ward Taira shortly for input to the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

COUNTY OF HAWAII

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720
(808) 961-8288

DANTE K. CARPENTER
Mayor

ALBERT LONO LYMAN
Director

ILIMA A. PHANUAIA
Deputy Director

May 20, 1986

Ms. Nancy I. Nishikawa
HHVH&K
Grosvenor Center PRI Tower
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Ms. Nishikawa:

Ooma II Resort EIS Preparation Notice (EISPN)

Thank you for the opportunity to submit comments for consideration in the draft EIS for the subject General Plan Amendment.

We have no comments to offer at this time.

Sincerely,

ALBERT LONO LYMAN
Planning Director

VKG:lv

RECEIVED
MAY 23 1986
BELKER, HASTERT, VAN HORN & KIMURA PLANNERS

XI-28

POLICE DEPARTMENT

COUNTY OF HAWAII
349 KAPIOLANI STREET
HILO, HAWAII 96720

GUY A. PAUL
CHIEF OF POLICE

WAYNE G. CARVALHO
DEPUTY CHIEF

OUR REFERENCE

YOUR REFERENCE

May 27, 1986

Ms. Nancy I. Nishikawa
Helbert, Hastert, Van Horn & Kimura, Planners
Grosvenor Center
PRI Tower
733 Bishop Street
Suite 2590
Honolulu, Hawaii 96813

Re: O'oma II Resort
North Kona, Hawaii
EISPN

Thank you for your letter of May 16, 1986, with the detailed EISPN with maps.

Please contact Inspector Raymond Glory regarding the police department's comments regarding this project by calling him at 961-2341.

GUY A. PAUL
CHIEF OF POLICE

GAP
sf

cc: Inspector Raymond Glory

10 June 1986

Mr. Guy A. Paul, Chief of Police
Hawaii County Police Department
349 Kapiolani Street
Hilo, HI 96720

Dear Chief Paul:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 27 May 1986.

At your suggestion, we will be contacting Inspector Raymond Glory shortly for input to the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

HAWAII ELECTRIC LIGHT COMPANY, INC. • PO BOX 1027 • HILO, HI 96721-1027

CUST
H-W/G

HEI

June 17, 1986

RECEIVED
JUN 18 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Helber, Hastert, Van Horn & Kimura Planners
Grosvenor Center, PRI Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Attention: Mr. Mark Hastert

Gentlemen:

Subject: Environmental Impact Statement Preparation Notice:
Ooma II Resort, North Kona, Hawaii
TMK: 7-3-9:4

We have reviewed the above project and have the following comments:

It appears that if this development should occur in its entirety, a substantial load will be added to the HELCO system; however, we do not have any electrical facilities within the area except for a 69KV transmission line along Queen Kaahumanu Highway. A transmission line extension, substation and 12.47KV distribution system will be required to service the area. Since design and equipment delivery take longer than a year, the developer should submit firm plans to HELCO as soon as possible.

If there are any questions on this, please call Melvin Yamaki at 969-0323.

Very truly yours,

Clyde H. Nagata
Sr. Electrical Engineer
Planning Division

CHN:MSY:ts

cc: Dennis H. Tanigawa

A Hawaiian Electric Industries Company

X1-30

HELBER HASTERT VAN HORN & KIMURA Planners
HHVH&K
Grosvenor Center
PRI Tower
733 Bishop Street
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2590
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HHVHK HW
Larry E.
HELBER
AIA
Mark H.
HASTERT
AICP
Richard H.
VAN HORN
AICP, AIA
Glenn T.
KIMURA
Nancy I.
NISHIKAWA
AICP
Thomas A.
FEE
AICP

19 June 1986

Mr. Clyde H. Nagata
Sr. Electrical Engineer
Planning Division
Hawaii Electric Light Company, Inc.
P.O. Box 1027
Hilo, HI 96721-1027

Dear Mr. Nagata:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 17 June 1986.

The information you provided regarding expansion of the electrical distribution grid to service the project will be included in the Draft EIS.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

HAWAIIAN TEL GTE

Hawaiian Telephone Company
PO Box 4249
Hilo Hawaii 96720
Telephone (808) 935-9411

May 28, 1986

RECEIVED
MAY 31 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Helber, Hastert, Van Horn & Kimura, Planners
Grosvenor Center, PRI Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813
Attn: Nancy I. Nishikawa

Reference: EISPN for O'oma II Resort; North Kona, Hawaii

Dear Ms. Nishikawa,

Thank you for including Hawaiian Telephone Company as a participant in your EIS preparation.

We have the following comments relating to Hawaiian Telephone Company providing telephone services to your proposed development:

1. Our existing facilities are located about 100 feet mauka of Queen Kaahumanu Highway, and would require crossing the highway to reach your resort development.

2. I doubt that the State Highway Division will allow us to cross the highway with aerial facilities. Thus, you must provide underground facilities across the highway from your development to our existing poleline.

3. We may require an easement to house our facilities somewhere on your development. A portion covering about 400 square feet. The actual size will be dependent on what is required to adequately serve the development.

If you have any questions, please call me at 935-9459 or Rodney Kelii at 935-9595.

Sincerely,

Kenneth Tanaka
Kenneth Tanaka
Supervising Engineer

KT/pk

HELBER HASTERT VAN HORN & KIMURA Planners
HHVH&K

10 June 1986

Mr. Kenneth Tanaka
Supervising Engineer
Hawaiian Telephone Company
P.O. Box 4249
Hilo, HI 96720

Dear Mr. Tanaka:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 28 May 1986.

Your comments regarding expected easement and facility requirements for telephone services to the proposed development will be included in the Draft EIS. The information also will be forwarded to our engineering consultants for consideration in preliminary infrastructure planning and cost estimates.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

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

May 17, 1986

Dear Mr. Hastert,

I write in regard to the planned O'oma II resort and industrial area in North Kona. I understand that the County of Hawaii has required an environmental impact statement, and I wish to be a consulted party.

I am particularly interested in your efforts to foresee and analyze the cumulative impacts of this project along with all the other upcoming projects in West Hawaii. In 1981 Belt Collins made a detailed effort to look at cumulative impacts in North and South Kohala with the EIS for Mahukona Resort. Perhaps you would want to examine that work.

Please feel free to contact me if I may be of help.

sincerely, Bill Graham

Bill Graham
Box 155
Hawi, HI 96719
phone 889-5957

RECEIVED
MAY 20 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

XI-32

HELBER HASTERT VAN HORN & KIMURA Planners HHVH&K

10 June 1986

Mr. Bill Graham
P.O. Box 155
Hawi, HI 96719

Dear Mr. Graham:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

We have received your letter of 17 May 1986 which included your request to be a consulted party in the preparation of the O'oma II Resort EIS.

The issue of cumulative development impacts in West Hawaii is germane to planning in this region and one that will be addressed in the Draft EIS. I particularly appreciate your suggestion regarding a previous investigation of this issue which is contained in the 1981 EIS for the Mahukona Resort.

If you have other specific concerns, please do not hesitate to contact us.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

Mark Hastert
Helber, Hastert, Van Horn
and Kimura, Planners
Grosvenor Center, PRI Tower
733 Bishop St. Ste. 2590
Honolulu, Hi. 96813

RECEIVED
MAY 31 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

May 27, 1986

Dear Mr. Hastert,

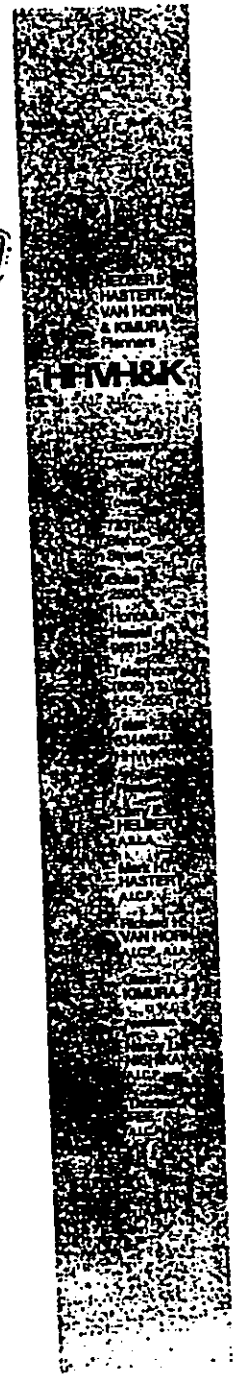
The Sierra Club, Moku Loa Group, wishes to be a consulted party on the matter of the O'OMA II Resort General Plan Amendement.

We request a copy of the EIS for our review. All of the five factors which triggered the EIS process are of concern to the Club.

Please address all correspondence to Sierra Club, Moku Loa Group Conservation Committee P.O. Box 1137 Hilo, Hi 96721.

Thank you,

Nelson Ho
Conservation Committee



10 June 1986

Mr. Nelson Ho
Sierra Club-Moku Loa Group
Conservation Committee
P.O. Box 1137
Hilo, HI 96721

Dear Mr. Ho:

O'oma II Resort, North Kona, Hawaii, TMK: 7-3-09:04
Environmental Impact Statement Preparation Notice

We have received your letter of 27 May 1986 which included the Sierra Club-Moku Loa Group's request to be a consulted party in the preparation of the O'oma II Resort EIS.

The Draft EIS is targeted for submittal to the Office of Environmental Quality Control in mid summer. Upon completion, we will notify you about the document's availability to facilitate review and comment. If there are particular concerns that the Moku Loa Group would like to see addressed in the Draft EIS, please do not hesitate to contact us.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

CHAPTER XII

CHAPTER XII

REFERENCES

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CHAPTER XIII

CHAPTER XIII

PARTIES WHO REVIEWED AND COMMENTED ON THE DRAFT EIS

A notice announcing the availability of the Draft Environmental Impact Statement (DEIS) was published in the OEQC Bulletin on 8 August 1986. The Office of Environmental Quality Control sent a copy of the DEIS with a request for their comments to the agencies, organizations, and individuals listed below. Review copies of the DEIS were transmitted to County agencies by the Hawaii County Planning Department. Only those County agencies that responded with written comments are listed below.

Parties who replied with a "no comment" statement are marked with a single asterisk. Those who sent substantive comments are indicated with two asterisks. Their letters are reproduced followed by our responses. The Attachments referenced in our responses have not been reproduced if they are also appended to the EIS.

Federal Agencies

Army Corps of Engineers
Army Facilities Engineering
Coast Guard
* Navy
Department of Agriculture
* Soil Conservation Service
Department of Housing and Urban Development
Department of the Interior
* Fish and Wildlife Service
Department of Transportation
** Federal Aviations Administration

State Agencies

** Department of Accounting and General Services
** Department of Agriculture
* Department of Defense
Department of Education
** Department of Health
Department of Land and Natural Resources
State Historic Preservation Office
** Department of Planning and Economic Development
High Technology Development Corporation
** Natural Energy Laboratory of Hawaii
State Energy Office
Department of Social Services and Housing
** Hawaii Housing Authority
** Department of Transportation
** Airports Division

University of Hawaii

** Environmental Center
* Water Resources Research Center

County Agencies

** Department of Parks and Recreation
** Department of Public Works
* Department of Water Supply
** Planning Department

Public Utilities

Hawaii Electric Light Co.
* Hawaiian Telephone Company

Individuals/Community Organizations

Bill Graham
Bruce Tsuchida, R. M. Towill
** Sierra Club, Moku Loa Group

US Department
of Transportation
Federal Aviation
Administration

AIRPORTS DISTRICT OFFICE
BOX 50244
HONOLULU, HI 96850-0001
Telephone: (808)546-7129

August 20, 1986

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

Dear Mr. Lyman:

We have reviewed the Draft Environmental Impact Statement for the proposed O'oma II Resort, North Kona, Hawaii. Our major concern is the development of residential areas beneath or near aircraft approach and departure patterns and the related noise exposure. Therefore, we suggest the EIS be coordinated with the Keahole Airport Master Plan and Noise Compatibility Study and the action on the EIS be delayed until noise exposure contours are available from the study.

We also note that the Keahole Airport was built in 1969 (p. IV-5) and two of the three mainland flights are from/to San Francisco, with one from/to Los Angeles.

We appreciated the opportunity to review the Draft EIS.

XIII-3

Sincerely,

David J. Welhouse
Airport Engineer/Planner

Henry A. Sumida
Airports District Office Manager

cc:
Nancy I. Nishikawa

RECEIVED
AUG 21 1986
BELSER, MASTERT, VAN HORN
& KUMUYA PLANNERS

22 September 1986

Mr. David J. Welhouse, Airport Engineer/Planner
Federal Aviation Administration
Airports District Office
P.O. Box 50244
Honolulu, HI 96850-0001

Dear Mr. Welhouse:

Environmental Impact Statement (EIS for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for your reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 20 August 1986.

Comment: Our major concern is the development of residential areas beneath or near aircraft approach and departure patterns and the related noise exposure.

Response: We agree with your concerns regarding the development of residential areas beneath or near aircraft approach and departure patterns and the related noise exposure. However, because the State is just getting its noise studies underway and does not anticipate completion until next year, we have undertaken our own studies in order to derive a reasonable understanding of the noise impacts on the site.

The EIS which you reviewed presented the first run on our model using 1985 base year data. Since then we have refined our inputs, prepared forecasts, and rerun the model for 1985, 1995, and 2005. That information was forwarded to Mr. Herb Kido of the State Airports Division on September 8, 1986, and a copy is enclosed for your use. (The noise contours showing projected air operations at Keahole Airport have been appended to the Final EIS as Appendix M.) We have also shown how the site plan for the property could be adjusted to accommodate changes in the L_{dn} contours as described in the letter to Mr. Kido.

Comment: We suggest the EIS be coordinated with the Keahole Airport Master Plan and Noise Compatibility Study and the action on the EIS be delayed until noise exposure contours are available from the study.

Response: It is important to understand that we are only in the early stages of the development approval process for this project. Presently, we have applied for a County General Plan amendment and a State Land Use Commission boundary amendment. Neither of these steps require that specific boundaries be tied down for residential areas within the project site. It is only when we get to the zoning and shoreline management area permit steps that specific land use boundaries be defined. By the time we apply for

these approvals, we anticipate that the State will have completed its studies and that the findings can be incorporated into our plans.

Therefore, it is not possible to coordinate our EIS with the Keahole Airport Master Plan and Noise Compatibility Study as you suggest, but it is possible to coordinate our overall planning effort with the State's work as we move through the approval process over the next year or so. You will recall that in a meeting on May 5, 1986 with you, Mr. Kido, Mr. Schlei, and Messrs. Hastert and Fee from our office, you agreed that the exact land use boundaries could be worked out at the zoning/SMA stage and that the general approvals for the project concept could proceed prior to the completion of the State's work.

We would like to emphasize that it is our client's sincere desire to be a good neighbor with the airport and to use its proximity as an asset rather than a detriment. Thus, he is willing to notify all parties who become involved in the project of the potential noise impacts and to use whatever mitigative measures are necessary to insure that acceptable noise standards for habitable spaces are achieved.

Comment: We note that the Keahole Airport was built in 1969 (page IV-5). Two of the three mainland flights are from/to San Francisco, with one from/to Los Angeles.

Response: The EIS has been revised to reflect this information. The overseas flight information has been noted.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy L. Nishikawa

Nancy L. Nishikawa

Attachment

cc: Hawaii County Planning Department

XIII-5

(P)1890.6

SEP 10 1986

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

RECEIVED
SEP 12 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Dear Mr. Lyman:

Subject: Ooma II
North Kona, Hawaii
Draft Environmental Impact Statement

We have reviewed the DEIS for the subject project and have the following comments to offer:

1. The final EIS should express a greater concern for the need of high quality ocean water at the Hawaii Ocean Science and Technology (HOST) Park and the Natural Energy Laboratory of Hawaii developments.

2. The seawater disposal alternatives discussed on page VI-10 should be updated to reflect the HOST Park project's current choice of shallow trenches for seawater return alternative.

Thank you for the opportunity to comment on this EIS. If there are any questions, please have your staff call Mr. Ralph Yukumoto of the Planning Branch at 548-5703.

Very truly yours,

D. Dominaga

TEUANE TOMINAGA
State Public Works Engineer

RY:jnl
cc: Ms. Nancy Nishikawa
Mr. William Bass, Jr.
Mr. Jack Huizingh

[redacted]

22 September 1986

Mr. Teuane Tominaga
State Public Works Engineer
Department of Accounting and General Services
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Tominaga:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 10 September 1986.

Comment: The final EIS should express a greater concern for the need of high-quality ocean water at the HOST Park and NELH developments.

Response: The existing high quality of the nearshore waters is recognized as a valuable asset. This resource is used for research and experimentation at NELH, by commercial aquaculture enterprises, by recreationists in the community, and provides habitat for marine flora and fauna. In particular, we note that the proposed Ooma II development contains an area designated for high technology aquaculture. Future tenants, like those at the HOST Park, would rely on sea water as a growing medium. Therefore, maintaining high water quality and properly disposing of used sea water are major concerns, not only as a "good neighbor" policy, but for the ultimate success of the overall project as well. We have initiated preliminary discussions regarding opportunities for concerned parties to cooperate on an ongoing program to monitor water quality, which would detect abnormal changes in water quality parameters and identify the probable source of pollutants.

Comment: The seawater disposal alternatives should be updated to reflect the HOST Park project's current choice of shallow trenches for the seawater return alternative.

Response: Appropriate sections of the EIS have been revised as noted.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Planning Department

GEORGE R. ARIYOSHI
GOVERNOR

JACK K. SUWA
CHAIRPERSON, BOARD OF AGRICULTU

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 96822-01

September 5, 1986

MEMORANDUM

To: Mr. A. Lono Lyman, Director
County of Hawaii Planning Department

Subject: Draft Environmental Impact Statement (EIS) for
O'oma II Resort
Kahala Capital Corporation
TMK: 7-3-09: 4 North Kona, Hawaii
Acres: 313.66

The Department of Agriculture has reviewed the subject document and offers the following comments.

According to the subject EIS, the proposal involves the development of a 313.66-acre parcel just south of the Ke-ahole Airport into a resort community. Included in the proposal are a 600-room hotel, 600.resort condominiums, an 18-hole golf course, and a "high tech park".

The Draft EIS indicates the proposed project's total water requirement at full development to be 1.34 million gallons per day. We note that water development for the subject project and others in the vicinity continues to be proposed on a case-by-case basis. While it appears that the ground water resources in the area are sufficient to meet current and projected demand, we continue to believe that development of water resources in this area should be done in a comprehensive manner with consideration given to water source and distribution facilities.

Thank you for the opportunity to comment.

Jack K. Suwa
JACK K. SUWA
Chairman, Board of Agriculture

cc: Ms. Nancy I. Nishikawa,
Helber, Hastert, Van Horn and Kimura, Planners
OEQC

22 September 1986

Mr. Jack K. Suwa, Chairman
Board of Agriculture
1428 S. King Street
Honolulu, HI 96814-2512

Dear Mr. Suwa:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your memorandum to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 5 September 1986.

Comment: We note that water development for the subject project and others in the vicinity continues to be proposed on a case-by-case basis. While it appears that the ground water resources in the area are sufficient to meet current and projected demand, we continue to believe that development of water resources in this area should be done in a comprehensive manner with consideration given to water source and distribution facilities.

Response: Your comment regarding regional coordination of water development has been noted.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Planning Department

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

LESLIE S. MATSUBAI
DIRECTOR OF HEALTH

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

In reply, please refer to
EPHSO

September 2, 1986

RECEIVED
SEP 4 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

MEMORANDUM

To: Mr. Albert Lono Lyman, Director
Planning Department, County of Hawaii

From: Deputy Director for Environmental Health

Subject: Draft Environmental Impact Statement (EIS) for Ooma II, North Kona, Hawaii

Thank you for allowing us to review and comment on the subject draft EIS.

The EIS does not address the impact of tying into the proposed County of Hawaii wastewater treatment facility, which will be built south of Honokowai Boat Harbor.

The proposed project is located in the planning area for the Kailua-Kona Northern Zone Facility Plan. However, no flows from the proposed project were included in the 20-year projections for the facility plan.

JAMES K. IKEDA

cc: Ms. Nancy I. Nishikawa ✓
DHO, Hawaii

22 September 1986

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

Dear Mr. Ikeda:

Environmental Impact Statement for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your memorandum to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 2 September 1986.

Comment: The EIS does not address the impact of tying into the proposed County wastewater treatment facility sited south of Honokohau Boat Harbor.

Response: The Draft EIS does not address the impact of tying in to the proposed County wastewater treatment facility south of Honokohau Boat Harbor due to insufficient capacity of the facility. The County of Hawaii Department of Public Works has stated that, as currently planned, the proposed facility at Honokohau will not have capacity to accommodate wastewater generated from the north, including the proposed Ooma II development. Due to space considerations, the Department of Public Works did not favor providing the additional sewage lagoons at Honokohau which would be required for treatment of Ooma II wastewater.

Comment: The proposed project is located in the planning area for the Kailua-Kona Northern Zone Facility Plan. However, no flows from the proposed project were included in the 20-year projections for the facility plan.

Response: Development of the Ooma II area was not anticipated when the Kailua-Kona Northern Zone Facility Plan was prepared, therefore, wastewater flows from the proposed project are not included in the 20-year projections. This item is of little consequence insofar as wastewater treatment is concerned because a private treatment facility will be employed.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Department of Planning

GEORGE R. ARIYOSHI
GOVERNOR
KENT M. KEITH
DIRECTOR
MURRAY E. TOWILL
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DEPUTY DIRECTOR

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

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INFORMATION OFFICE

Ref. No. P-4993

September 4, 1986

The Honorable Albert Lono Lyman
Planning Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Subject: Draft EIS for O'oma II, North Kona, Hawaii

We have reviewed the subject draft environmental impact statement (EIS) and offer the following comments.

1. In Appendix A of the Draft Environmental Impact Statement for O'oma II, Kalaoa and Waikoloa are cited as existing and planned subdivisions which should more than compensate for increased, tourism generated demand for housing. In the discussion of population and housing it is stated that, "Based on historical preferences, current economic/growth trends, and availability of infrastructure it is highly probable that a significant majority of future residential inventory (sites and homes) will be added near the existing communities of Waimea, Kalaoa-Kealakehe, and the Kailua-Kona to Keauhou corridor." It also states that the Kalaoa-Kealakehe area is desirable because of the "cooler climactic conditions (a major factor)" and that, plans to develop 1,800 lots in the Kalaoa area are currently being discussed with County planners, and are to receive approval for subdivision as County water becomes available. On Page A-18, the difficulty in obtaining subdivision and governmental approvals and the cost of infrastructure construction (particularly water) are cited as deterrents to large scale residential development in the Kalaoa area. Considering the water source development problem in the area and its effect on the availability of housing, the Draft EIS should discuss in greater detail the regional impacts of tourism growth on housing.

2. As shown in Appendix E of the Draft EIS, the LDN levels for the subject property are considerably affected by the flight patterns for takeoff and landing. The percent of "turning" operations versus "straight in-out" operations should be provided.

8-III-X

The Land Use section of Chapter IV discusses the visitor projections to the year 2005. These increases would affect the number of aircraft operations for air carriers, air taxi and general aviation. Projections of increased flight operations should be included in the Draft EIS.

According to the Draft EIS commercial air tours, general aviation aircraft and military training flights fly over the subject property and have a greater impact on noise levels. Since air carriers account for only approximately 22 percent of the air traffic with the above mentioned flights accounting for the remaining 78 percent, it would appear that the "straight in-out" LDN contour would be most applicable to the project noise impacts and should be included in the aircraft noise section instead of the contour map for 100 percent "turning" operations.

3. Table 10 in Section IV shows cumulative resort development. Although this table indicates proposed and existing developments for North Kona, it only shows existing resorts for South Kohala and other Big Island resorts. As the proposed developments in South Kohala will also contribute to the projected island resort units, the Draft EIS should include proposed developments for South Kohala.

4. The Hawaii Ocean Science and Technology (HOST) Park and Natural Energy Laboratory of Hawaii are both reliant on contaminant free, nutrient rich water from the deep ocean, and on nutrient deficient water from the ocean's surface. The proposed activity can potentially alter the quality of these waters and impact the users of the resource. However, in finding negligible impacts from the project, the subject document does not substantiate its conclusion. Notable in this regard is the absence of data on water quality and related impacts which we understood were to have been included in the marine baseline assessment.

5. According to the Market Study and Highest and Best Use Analysis, among the general attributes which contribute to the desirability of an individual site for resort development are "an extensive white (or golden) sand beach and protected swimming and diving areas." "Beach enhancement" is noted as a requirement for resort use of the site. Also swimming potentials for the site are described as poor to average and average to good. Mention is made of the development of swimming lagoons to improve the swimming potential. Since resort development of these attributes are important to resort development, the impacts associated with beach enhancement and lagoon development should be included in the Draft EIS.

6. Although the Draft EIS discusses beach access and the Preliminary Land Use Plan Map (Figure 3) shows beach parking, there is no provision for a public beach park or facilities. The Draft EIS should discuss the provision of improved public recreational facilities in the subject area.

7. There has been public discussion concerning a possible land exchange with the State which would include a change in the land use concept for the project. The Draft EIS should discuss any proposed exchange and possible impacts of such an exchange.

8. The proposed resort development at O'oma II is located immediately south of the HOST Park. The compatibility of the resort complex adjacent to aquaculture, mariculture and other ocean-related commercial operations should be discussed in terms of future plans for expansion, noise, odors, visual considerations and other environmental effects.

9. An issue listed as unresolved is the degree to which the shoreline will be modified. Details for the use of the marine park also remain undisclosed. Regarding the document's organization, we note the omission of the chapter describing probable adverse impacts which cannot be avoided. These should be discussed in the document to avoid the need for further assessment in a supplemental impact statement.

10. Additionally, relative to the listing of permits and approvals on Page II-12, please be advised that if a U.S. Army Corps of Engineers permit is required for the project, a Coastal Zone Management (CZM) consistency determination from our department will also be required in accordance with Federal CZM regulation, 15 CFR Part 930.

Thank you for this opportunity to comment on the subject document.

Very truly yours,

Murray E. Towill

for Kent M. Keith

cc: Office of Environmental Quality Control
Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn & Kimura, Planners

22 September 1986

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

Dear Mr. Keith:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 4 September 1986.

Comment: Considering the water source development problem in the area and its effect on the availability of housing, the Draft EIS should discuss in greater detail the regional impacts of tourism growth on housing.

Response: Regional demand for housing is related to tourism growth through three markets. First, to the extent that a resort project hires employees that currently do not reside in the region, additional housing is required for these employees. The Ooma II project does not include employee housing per se; however, it is not inconceivable that some of the employees would choose to live on site in the proposed multi-family housing area. A second market consists of people who work elsewhere, but desire to live in resort communities because of the breadth of amenities often provided. The third market consists of purchasers of vacation or second homes, who may have been attracted to an area because of pleasurable experiences during an earlier visit. The Ooma II land use plan allocates acreage for multi-family housing; however, the degree to which the development would draw from each of the three markets, and contribute to the regional inventory of units that are targeted toward the respective markets, would be contingent upon more detailed market analyses and attendant projections of market conditions.

With regard to water availability, our discussions with the Hawaii County Department of Water Supply indicate that adequate water can be made available to the project if the developer contributes to the cost of developing source and transmission facilities. The developer would also be expected to share in the cost of secondary impacts of resort development by participating in an employee housing program coordinated through the County.

Comment: The L_{dn} levels for the subject property, shown in Appendix E, are considerably affected by flight patterns for take-off and landing. The percent of "turning" operations versus "straight in-out" operations should be provided.

Response: The two figures, one based on 100% turning operations and the other based on 100% straight in-out operations, indicate a range of potential impacts by showing what could occur at the theoretical extremes; the actual situation would lie somewhere between these sets of contours. Determining the percent "turning" versus "straight in-out" for current operations would not be meaningful in identifying future impacts since the absence of development in the surrounding area circumvents the need for controls over flight operations. The existing modus operandi, therefore, is not indicative of routine flight controls that could be employed if the surrounding area were developed.

Comment: Projections of increased flight operations should be included in the Draft EIS.

Response: Attachment 1 to this letter (Appendix M of the Final EIS) provides projections of increased air traffic operations in 1995 and 2005. Also included are noise contours corresponding to the projected levels of air operations in those years and the assumptions under which the analysis was performed.

Comment: Since air carriers account for some 22 percent of the air traffic, with commercial air tours, general aviation aircraft, and military training flights accounting for the remaining 78 percent, it would appear that the "straight in-out" L_{dn} contour would be most applicable to the projected noise impacts.

Response: Although air carriers account for a smaller proportion of total Keahole air operations than other types of aircraft, the heavier, turbo jet aircraft have a disproportionately large impact on the noise profile. The bulk of commercial air tours, general aviation aircraft, and military aircraft are propeller aircraft. As mentioned above, future development of properties near the airport would probably require a review of aircraft landing and takeoff procedures to address safety and nuisance concerns.

Comment: Table 10 in Section IV should include proposed developments for South Kohala.

Response: Table 10 (page IV-32) and the accompanying text have been revised to include proposed developments for North and South Kohala.

Comment: In finding negligible impacts from the project, the subject document (the Draft EIS) does not substantiate its conclusion. Notable in this regard is the absence of data on water quality and related impacts which we understood were to have been included in the marine baseline assessment.

Response: The report by marine consultant, Steven Dollar, Appendix C, is the basis for the conclusions reported in the Draft EIS and should be referred to for a more complete discussion of impacts from the project.

Since the report was prepared, Dollar has constructed a basic model of groundwater transport of nutrients originating from golf course treated sewage irrigant to arrive at an estimate of the effects to marine waters. Nutrient input estimates for the mode were based on data from the Mauna Lani golf course, estimates of nutrient uptake by bermuda grass were taken from studies by the Water Resources Research Center, and estimates of offshore currents were taken from a study by Noda and Associates prepared for the Kohana-iki Resort Draft EIS. The results of the model indicate that irrigating an 18 hole golf course with secondary treated sewage potentially could increase the nutrient content of off-shore waters by only about 0.5% for nitrogen and 0.06% for phosphorus above present levels. In most situations the increases derived by the model calculations are below the level of detection; however, the proximity to NELH and HOST Park presents a unique situation. Preliminary discussions with NELH and HOST Park have been initiated concerning cooperation of concerned parties in a water quality monitoring program that would be able to detect significant changes in water quality parameters and to identify the probable source of the pollutant.

Baseline water quality data from NELH is reproduced in Attachment 2 (Appendix L of the Final EIS).

Comment: Since development of attributes, such as an extensive sandy beach and protected swimming and diving areas, are important to resort development, the impacts associated with beach enhancement and lagoon development should be included in the Draft EIS.

Response: The statement taken from the Market Study is applicable to resort developments in general and does not necessarily apply to the Ooma II development. Lagoon construction is not being considered for the Ooma II project. The Draft EIS mentioned the potential for shoreline modification, including the possible replenishment of sand to widen the existing beach; however, further study is needed to determine the scope of such action, and whether it would be feasible. Environmental impacts would be explored as part of part of a feasibility study.

Comment: Although the Draft EIS discusses beach access and the Preliminary Land Use Plan (Fig. 3) shows beach parking, there is no provision for a public beach park or facilities. The Draft EIS should discuss the provision of improved public recreational facilities in the subject area.

Response: In our discussions with the County Department of Parks and Recreation, the focus of concern has been the provision of adequate public access to the shoreline. While park officials support the provision of public beach parking, they do not favor developing an improved public beach park,

which would incur perennial maintenance costs. The developer will coordinate detailed planning of public beach parking areas and accesses with the County.

Comment: The Draft EIS should discuss any proposed exchange and possible impacts of such an exchange.

Response: The proposed land exchange involves approximately 85 acres in the northern portion of Ooma II for a comparable amount of land in the southern portion of the HOST Park. The State DLNR is currently processing a Conservation District Use Application (CDUA) for a conditional use permit that would allow consolidation and resubdivision of the Ooma II property and State lands, a precursor to further administrative and legislative action required to authorize the land exchange. We have included the CDUA as Attachment 3 (Appendix J of the Final EIS). A subsequent refinement of the land use plan for the reconfigured Ooma II parcel is included as Attachment 4 (Appendix K).

Comment: The compatibility of the resort complex adjacent to aquaculture, mariculture, and other ocean-related commercial operations should be discussed in terms of future plans for expansion, noise, odors, visual considerations, and other environmental effects.

Response: The Ooma II project itself allocates land for aquaculture development. However, in siting the various land uses, an effort has been made to spatially segregate uses that, if juxtaposed, could create noise and odor nuisances. Buffers, notably the golf course, provides a visual screen, and landscaping treatment can be designed to accommodate specific problem areas.

Comment: Details for the use of the marine park remain undisclosed.

Response: Discussions currently are in progress to decide upon desired features of the proposed marine park. The Army Corps of Engineers will be consulted as planning proceeds on the marine park and upon their advisement, a supplemental environmental impact statement would be prepared.

Comment: We note the omission of the chapter describing probable adverse impacts which cannot be avoided.

Response: The EIS has been organized to address each topic cohesively, therefore discussions of probable adverse impacts which cannot be avoided occur throughout the EIS under the respective subject headings. In addition, please refer to Chapter VIII on Irreversible and Irretrievable Commitments of Resources.

Comment: If a U.S. Army Corps of Engineers permit is required for the project, a Coastal Zone Management (CZM) consistency determination from DPED will also be required in accordance with Federal CZM regulation, 15 CFR Part 930.

Response: The CZM requirement for consistency review by DPED is noted and the list of permits and approvals on pages I-9 and II-12 have been revised.

Thank you for your comments on the Ooma II EIS. We will append your letter and this response to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

Attachments

cc: Hawaii County Planning Department

The Natural Energy Laboratory of Hawaii

September 8, 1986

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

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

Re: Draft Environmental Impact Statement O'oma II, North Kona, Hawaii

Dear Mr. Lyman:

Thank you for the opportunity to comment on the subject draft environmental impact statement. As we indicated in our letter of June 12, 1986 in answer to the NOP, our primary interest is to assure that the EIS addresses the preservation of the pure and pristine quality of the coastal waters upon which the future of our laboratory and its tenant users depend. In this respect, we offer the following comments for your consideration.

1. We believe the report should have modeled the groundwater transport of nutrients from the golf course to the coastline (in particular leaching of sewage effluent, fertilizers and herbicides) and their subsequent diffusion and advection in the coastal waters in light of the potential impacts on the NELH warm seawater intakes. The two warm seawater intakes (one located 303 ft. offshore and 20 ft. below the surface and the other 30 ft. offshore and 10 ft. below the surface) are as important as the cold seawater intakes to the success of NELH. Future plans at NELH and HOST call for the installation of five new pipelines this year and next with an additional 15 pipelines planned for the long term. The tenants of NELH and HOST park will be dependent on the quality of the warm and cold seawater being pumped ashore for their operations. What happens to the quality of the coastal waters as a result of this development is therefore most important to NELH and its users and should be addressed in greater detail.

   The high precision, surface water nutrient monitoring program referenced on page IV-16 is not an end in itself. The "spurious signal to the NELH data" is not what we are protecting, it is the potential pollution of the warm and cold seawater used for OTEC and mariculture. Pollution caused by seepage from the golf course and other urban development could result in adverse impacts to the research and commercial demonstration operations currently being conducted at NELH. NELH is currently developing treatment and monitoring measures of its own to assure that they do not pollute their own discharge receiving waters. Studies have shown that leaching of nutrients from a golf course into the nearshore waters does occur (Final Environmental Impact Statement - Waikoloa Beach Resort. 1985. U.S. Army Corps of Engineers, Honolulu District).

2. The statements concerning dilution and water exchange ignore the presence of eddies identified by Noda and Associates (Final Environmental Impact

220 South King Street, Suite 1280 • Honolulu, HI 96813 • (808) 548-7017
P.O. Box 1749 • Kailua-Kona, HI 96745 • (808) 329-7341

The Natural Energy Laboratory of Hawaii

Statement - Kohana-Iki Resort Community. 1986. Helber, Hastert, Van Horn & Kimura, Planners, Appendix H.). These eddies may tend to hold nutrient rich water and/or potential pollutants for longer periods of time. Although the monitoring program presented in the dEIS may identify changes in the marine structure or physio-chemical parameters, it would not, based on the information presented in the dEIS pinpoint the cause of any change. Adverse water quality cannot be remedied without identifying the cause of the problem.

3. Page IV-13 - Drainage. The impact of concentrating runoff toward NELH and HOST to the north end of the property should be made more explicit, especially as it might affect the quality of the nearshore waters.

4. Page IV-16 - Nutrient Loading. Eddies may tend to hold nutrient rich water for longer periods of time. In addition, secondary sewage treatment does not substantialy reduce nutrient loading. It merely changes the form from organic to inorganic and hence increased availability to algae.

5. Page IV-7 - Sea Water Disposal:

   Impact: Please reference calculation.

   Mitigation Measure: Sea water disposal by injection wells and trenches was not found unsatisfactory. In fact, HOST plans to construct a trench to dispose of its return sea water flows. NELH is also investigating a trench and deep injection wells.

6. Page IV-12 - Electric Mitigation. OTEC experiments at NELH have not been undertaken in the anticipation of reducing the consumption of petroleum used to generate electricity on the island of Hawaii. The close natural proximity of deep seawater at Ke-ahole Point, the ocean expertise of the University of Hawaii, and the State's ocean resources development objectives resulted in the selection of the Keahole Point as a preferred site at which to conduct OTEC research and development.

7. Appendix C. Page C-4 and map on C-5. The location of the control site is not specified.

Best regards,

Jack P. Huizinga
Executive Director

cc: B. Bass
[redacted]

22 September 1986

Mr. Jack P. Huizingh
Executive Director
The Natural Energy Laboratory of Hawaii
220 South King Street, Suite 1280
Honolulu, HI 96813

Dear Mr. Huizingh

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 8 September 1986. Some of the responses have been prepared with the assistance of the project's marine engineer, Steven Dollar, Ph.D.

Comment: We believe the report should have modeled the groundwater transport of nutrients from the golf course to the coastline and their subsequent diffusion and advection in the coastal waters in light of the potential impacts on the NELH warm water intakes. The two warm seawater intakes are as important as the cold seawater intakes to the success of NELH.

Response: Dollar subsequently constructed a simple model of groundwater transport nutrients originating from golf course treated sewage irrigant to arrive at an estimate of the effects to marine waters. Nutrient input estimates for this model were based on data from the Mauna Lani golf course, which currently uses secondary treated sewage for irrigation. Estimates of nutrient uptake by bermuda grass was taken from three reports prepared by the Water Resources Research Center, University of Hawaii, while estimates of off-shore currents were taken from a report by Edward K. Noda and Associates attached to the Kohana-iki Resort Draft EIS.

The results of the model indicate that irrigating an 18-hole golf course with secondary treated sewage potentially could increase the nutrient content of off-shore waters by only about 0.5% for nitrogen and 0.06% for phosphorous above present levels. Many of the assumptions made in arriving at these figures must be considered "best guesses" because of the lack of previous investigation of the problem.

A second run of the model, reflecting a "worst case" scenario, produced results of 8.8% for nitrogen and 6.6% for phosphorus, amounts that are just at the level of detectability. These levels of nitrogen and phosphorus would appear if half of the treated wastewater used to irrigate the golf course were to reach the ocean directly (without the mitigating effect of any filtering through the lava strata) and if off-shore water circulation were slowed by five times.

For most situations, the increases derived by the model calculations are below the level of detection, and would be considered insignificant. In the present case, however, the proximity to NELH and HOST Park may mean that even the slightest increase could have an impact. For this reason, we have initiated preliminary discussions regarding opportunities for concerned parties to cooperate on an ongoing program to monitor water quality, which would deject abnormal changes in water quality parameters and identify the probable source of pollutants.

Comment: The high precision, surface water nutrient monitoring program referenced in page IV-16 is not an end in itself. The "spurious signal to the NELH data" is not what we are protecting, it is the potential pollution of the warm and cold seawater used for OTEC and mariculture.

Response: We recognize that the NELH surface water nutrient monitoring program is a means of detecting water pollution. We also note that the proposed Ooma II development contains an area designated for high technology aquaculture. Future tenants, like those at HOST Park, would rely on the seawater as a growing medium. Therefore, maintaining the high quality of the water and proper disposal of used sea water is a major concern, not only as a "good neighbor" policy, but for the ultimate success of the overall Ooma development as well.

Comment: Studies have shown that leaching of nutrients from a golf course into the near-shore waters does occur (Final EIS for Waikoloa Beach Resort, U.S. Army Corps of Engineers, Honolulu District, 1985).

Response: It should be clarified that the influences owing to golf course irrigation at Waikoloa concern anchialine ponds only, and not the near-shore coastal waters. In fact, the Waikoloa EIS states that "...wave action and currents would result in rapid mixing as soon as the groundwater enters the ocean so that coastal water quality would be maintained" (page 4-15).

Comment: The statements concerning dilution and water exchange ignore the presence of eddies identified by Noda and Associates (Appendix H, Final EIS for Kohana-iki Resort Community), which may tend to hold nutrient rich waters and/or potential pollutants for longer periods of time.

Response: The eddies in question are large features with diameters of about 40 to 100 miles. The outer boundaries of the eddies, which sweep past the coastline, would probably serve to speed up the dispersal of groundwater-borne nutrients, rather than slow down their dispersal. Relative to the amount of nutrient input, the size of the eddies is of a magnitude that it is not feasible to consider the whole eddy as capable of influencing a specific region of shoreline (i.e., NELH).

Comment: The impact of concentrating runoff toward NELH and HOST Park to the north end of the property should be made more explicit.

Response: The drainage plan is conceptual. Discussions with civil engineers for Ooma II indicate that it would be possible to redirect flows so that impact of the northernmost outlet is shifted approximately 1,300 feet to the south of the northern boundary. At the same time, it should be remembered that the drainage plan is designed for overland sheet flow as a result of a 100-year storm.

Comment: Secondary sewage treatment does not substantially reduce nutrient loading. It merely changes the form from organic to inorganic, and hence increased availability to algae.

Response: The nitrogen and phosphorous levels reported above are inorganic substances.

Comment: Reference calculation for sea water disposal.

Response: The calculation of 5 million gallons per day (MGD) sea water discharge is based on a 50-acre site and the HOST Park disposal rate of 2.2 gallons per day per square foot. (Final EIS for Expansion of NELH and HOST Park, Traverse Group, Inc., 1985).

Comment: Sea water disposal by injection wells and trenches was not found unsatisfactory. In fact, HOST plans to construct a trench to dispose of its return sea water flows. NELH is also investigating a trench and deep injection wells.

Response: The section on environmental impacts and mitigation measures pertaining to sea water disposal (pages V-7 and V-8) was intended to state the concerns involved when applying the on-land disposal methods without judging the alternative as unsatisfactory. The EIS has been revised to clarify this point.

Comment: OTEC experiments at NELH have not been undertaken in the anticipation of reducing the consumption of petroleum used to generate electricity on the island of Hawaii.

Response: It is our understanding that OTEC has been supported by state and federal agencies in large measure because of its potential as an alternate source of energy, one that will someday attain large-scale commercial viability to reduce Hawaii's dependence on imported petroleum. The EIS has been revised to note that OTEC is at the experimental phase and reduction of petroleum consumption is not a near-term mitigative action.

Comment: The location of the control site is not specified on the map on page 5 of Appendix C.

Response: The control site was located approximately 800 feet north of the Kohana-iki's southern boundary. The transect at this protected location allowed comparison of the relative effects of storm stress to which the Ooma II coastline is subjected.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document which adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy L. Nishikawa

Nancy L. Nishikawa
Project Planner

cc: Hawaii County Planning Department

STATE OF HAWAII
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817-0907

86:PLNG/5584

September 5, 1986

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

Dear Mr. Lyman:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for O'oma II.

The need for employee housing due to the project has been recognized in the draft EIS. However, the Hawaii Housing Authority (HHA) would like to further request that at least ten percent (10%) of the housing be targeted for the low to moderate income population. This consideration is important especially in light of the findings noted within the statement that North Kona was found to have one of the highest housing costs in the county.

The HHA suggests that the developers work closely with the HHA or County of Hawaii Housing agency to meet this need. We also request to be kept apprised of the development of the project.

For any further questions please contact Colette Sakoda of my staff at 848-3226.

Sincerely,

RUSSELL N. FUKUMOTO
Executive Director

cc: Ms. Nancy I. Nishikawa
Helber, Hastert, Van Horn & Kimura, Planners

22 September 1986

Mr. Russell N. Fukumoto
Executive Director
Hawaii Housing Authority
P.O. Box 17907
Honolulu, HI 96817-0907

Dear Mr. Fukumoto:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 5 September 1986.

Comment: The need for employee housing due to the project has been recognized in the Draft EIS. However, the Hawaii Housing Authority (HHA) would like to further request that at least ten percent of the housing be targeted for the low to moderate income population.

Response: We have noted your comment regarding the need for housing that can be afforded by the low- to moderate-income market.

The developer intends to work with the County and/or State to meet housing needs generated by the project. The scope of housing needs will be determined before the project becomes operational, and a program to meet those needs will be established at the appropriate time.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Planning Department

4939
STP 8.1558

September 10, 1986

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

Dear Mr. Lyman

Draft Environmental Impact Statement
O'oma II, North Kona, Hawaii

We recommend that the accesses for the proposed development and the proposed adjacent Kohana-Iki development (TMK: 7-3-09: 3) be coordinated. Since the two accesses are only about 700 feet apart, consideration should be given to consolidating them into a single channelized intersection. We are also recommending one location for underground utility ductlines and waterline crossings. We further suggest the sharing of one substation.

The mitigation measures noted on Page VI-3 have our concurrence.

Our Airports Division will be submitting comments directly to your office.

Thank you for this opportunity to provide comments.

Very truly yours,

Wayne J. Yamasaki
Director of Transportation

DT:ko

cc: HWY, AIR
Ms. Nancy Nishikawa
Helber, Hastert, Van Horn & Kimura

22 September 1986

Mr. Wayne J. Yamasaki
Director of Transportation
869 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Yamasaki:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 10 September 1986.

Comments: We recommend that the accesses for the proposed development and the proposed Kohana-iki development be consolidated. Since they are only about 700 feet apart, consideration should be given to consolidating them into a single channelized intersection. We also recommend one location for underground utility ductline and waterline crossings and that one substation be shared.

Response: The recommendations for coordinating road and utility improvements with proposed development of Kohana-iki are noted. The developer of Ooma II intends to pursue opportunities for joint development of these facilities. The difficulty lies in uncertainties related to the development timetables for the respective projects. Therefore, the Ooma II project is proceeding on the development track as an independent project at the present time.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Planning Department

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION
HONOLULU INTERNATIONAL AIRPORT • HONOLULU, HAWAII 96819

WAYNE J. YAMASAKI
DIRECTOR

DEPUTY DIRECTORS
JONATHAN K. SHIMADA, Ph.D
WALTER T.M. HO
CHERYL D. SOON
ADAM D. VINCENT

IN REPLY REFER TO:

AIR-EP
86.2787

September 4, 1986

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

Dear Mr. Lyman:

Subject: Environmental Impact Statements
Kohana-Iki Resort Community and
O'oma II Development
North Kona, Hawaii

RECEIVED
SEP 13 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

We have received a response from Helber, Hastert, Van Horn and Kimura, Planners, on our questions regarding the technical considerations underlying the noise methodology and assumptions used in preparing the noise contours for the subject EIS. The following are our comments to the response:

The modeling that Bricken used to generate the Keahole contours was relatively simplistic, and the results were dominated by the operational and noise curve assumptions associated with one aircraft type ("2 Engine Turbo Fan"). In other words, Keahole Airport was essentially modeled as an airport having 20,510 operations of a "2 Engine Turbo Fan" aircraft. Apparently storage constraints and the desire to run programs quickly were the reasons for the simplifications of his modeling.

It should be noted that both turbo fan and turbo jet aircraft operate at Keahole Airport, the latter being in the noisier category of aircraft.

The simplifications used by Bricken in developing the Keahole noise contours were unreasonable, and new contours (using a more sophisticated and calibrated model) should be developed for the following reasons:

1. There are substantial noise level differences among the inter-island, overseas, and military jets which use Keahole Airport, and it is not possible to model the group as a single aircraft type without applying weighting factors for the number of operations of each aircraft type.

2. Noise measurements were not provided to validate or calibrate the noise curve assumptions used for the turbo fan, turbo prop, and GA aircraft groups, or to corroborate the calculated Ldn contour results.

3. Military aircraft (C130, P3, A4, C141, C135, T33, etc.) which use Keahole for training operations were not included in the modeling.

4. The "Thrust Adjustments" of TABLE 5 for the critical "2 Engine Turbo Fan" aircraft on landing and departure do not appear to be consistent with FAA INM model assumptions for the Standard 3 Degree Approach Profile or a typical jet departure profile. Bricken should provide the INM Data Base approach and departure profile, and noise curve identifiers which he extracted from the "INM model" for use in generating the Keahole contours.

5. No nighttime (10:00 a.m. to 7:00 p.m.) operations were included in the modeling. Inter-island jets and cargo aircraft regularly fly at night to/from Keahole.

6. The possible noise conflicts associated with the proposed land use, the low background ambient (non aircraft) noise levels in the area, and the noise impact risks associated with inaccurate Ldn contours suggest that more sophisticated modeling and verification methods be used when developing Keahole Airport noise contours for this EIS.

7. There does not appear to be noise contributions from the RWY 35 departures or approaches. The lack of "bumps" in the noise contours suggest that these operations may have been omitted.

8. The noise contours associated with approaches to RWY 17 are probably not correct, observations made on August 14, 1986 indicated that aircraft were on the ILS approach for approximately one minute. This equates to a straight-in track length of approximately 16,000 ft. prior to touchdown, at an average ground speed of 164 knots. The straight-in track length shown in the Draft EIS is in the order of 6,000 ft.

9. The 60 and 65 Ldn contours of Figure 15 indicate that a power cutback was assumed for departing aircraft crossing the south end of runway. The noise contours indicate a 4 to 5 Ldn reduction immediately south of the end of the runway, which is not typical of inter-island jet departure noise contours. The 70 and 75 Ldn contours of Figure 15 do not depict a similar noise reduction, and are not consistent with the 60 and 65 Ldn contours depicted.

In respect to the use of Table 7 and Table 8 as land use compatibility criteria applicable to the proposed projects at Kona, the following clarifications should be made:

1. Both tables (as well as FAA Part 150 criteria) assume an exterior-to-interior noise reduction of 20 dB for "typical construction" when designating 65 Ldn as an acceptable outdoor noise level.

2. If the 20 dB reduction is not achieved (as is typical of naturally ventilated structures), then risks of adverse noise impacts indoors increases. The noise reduction afforded by naturally ventilated structures is in the order of 8 to 10 dB, and an exterior noise level of approximately 55 Ldn (10 Ldn less than 65 Ldn) is required to reduce interior noise levels to the acceptable interior level of 45 Ldn.

3. Because of the difficulties in achieving the desired interior level of 45 Ldn within naturally ventilated structures situated in areas with exterior noise levels of 55 Ldn to 65 Ldn, risks of adverse noise impacts cannot be eliminated unless 20+ dB of noise reduction (and probably air conditioning) is employed.

4. In the highly urbanized environs of Honolulu, where other non-aircraft noise sources can be higher than 60 Ldn, a compromise value of 60 Ldn was selected for urbanized Honolulu, since 60 Ldn is midway between the unconditionally acceptable (20 dB reduction not required) level of 65 Ldn. Selection of the 60 Ldn planning level should not be interpreted as a basis for defining the impact threshold for aircraft noise. The impact thresholds for aircraft noise have been established scientifically by EPA and others as 55 Ldn outdoors and 45 Ldn indoors.

5. The use of an Ldn level for defining acceptable boundaries for noise sensitive developments should be ambient noise levels, and selection of the lower 55 Ldn level may be prudent when planning initial development of a region.

6. The use of an Ldn level for defining acceptable boundaries for noise sensitive developments should also be sensitive to the desires of the end user. If extensive outdoor activities in a resort setting is anticipated, with primarily naturally ventilated accommodations, selection of the lower 55 Ldn level is prudent.

7. Whichever planning level (55, 60, or 65 Ldn) is selected, risks of adverse impacts or user dissatisfaction resulting from aircraft noise will exist under the following conditions for residential uses:

   a. Outdoors at noise levels above 55 Ldn; and

   b. Within naturally ventilated dwellings at outdoor noise levels above 55 Ldn.

Very truly yours,

OWEN MIYAMOTO
Airports Administrator

cc: Helber, Hastert, Van Horn and Kimura

22 September 1986

Mr. Owen Miyamoto
Airports Administrator
Department of Transportation, Airports Division
Honolulu International Airport
Honolulu, HI 96819

Dear Mr. Miyamoto:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 4 September 1986. We have forwarded your letter to our acoustical consultant, Mr. Gordon Bricken. He has responded to the nine technical points raised in your letter as follows:

Comment: There are substantial noise level differences among the inter-island, overseas, and military jets which use Keahole Airport, and it is not possible to model the group as a single aircraft type without applying weighting factors for the number of operations of each aircraft type.

Response: The statement is correct. However, the fact that there are differences does not intrinsically mean that one aircraft will not dominate the outcome.

Comment: Noise measurements were not provided to validate or calibrate the noise curve assumptions used for the turbo fan, turbo prop, and GA aircraft groups, or to corroborate the calculated L_{dn} contour results.

Response: There is no requirement in the EIR process to conduct the type of exhaustive measurement program that would be required for such validation. The EIR questions at this stage of Entitlement is whether the data presented reasonably represents the range of impacts, and is sufficient to make decisions on the Entitlements requested.

Comment: Military aircraft (C130, P3, A4, C141, C135, T33, etc.) which use Keahole for training operations were not included in the modeling.

Response: This is true. Inquiries at the Airport indicated that the bulk of Military operations were propeller and small aircraft. If this is not correct, then, the Airport sources were incorrect. The State does not shed much light on the extent of the jet aircraft usage in this reply, so the absence of the Military may not be a critical factor.

Comment: The "Thrust Adjustments" of TABLE 5 for the critical "2 Engine Turbo Fan" aircraft on landing and departure do not appear to be consistent with FAA INM model assumptions for the Standard 3 Degree Approach Profile or a typical jet departure profile. Bricken should provide the INM Data Base approach and departure profile, and noise curve identifiers which he extracted from the "INM model" for use in generating the Keahole contours.

Response: The State does not clarify the extend of the error. For example, on landing, no adjustments are used for the airborne portion which would affect your property, so the landing element is a "worse case" condition.

Comment: No nighttime (10:00 a.m. to 7:00 p.m.) operations were included in the modeling. Inter-island jets and cargo aircraft regularly fly at night to/from Keahole.

Response: The data used here was based on the current schedules which did not show night flights. The State would have to clarify the discrepancies.

Comment: The possible noise conflicts associated with the proposed land use, the low background ambient (non aircraft) noise levels in the area, and the noise impact risks associated with inaccurate L_{dn} contours suggest that more sophisticated modeling and verification methods be used when developing Keahole Airport noise contours for this EIS.

Response: In general, one can always refine the Noise Contours. However, as pointed out above, no data used in our analysis will ever be exactly like that being used in the State's Master Plan Study, unless the State supplies their data base. There is no point in revising contours if the critiques are going to revolve around the differences between the data base we use and the data base that the State uses.

Comment: There does not appear to be noise contributions from the RWY 35 departures or approaches. The lack of "bumps" in the noise contours suggest that these operations may have been omitted.

Response: This is an incorrect statement.

Comment: The noise contours associated with approaches to RWY 17 are probably not correct, observations made on August 14, 1986 indicated that aircraft were on the ILS approach for approximately one minute. This equates to a straight-in track length of approximately 16,000 ft. prior to touchdown, at an average ground speed of 164 knots. The straight-in track length shown in the Draft EIS is in the order of 6,000 ft.

Response: The approach to Runway 17, as we understand the pattern designations, are not ever over your property. This is why, in the later Contours, we eliminated that side of the Airport. However, this comment points out the earlier concern that the State views your work in the same context as their Master Plan Study.

Comment: The 60 and 65 L_{dn} contours of Figure 15 indicate that a power cutback was assumed for departing aircraft crossing the south end of runway. The noise contours indicate a 4 to 5 L_{dn} reduction immediately south of the end of the runway, which is not typical of inter-island jet departure noise contours. The 70 and 75 L_{dn} contours of Figure 15 do not depict a similar noise reduction, and are not consistent with the 60 and 65 L_{dn} contours depicted.

Response: This statement is incorrect. However, we would point out that if a power cutback of the degree suggested were used, it would not have to affect all Contours equally and usually, does not. We are puzzled why the State believes this to be the case.

We would also like to respond to some of the more general policy and procedural issues raised in your letter.

Comment: The simplifications used by Bricken in developing the Keahole noise contours were unreasonable, and new contours (using a more sophisticated and calibrated model) should be developed.

Response: Despite the fact that we are utilizing a simplified model which may not account for every nuance of flight operations, we are confident that the contours depicted in our studies are a reasonable reflection of actual and future noise impacts on the subject property. Although your letter states that our model simplifications were "unreasonable," the Airports Division has yet to provide any information to indicate that our findings are inaccurate.

The focus of your September 4 response was on the first model runs depicting 100% turning and 100% straight in-out flight operations for 1985. Since that time, we have refined our model input and generated new 1985 contours as well as projected contours for 1995 and 2005 for the project. This material was sent to Mr. Herb Kido of your staff on 8 September 1986. Since anticipated changes in the runway length, aircraft types, operations, and flight patterns over the next 10 to 20 years will significantly change the noise contours in the future, the present scrutiny being given to the accuracy of the 1985 contours is unwarranted. In fact, the real attention should be focused on the projected contours since these will more accurately portray the future noise impacts on the site. As indicated on the plan included with Mr. Kido's letter, we have shown how adjustments can be made to accommodate these impacts.

Comment: The use of an L_{dn} level for defining acceptable boundaries for noise sensitive developments should be ambient noise levels, and selection of the lower 55 L_{dn} level may be prudent when planning initial development of a region.

Response: Although the selection of 55, 60, or 65 L_{dn} as the limit for habitable structures is a public policy decision and not an EIS decision, we must take strong issue with your implied suggestions to establish 55 L_{dn} as the limit for this property. To our knowledge, there is no precedent in this State for using 55 L_{dn} as a limit. As noted in the EIS, the FAA uses 65 L_{dn} as a national standard; the City and County of Honolulu, contrary to the implications in your letter, has compromised on 62.5; and, the State Board of Health's administrative rules establish 60 dBA as the allowable noise levels for Apartment, Hotel and Business districts. (Fifty-five dBa only applies to Single Family Residential Districts, none of which are proposed for this property.)

Comment: If extensive outdoor activities in a resort setting is anticipated, with primarily naturally ventilated accommodations, selection of the lower 55 L_{dn} level is prudent.

Response: The implication in your letter that most units will be naturally ventilated is an erroneous assumption. Given the warm climate of this coastal region, we anticipate that all habitable structures will be air conditioned and built of materials which would be sufficient to attenuate interior noise to the suggested 45 L_{dn} level. In addition, as noted in our letter to Mr. Kido, the landowner has stated that he is willing to place a disclaimer in any deeds and sales material for residential properties advising potential buyers of the proximity to the airport and the possible impacts of aircraft noise on the project.

Since we are in the early stages of the development approval process (County General Plan and State Land Use Commission amendments) and specific land use boundaries are still flexible, an exact delineation of the noise contours is not yet required. The appropriate time to establish these boundaries is at the zoning and SMA steps which are not expected to occur until after the State has completed its master plan studies. At that time our plans can be adjusted, if necessary, to accommodate the State's more definitive findings.

In summary, we realize that your own airport master planning work is just getting underway, and we regret that you are unable to provide us with your findings at this time. However, we do feel that the information provided in the EIS and the subsequent information sent to you on August 4 and September 8 is a reasonably accurate description of a highly technical and often subjective analytical process. (Unfortunately, the accuracy of our respective assumptions, forecasts, and modeling efforts cannot be truly evaluated until we actually reach the years 1995 and 2005.)

Should the findings of your studies differ from ours, ample opportunity exists to modify our plans at the zoning and SMA steps of the development approval process.

We appreciate your comments on the Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Planning Department

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

RECEIVED
SEP 9 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

September 8, 1986
RE:0442

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

Dear Mr. Lyman:

Draft Environmental Impact Statement
Ooma II
North Kona, Hawaii

The Environmental Center has reviewed Kahala Capital Corporation's proposed development of a multi-use resort complex, Ooma II, in North Kona. The review has been prepared with the assistance of Doak Cox, Emeritus Geophysicist; Charles Lamoureux, Botany; Richard Brock, Hawaii Institute of Marine Biology; and Scott Derrickson, Environmental Center.

Marine Park and Visitor Center (p. II-5, II-6)

The proposal for a marine park and visitor center was cited only briefly and no information is provided as to its magnitude, location, or potential environmental impacts. We understand that discussions are currently in progress to decide upon desired features of the planned marine park. An undertaking of this nature will likely require a separate environmental assessment, possibly a supplement to the current EIS, and depending on the location and nature of the marine park, consultation with the Army Corps of Engineers.

Seismicity

In the Uniform Building Code seismic risk classification, the highest risk zone is Zone 4, not 3 as stated in the Draft EIS (p. IV-7). Zone 4, however, is restricted to a part of California.

Tsunami Hazard

The statement (p. IV-7) that, "The greatest tsunami wave run-up height ever recorded in the Kona region resulted from the 1960 tsunami which caused extensive damage throughout the state," should be checked. The greatest historic tsunami run-up height in Kona may have been that of the Japanese tsunami of 1895 at Keauhou, 18 feet msl.

Hydrology

The statement (p. IV-11) that: "Suitable potable water supplies are expected to be found further inland at elevations of 1200 feet or higher," is true only to the extent that, in island areas with ground elevations of 1200 feet or more, the finding of potable water in basal groundwater bodies near sea level is expectable. It is not expectable that significant water resources will be found on the surface in those areas, and the question whether the sustainable yield of the basal groundwater resource is equal to or greater than the sum of the present demands plus the demands of this development and others planned is a serious one and should be addressed in the Final EIS.

Shoreline Modification

The stability of the proposed artificial beach (p. IV-16) should be discussed in the Final EIS.

Water Supply: Potable Water

The section on "Potable Water" (p. VI-5) seems to imply that water will be supplied to the project from present water developments in areas further south or at least from groundwater sources in those areas. The estimate of a total of 100 mgd for groundwater resources in the Kona area means very little in itself. To the extent that resources are widely dispersed, the permissible draft at any one point is small, and if the lift to the surface is great, they cannot be economically developed.

Marine Baseline Studies: Appendix C

The marine section adequately covers the proposed Ooma II development and its impacts to the nearby marine environment. The potential for sediment, nutrients, and herbicides from the development and patricularly the golf course to enter the nearshore waters is recognized. Also noted in the DEIS is the proximity of the proposed drainage channels to the warm water intake pipe at the NELH and the potential for these discharges and sewage effluent from the golf course to enter the NELH warm (surface) water system. Whether or not this contamination of the NELH surface water intake will be significant depends primarily on the use of that water and secondarily on the frequency and duration of the discharge and the content and quantity of the pollutants it contains. We urge that staff at NELH be consulted on these issues as the potential for significant impacts to the research and aquaculture production operations at NELH seems high.

The establishment of the baseline marine biological study "in such a way that replicate surveys can be conducted in subsequent years," and the recommendations for an ongoing marine monitoring program (p. IV-17) are commendable procedures that should be adopted. While it is often true that "natural phenomena" may be more influential (or destructive) than incremental changes that could result from any development activities" (p. IV-16) this observation is not likely to apply to long-term persist development activities. Marine communities may well tolerate the short-term occasional devastation of storm waves and sediment influx but cannot withstand long-term persistent degradation of their environment. If a long-term continuously higher nutrient load is experienced in the near coastal waters it will likely modify permanently the structure of the exposed ecological community. This alteration may be either positive or negative, depending on the interests and needs of that community be they plants, animals, or people.

Page C-22: There are very few references cited to support definitive statements made in the text of Appendix C. Appropriate reference statements should be included. For example, the existence of a water quality data base is mentioned (p. C-12) but no indication is provided as to its source or location. The statement that, "It has not been found necessary to utilize substantial quantities of pesticides on golf courses in Hawaii.." should be referenced as well as the definition of "substantial quantities." These types of statements should be backed by appropriate references in the Final EIS.

Biological Survey: Appendix D

The terrestrial biological resources in the proposed development area have been adequately addressed in the DEIS. The terrestrial area is not overly sensitive, biologically speaking, and therefore there exists no foreseeable significant problems with the floral and faunal resources within the area.

We hope that the preceeding comments will be of assistance in the preparation of a Final EIS for the proposed Ooma II development.

Yours truly,

Jacquelin N. Miller

Jacquelin N. Miller
Acting Associate Director

cc: Patrick Takahashi
OEQC
Nancy I. Nishikawa
Charles Lamoureux
Richard Brock
Doak Cox
Scott Derrickson

22 September 1986

Ms. Jacquelin N. Miller
Acting Associate Director
Environmental Center
Crawford 317
2550 Campus Road
Honolulu, HI 96822

Dear Ms. Miller:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 8 September 1986.

Comment: The proposed marine park and visitor center may require a separate environmental assessment or supplement to the current EIS, and, depending on the location and nature of the marine park, consultation with the Army Corps of Engineers.

Response: The Army Corps of Engineers, as well as State and County agencies with related jurisdictions will be consulted as planning proceeds on the proposed marine park to ensure that applicable permit requirements are met. A supplemental EIS will be prepared for this component of the Ooma II development if required.

Comment: The highest seismic risk zone in the Uniform Building Code is Zone 4 and not Zone 3.

Response: The correction is noted and the appropriate section of the EIS has been revised.

Comment: The greatest historic tsunami run-up height in Kona may have been the Japanese tsunami of 1896 at Keauhou measuring 18 feet msl, rather than the 1960 tsunami as reported in the Draft EIS.

Response: The correction is noted and the appropriate section of the EIS has been revised.

Comment: It is not expectable that significant water resources will be found on the surface in those areas (inland at elevations of 1,200 feet or higher), and the question of whether the sustainable yield of the basal groundwater resource is equal to or greater than the sum of the present demands of this development and others planned is a serious one and should be addressed in the Final EIS.

Response: Our statement (p. IV-11) that "Suitable potable water sources are expected to be found further inland at elevations of 1,200 feet or higher" refers to basal groundwater; no reference has been made to the expectation of finding significant water resources on the surface.

The groundwater resources in the Kona area have been estimated to total 100 million gallons per day (MGD) (Hawaii Water Resources Plan, 1979:54). Pumpage projections indicate that the safe capacity of the existing Kahaluu system (estimated at 8.4 MGD) may be reached by 1990. Therefore, developments projects in the North Kona area will have to assist in new water source and transmission systems in order to acquire adequate water supply.

Comment: The stability of the proposed artificial beach should be discussed in the Final EIS.

Response: The feasibility of any shoreline modification, including creation of an artificial beach, will require further study. Stability of the beach given seasonal wave action, tides, and local currents will be a major consideration in determining the scope of shoreline modification and its feasibility.

Comments: The section on Potable Water (p. VI-5) seems to imply that water will be supplied to the project from present water developments in areas further south or at least from groundwater sources in those areas.

Response: The purpose of the first paragraph under Potable Water (p. VI-5) is to describe the existing water system infrastructure. A discussion of potential water development alternatives is found on Page VI-7, Mitigation Measures. The alternatives favored at this time are either to purchase shares in an existing water source agreement or to participate in a new water source agreement. Both alternatives are under the auspices of the County Department of Water Supply who would be responsible for identifying the well site(s) and engineering the system.

Comment: While it is true that "natural phenomena" may be more influential (or destructive) than incremental changes that could result from any development activities" (p. IV-16) this observation is not likely to apply to long-term persistent development activities. Marine communities may well tolerate the short-term occasional devastation of storm waves and sediment influx but cannot withstand long-term persistent degradation of their environment. If a long-term continuously higher nutrient load is experienced in the near coastal waters, it will likely modify permanently the structure of the exposed ecological community.

Response: We have asked marine consultant Steven Dollar to respond to the previous comment. He responds as follows: In some ecosystems, especially aquatic environments where circulation is restricted, long-term persistent degradation related to development activities can exceed natural phenomenon in terms of environmental alteration. However, in open ocean

coastal communities, such a response is, for all practical purposes, not possible. In Hawaii, circulation and flushing characteristics of open ocean areas prevent the buildup of nutrients, or other potential pollutants, to the point where change occurs in the structure of communities. In comparison to natural phenomena, such as devastation from infrequent storms, the effects from development activities are essentially insignificant.

Comment: The existence of a water quality data base is mentioned (p. C-12), but no indication is provided as to its source or location.

Response: NELH has collected water quality samples on a weekly basis since 1982. The data set is reproduced as Attachment 1 to this letter (Appendix L of the Final EIS).

Comment: The statement in Appendix C that "It has not been found necessary to utilize substantial quantities of pesticides on golf courses in Hawaii..." should be referenced as well as the definition of "substantial quantities."

Response: Dollar's statement was based on personal communications with N. J. Bustamente, groundskeeper of the Mauna Lani golf course. As of September 1985, insecticides had not been used on the course. Use of herbicides involves spot application to the greens. Dollar also references the Mauna Lani EIS (p. 103) which states: "Fairway bermuda grass is highly resistant to pests such as army worm (and) to intruding plants such as weeds, so only the grasses on tees and greens may need special treatment with pesticides and/or herbicides. Spraying with these control chemicals will be limited to isolated locations and will be done only as the need arises rather than regularly."

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure adequate coverage of pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy L. Nishikawa

Nancy L. Nishikawa
Project Planner

Attachment

cc: Hawaii County Planning Department

Lorraine K. Inamine
Mayor

Eugene N. Tiwanak
Managing Director

Patricia G. Engelhard
Director

Ronald Okamura
Deputy Director

DEPARTMENT OF PARKS & RECREATION
COUNTY OF HAWAII

August 21, 1986

RECEIVED
AUG 22 1986
HELBER, HASTERT, VAN HORN & KIMURA PLANNERS

Mr. Albert Lono Lyman, Director
Planning Department
County of Hawaii
Hilo, HI

Subject: EIS for Ooma II Resort
North Kona, Hawaii (TMK: 7-3-09:4)

Dear Mr. Lyman:

Our review of the EIS preparation notice raised the question of vehicular access to the proposed public beach parking area located on the northwest corner of the site. In response, it was the developer's intent to utilize the unimproved road from the highway to the Natural Energy Laboratory of Hawaii (NELH).

We would be interested in knowing what agreements have been made with NELH and HOST Park to assure perpetual access through these developments and whether any roadway improvements are proposed for this existing access.

We appreciate the opportunity to review the EIS and again request the opportunity to review detailed plans of the public beach parking areas and accesses as the project progresses.

Sincerely,

Pat Engelhard

Patricia Engelhard
Director

PE:GH:al

cc: Nancy Nishikawa,
Helber, Hastert, Van Horn & Kimura, Planners

• 25 AUPUNI STREET • HILO, HAWAII 96720 • TELEPHONE 961-8311

22 September 1986

Ms. Patricia Engelhard, Director
Department of Parks & Recreation
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Ms. Engelhard:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Planning Department, dated 21 August 1986.

Comment: In response to our question of vehicular access to the proposed public beach parking area located on the northwest corner of the site, it was the developer's intent to utilize the unimproved road from the highway to the Natural Energy Laboratory of Hawaii (NELH).

Response: Subsequent to the EIS Preparation Notice, the Ooma II preliminary land use plan was modified slightly, resulting in a realignment of the project's main parkway to provide access through the development to the public parking area in the northwest portion of the site. Two consequences have come from this modification. First, the access is not dependent on future development by NELH or HOST Park. Second, the Ooma II parkway provides a safer, more comfortable access to the parking area which does not require use of a four-wheel drive vehicle.

Comment: We would be interested in knowing what agreements have been made with NELH and HOST Park to assure perpetual access through these developments and whether any roadway improvements are proposed for this existing access.

Response: No formal agreement has been entered into with HOST Park to maintain the coastal jeep trail. However, our discussions with HOST Park officials indicate that the trail and the NELH Access Road is expected to be open to the public during the day. Because the Ooma parkway is an improved roadway, no improvements are proposed for the jeep trail.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Planning Department

COUNTY OF HAWAII

PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 96720
(808) 961-8288

DANTE K. CARPENTER
Mayor

ALBERT LONO LYMAN
Director

ILIMA A. PHANAIA
Deputy Director

September 8, 1986

Helber, Hastert, Van Horn and Kimura
Grosvenor Center, PRI Tower
733 Bishop Street, Suite 2590
Honolulu, HI 96813

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

Gentlemen:

Comments - Draft EIS 'O'oma

We have reviewed the subject draft EIS for the proposed 'O'oma resort and marine technology park and submit the following comments for your appropriate action.

Project description: Though we recognize that the proposal is still at a conceptual stage of development, the Draft EIS has not described the project fully.

a. It is our understanding that an exchange of lands is being considered so that HOST park may be able to utilize lands closer to the coast for a more efficient use of the sea water. If this is the case, this should be discussed as a possibility in the overall description of the project, or as an alternative development scheme. Even if such an exchange is still being discussed at a conceptual level, its description would provide alternative parameters from which the impacts may be assessed.

b. We note that the intermediate resort standards of the General Plan call for 45 acres for resort use. The project is described as utilizing 25 acres for resort use, thus the relationship between the project as described and the General Plan standards should be discussed.

c. Some of the details described in other sections of the draft EIS allude to facilities or improvements which have not been described in the overall project description section, and should be. For example, there is mention of conference facilities. Are these to be part of the hotel complex, office park facilities, marine park or in the high tech/aquaculture park itself. HOST park

is also proposing a visitor center. Is the visitor center and other facilities duplicative of those being proposed through HOST or are these to be coordinated with the HOST development?

There are also indications that the project may include beach improvement and/or replenishment. If so, this aspect of the project development should be included in the overall project description in the same manner as the beach access, parking and pedestrian accesses have been described. In this regard, a shoreline setback variance from the Planning Commission may also be required for beach improvements (pages I-9 and II-12).

We would note that the parcel size (313 acres) places some limitations on the development of a resort at an intermediate resort scale together with the development of a high tech/aquaculture park, commercial areas, golf course and marine park/visitor center. Hence, the description of the project and rationale for all segments of the proposal should be clearly articulated and justified.

Impacts to the physical environment: Shoreline and marine environment - The baseline marine survey consisted of transects describing the marine community fronting the 'O'oma coastline. No water quality samples were taken for the same area. The consultant has justified the lack of this set of data noting that a sampling over a short period in an open ocean context does not provide reliable data over a series of seasons and fluctuating oceanographic conditions. The draft EIS, however, does note the use of information generated by NELH for waters near 'O'oma over a three year period. Is it reasonable to assume that the information from NELH is transferable to the 'O'oma site? Is the draft EIS also suggesting that that data may be used as the baseline data from which subsequent monitoring programs may be measured against. If so, the data should also be included as part of the appendix or clearly referenced so that it can be made available.

Effects to NELH and HOST: The success of aquaculture, NELH and HOST park uses (including aquaculture operations proposed as part of this proposal) depend on two kinds of ocean water; cold deep water which is brought up from sources at 1,900' depths off Keahole Point and warm, clean water which is used for mixing purposes. No locational sources have been identified for this second type of water, though the assumption is that it is from shallower depths or surface layers. The draft EIS discusses the effects of the proposed development on the cold water source, however it has not discussed the potential impacts to the warm water. Since clean ocean water is critical to the continued viability of NELH, HOST and the proposed aquaculture/high tech aspects of the 'O'oma project, a full description of the potential impacts should be included. These

should include potential impacts from at least three sources; 1) storm and surface water drainage improvements, 2) golf course irrigation and disposal of treated sewage wastewater and 3) disposal of wastewater from the aquaculture projects.

A program for water quality monitoring should be described and should also include chemical measurements in conformance with State Department of Health standards or regulations.

Noise impacts: The descriptions of the noise impact from flights out of Keahole Airport are based on 1985 data and does not include data based on projected increases in the number of flights nor the possible use of larger aircraft. Such estimates together with noise contour maps should be included within the final EIS. What also is the relationship between these levels of noise and the Department of Health's noise standards?

Land Use: (page IV-33) The statement "The previous analysis of new hotel construction required by 1995 would indicate that a greater allowance is needed for resort use.", which is made in context of projections made through the Preliminary Draft General Plan, is not clear. The projections are not intended to be specific goals which require satisfaction, but rather are estimates of possible growth.

Socio-economic impacts: It should be noted that although the draft EIS estimates that 415 additional employee housing units may be needed as a result of the proposed development, the ultimate determination of additional employee housing requirement will be done in conjunction with the rezoning process. The analysis of housing requirement should also include consideration of the indirect population impacts and their resulting housing requirements. Further, the draft EIS does not state that employee housing will be provided on-site. Is the assumption then that all employee housing will need to be accommodated off-site?

The draft EIS also notes that a preliminary housing impact analysis has been prepared, however none was included in the Appendix. If such a separate study has been completed, please submit a copy of that study.

Public Facilities and Utilities: The draft EIS notes that successful development of the three adjoining projects (HOST, 'O'oma, and Kohanaiki) could increase traffic volumes which may exceed design standards and that additional lanes may be needed. Was a separate traffic study conducted? If so it should be included as part of the appendix. How does the developer intend to monitor traffic conditions? The impact of resort visitors, residents and

employees need to be included in the traffic analysis. The analysis should address regional impacts and not just impacts on the highway immediately adjacent to the site.

The draft EIS lists injection wells as a method of disposal for both domestic, sewage treated wastewater as well as sea water utilized for the aquaculture operations. This method of disposal should also be discussed in relation to the Underground Injection Control regulation of the Department of Health.

We note also that the estimated demand for water is 1.34 MGD, whereas the estimated wastewater flows are 294,300 GPD. These gross estimates suggest that approximately four times as much water is consumed. Is this ratio a reasonable and normal one?

Alternatives to the proposed action: An alternative which should be discussed, particularly with respect to impacts to public utilities and facilities, is one in which there is coordinated planning and development of projects proposed in adjoining properties.

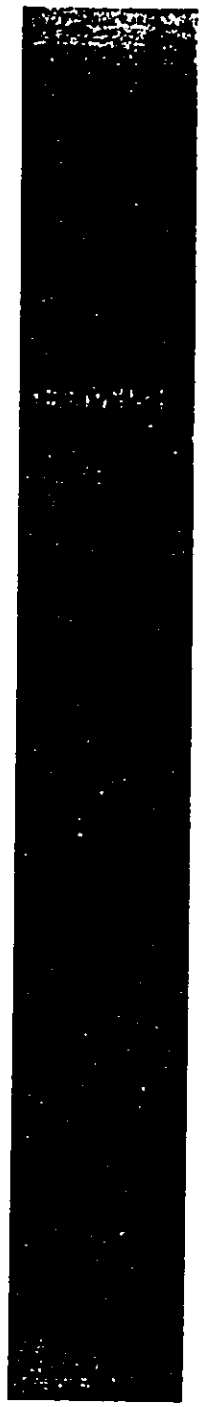
Should you have any questions or wish to discuss any comments, please do not hesitate to contact us at 961-8288.

Sincerely,

ALBERT LONO LYMAN
Planning Director

VKG/ALL:lkt

cc: Office of Environmental Quality Control
Land Use Commission



22 September 1986

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

Dear Mr. Lyman:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter dated 8 September 1986.

Comment: The possibility of a land exchange between Ooma II and the HOST Park should be discussed in the overall description of the project, or as an alternative development scheme.

Response: The proposed land exchange involves approximately 85 acres in the northern portion of Ooma II for a comparable amount of land in the southern portion of the HOST Park. The State DLNR is currently processing a Conservation District Use Application (CDUA) for a conditional use permit that would allow consolidation and resubdivision of the Ooma II property and State lands, a precursor to further administrative action and legislation required to authorize the land exchange. Because the CDUA approval is still under consideration, and the subject of the Hawaii County General Plan amendment is the existing Ooma II property, the land exchange proposal originally was not included in the Draft EIS.

However, we have included the CDUA petition as Appendix J of the Final EIS (see Attachment 1 to this letter). A subsequent refinement of the land use plan for the reconfigured Ooma II parcel is included as Appendix K of the Final EIS (see Attachment 2 to this letter).

Comment: We note that the intermediate resort standards of the General Plan calls for 45 acres for resort use. The project is described as utilizing 25 acres for resort use, thus the relationship between the project as described and the General Plan standards should be discussed.

Response: The General Plan defines intermediate resort area as "a self-contained resort destination area which provides basic and support facilities for the needs of the entire development on a smaller scale than a major resort area." In contrast, a minor resort is one that "shall not exceed the density of an intermediate resort area and is generally an area with many small property owners or an isolated resort development without sufficient land area to develop into a self-contained destination area." (General Plan, County of Hawaii, p. 95)

Provision of more extensive on-site services and amenities is one of the keys to differentiating intermediate and minor scale resort developments. The Ooma II proposal is consistent with the standard for intermediate resort in that it extends beyond hotel accommodations and customary accessory uses (restaurants and gift shops) to include an 18-hole golf course and a major visitor attraction. The marine park/visitor center would be heavily patronized by tourists and its establishment on the Ooma II property will give the resort area a distinct character. To meet the General Plan definition of an intermediate resort, the marine park/visitor center (approximately 20 acres) could be included in the resort acreage. This would yield a total resort component of approximately 45 acres.

Comment: Some of the details described in other sections of the draft EIS allude to facilities or improvements, such as conference facilities, which have not been mentioned in the overall project description section.

Response: The development concept described on pages II-5 through II-8 of the EIS have have been revised to incorporate all facility proposals being considered at present.

Comment: Is the visitor center and other facilities duplicative of those being proposed through HOST Park or are these to be coordinated with the HOST development?

Response: Mr. Bill Bass, Executive Director of the High Technology Development Corporation, has indicated that there are no plans to develop a visitor center as part of HOST Park. On the other hand, both he and Mr. Jack Huizingh, Executive Director of NELH, feel that an exhibit with educational displays of HOST Park/NELH activities would be of interest to the community and is a function they are currently unable to fulfill to the extent desired.

Comment: There are indications that the project may include beach improvement and/or replenishment. If so, this aspect of the project development should be included in the overall project description in the same manner as beach access, parking, and pedestrian accesses.

Response: Further studies are required to determine the feasibility of beach improvements. However, the project description section of the EIS has been revised to include beach improvements thereby indicating that proposal is under consideration.

Comment: A shoreline setback variance from the Planning Commission may also be required for beach improvements.

Response: The potential requirement for a shoreline setback variance has been added to the list of permits and approvals on pages I-9 and II-12.

Comment: We would note that the parcel size places some limitations on the development of a resort at an intermediate resort scale together with the development of a high tech/aquaculture park, commercial areas, golf course, and marine park/visitor center. Hence, the description of the project and rationale for all segments of the proposal should be clearly articulated and justified.

Response: The General Plan amendment application requests a change in land use designation from open to open, intermediate resort, medium density urban, and industrial. These new designations would support a mixed use development. The particular mix of uses has been influenced by the environment surrounding the site -- the opportunities and constraints presented. Moreover, we believe these uses are synergistic both in terms of interactions with neighboring uses, such as NELH/HOST Park, Keahole Airport, and future developments along the Keahole-Kailua corridor, and also internally within the project boundary.

The hotel would provide accommodations for several different user groups, including persons who want to be near the airport, near to industrial and commercial activities at NELH/HOST Park, and those who want to have a resort experience. Conference facilities, that may be developed in conjunction with the hotel, and the office park would interact favorably with the proximity to the airport and to the emerging high technology area. While the majority of visitors to West Hawaii are tourists, as North Kona becomes a more urbanized, non-tourist commercial activity can be expected to increase with a growing number of professional and service sector businesses. Future demand for different types of transient accommodations is becoming apparent. The Ooma II property has the advantage of proximity to the region's entry/exit point for air traffic to fill an unoccupied niche in the resort/business market.

Similarly, the multi-family residential area is seen as potentially supporting several housing markets: the visitor trade, local residents, and long-term transients visiting HOST Park or NELH researchers and their families.

The advantages of developing a hotel and golf course are several and include the provision of a recreational amenity for hotel guests, another source of income that would also attract the local golfing public, an aesthetic amenity and buffer between different uses, and enhancement of real estate value away from the coastline. The proposal to develop a marine park/visitor center would capture opportunities afforded by the proximity to NELH/HOST Park and the scarcity of major regional attractions outside of Kailua.

Comment: Is it reasonable to assume that the water quality information from NELH is transferable to the Ooma site? Is the Draft EIS also suggesting that data may be used as the baseline data from which subsequent monitoring programs may be measured?

Response: According to Steven Dollar, the project's marine consultant, the proximity of NELH to the project site is such that transferability of baseline water quality data from NELH to Ooma II is a valid assumption. The NELH data set has been compiled from water samples taken weekly since 1982. Given naturally occurring fluctuations in water quality parameters, the historical information would serve as a significant baseline for any subsequent monitoring program. Water quality information received from NELH is attached to this letter (Attachment 3) and reproduced as in Appendix L in the Final EIS.

Comment: The Draft EIS discusses the effects of the proposed development on the cold water source; however, it has not discussed the potential impacts to the warm water.

Response: According to Dollar, the impacts identified in his report relate primarily to warm water; cold water at depths to 1,900 feet would not be impacted significantly by the project. Impacts from storm and surface drainage improvements and golf course irrigation with secondary treated sewage are discussed in Appendix C, pages C-21 through C-24. Disposal of used sea water is discussed on pages VI-9 and VI-10 of the EIS.

Comment: A program for water quality monitoring should be described and should also include chemical measurements in conformance with State Department of Health standards or regulations.

Response: We have had preliminary discussions with officials of NELH and HOST Park regarding the need to safeguard the quality of near shore waters and to meet the particular needs of NELH, HOST Park, and future aquaculture development at Ooma II. The discussions have identified opportunities for concerned parties to cooperate on an ongoing program that would essentially expand the monitoring procedures currently employed by NELH. Preliminary agreement has been reached to pursue such a monitoring program so long as all affected parties share in the program costs and those costs are not unreasonable. As presently envisioned and discussed by the NELH, HOST Park and Ooma representatives, the monitoring program would include a minimum of three test locations: the existing NELH station, a location in front of Ooma, and a control station which is reasonably separated from the other two. The source of any potentially harmful contents could then be readily identified depending on which station or combination of stations pick up the information. Monitoring would be done on a regular basis and established well before any construction on the Ooma site begins in order to ensure that adequate baseline information is collected.

Further details would be developed when more specific design and construction plans are available, i.e., at the Special Management Area permit stage. The NELH data set that would constitute a significant portion of the baseline data includes measurements in accordance with Department of Health standards.

Comment: The descriptions of the noise impact from flights out of Keahole Airport are based on 1985 data and does not include data based on projected increases in the number of flights nor the possible use of larger aircraft. Such estimates together with noise contour maps should be included within the Final EIS.

Response: Noise contours generated from our projections for air traffic in 1995 and 2005 are shown in Attachment 4 to this letter (Appendix M in the Final EIS). Also included are the assumptions under which the noise analysis was performed. As noted, three- and four-engine aircraft (DC-8, DC-10/L1011, and 747) are included in the mix of aircraft.

Comment: The visitor count projections (contained in the Preliminary Draft General Plan) are not intended to be specific goals which require satisfaction, but rather are estimates of possible growth.

Response: The referenced statement (page IV-33) has been clarified.

Comment: The analysis of housing requirements should also include consideration of the indirect population impacts and their resulting housing requirements.

Response: Indirect population growth includes the additional population that is supported by indirect jobs spawned by the project's operations and by workers filling positions vacated by persons who have taken jobs newly created by the project. Identification of housing requirements for this segment of the population will be included as part of the ongoing dialog with County and State officials to meet project-related housing needs.

Comment: The Draft EIS does not state that employee housing will be provided on site. Is the assumption that all employee housing will need to be accommodated off site?

Response: The project does not provide for employee housing per se. However, the plan includes a multi-family housing area where employees of the hotel, office park, or any other business within the project may choose to live.

Comment: The Draft EIS notes that a preliminary housing impact analysis has been prepared; however, none was included in the appendices.

Response: The preliminary housing impact analysis refers to our in-house calculations which provide an order-of-magnitude estimate of housing demand. A separate housing analysis study has not been prepared.

Comment: Was a separate traffic study conducted?

Response: A separate traffic study has not been conducted. Preliminary improvements that are proposed as mitigation measures (page VI-3) are based on the experience of other resort developments and correspondence from the Department of Transportation (response to EIS preparation notice, dated 5 June 1986).

Comment: How does the developer intend to monitor traffic conditions?

Response: Traffic conditions will be monitored through observation of traffic levels, comparison with commonly used standards for level of service (Highway Research Board, Highway Capacity Manual, 1965), and consultation with the Department of Transportation, as appropriate.

Comment: The impact of resort visitors, residents, and employees need to be included in the traffic analysis.

Response: The estimates projected in Table 19 of the EIS appear to include the information desired, although the projections are based on types of land use rather than types of user.

Comment: The analysis should address regional impacts and not just impacts on the highway immediately adjacent to the site.

Response: Regional traffic impacts are difficult to predict in the absence of geographic-based data on projected regional economic, employment, and housing growth, and detailed information on the nature and timing of regional development proposals. Our comments, therefore, are necessarily general in nature.

Increased vehicular traffic can be expected to increase island-wide as a result of the resort development, as is the case with any significant resort development. Because the development is located near the airport (approximately one mile away) and because it is the major regional port of entry and exit, a large portion of resort-generated vehicular traffic would impact only a small segment of Queen Kaahumanu Highway. This is not the case with many other resorts in South Kohala and North Kona that are located further from the airport corresponding to longer trip times.

A wide range of services and amenities are planned on site at Ooma II, thereby reducing the amount of travel required for guests and residents to obtain those services. Of course, guests and residents will wish to travel to other scenic, cultural, recreational, and commercial attractions on the Big Island. Of these Kailua-Kona, a major commercial center, will be a principal attraction and experience an increase in traffic. The costs associated with this increase will be partially offset by increases in sales earned by Kailua-Kona merchants with a public increment derived from excise tax payments. The volume of trips to other destinations is not expected to be as concentrated or significant.

Another component of regional traffic generation is the residence-to-work traffic. Some employees may commute from as far away as Hamakua and Hawi to the north and Captain Cook to the south; however, the majority are expected to live in the Kailua-Kona area. This would increase traffic on the mauka-makai roads linking the upland subdivisions with the highway system in addition to increasing traffic on the highway itself. The location of any residential area that may be developed specifically in response to employee housing needs generated by Ooma II have not been identified, consequently regional traffic impacts are indeterminable as yet.

Comment: The Draft EIS lists injection wells as a method of disposal for domestic treated sewage as well as used seawater and should be discussed in relation to the Underground Injection Control regulation of the Department of Health.

Response: The Underground Injection Control (UIC) regulation was established by the State to protect the quality of underground drinking water sources. The proposed Ooma II development is located over an exempted aquifer, and thus is not a potential underground source of drinking water. Due to the exempted aquifer status of the aquifer below Ooma II, injection wells for sewage effluent and seawater disposal are not restricted. Should this alternative be recommended in the future, due to a change in circumstances, an Underground Injection Control (UIC) permit would be required from the Department of Health for construction of the injection wells and the developer would be required to meet DOH conditions for operations that do not adversely affect the public health and safety.

Comment: Is the ratio of estimated demand for water (1.34 MGD) to estimated wastewater flows (294,300 GPD) reasonable?

Response: The estimates for water demand and wastewater flows calculated by the project's civil engineers were based on commonly accepted factors for developments similar to Ooma II. The apparent disparity between the two figures is due to the inclusion of a holding tank in the design of the sewage treatment facility, which would even out the fluctuations in wastewater generated, allowing a more constant volume of effluent to be processed.

Comment: An alternative which should be discussed, particularly with respect to impacts to public utilities and facilities, is one in which there is coordinated planning and development projects proposed in adjoining properties.

Response: The issue of coordinated planning and development has been in the background continuously throughout the current planning effort. It is seen not as an alternative, but rather as an opportunity that should be pursued as appropriate. Cost savings potentially can be realized by

designing and constructing facilities that are shared by neighboring developments. These include access roads, substations, utility lines, and even a water quality monitoring program. Nevertheless, coordinating on a large-scale remains difficult in the early planning stages as the projects proceed through the various public permit stages and are faced with the associated uncertainties.

Thank you for your comments on the Ooma II Draft EIS. We will append your letter and this response to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa
Project Planner

Attachments

22 September 1986

Mr. Hugh Y. Ono
Chief Engineer
Department of Public Works
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Ono:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your memorandum to the Planning Department, dated 26 August 1986.

Comment: Provide a fully-channelized intersection at Queen Kaahumanu Highway. Investigate and provide roadway connections to adjacent properties.

Response: Your comments regarding design of the roadway improvements have been noted. Design considerations will be addressed when detailed site plans are prepared in conjunction with later permit and rezoning applications. At that time, engineers will consult with the State and County to incorporate all requirements for safe and efficient circulation. The developer also intends to coordinate the internal roadway system with adjacent landowners to the extent possible to minimize impacts on the highway.

Comment: The County operates 28 transfer station chutes at 21 locations, including the new Kailua transfer station which is scheduled to open 15 September 1986.

Response: The corrected information is noted and the EIS has been revised accordingly.

Comment: The typical County transfer is 70 cubic yards with a capacity of approximately 15-16 tons.

Response: The transfer capacity and trip generation information provided in the Draft EIS was based on information received from a private hauler in the Kona area. Trip generation rates were based on uncompacted dumping into 40 CY containers which would be hauled to the landfill when full. A typical density of 220 pounds per cubic yard was assumed for

municipal solid waste. The county's transfer capacity of 70 cubic yards (15-16 tons) will be used to compute trip generation, should county vehicles be employed for solid waste removal from the proposed development. Trip generation based on use of County vehicles is included in the Final EIS.

Comment: When the refuse generation of this project is combined with that of the Kohana-iki resort community, the combined total would be between 23.9-26.4 percent and would significantly affect a landfill's projected lifespan.

Response: The volume of solid waste projected from the projected developments of Kohana-iki and Ooma II would account for approximately 25 percent of the total volume of waste generated in the refuse district. However, we do not feel there is a need to construct a new landfill solely for the disposal of wastes from Kohana-iki and Ooma II.

Comment: Based on the projected quantities, a transfer station appears to be in order.

Response: The EIS has been revised to include a recommendation for construction of a new transfer station in the vicinity of Kohana-iki and Ooma II for community safety and convenience.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

cc: Hawaii County Planning Department

8 September 1986

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

Dear Mr. Lyman:

Mokuloa Group, Sierra Club would like to respond to the Draft Environmental Impact Statement for Ooma II.

ECONOMIC CONCERNS

No alternative option was given to developing the project lands solely for aquaculture. This would seem an obvious alternative given the proximity to NELH and the HOST Park. As noted in the DEIS, the HOST Park is expected to fill up in five years. We have had discussions with DLNR Aquaculture Development staff wherein they have expressed a strong interest in a land exchange, so that the HOST Park would have more room for expansion. The OTEC waters are a unique resource very expensive to duplicate elsewhere. Proximity to this resource is critical. Given the environmental impacts to be discussed in detail later in this response, this would be the best option while still allowing for economic development.

ENERGY CONCERNS

As noted in the HELCO letter of response, the projected need of 7MW of electricity is very large and bears with it environmental impacts of its own. Given additional demands by other proposed resort developments, what are the cumulative effects on the environment and the existing electrical grid? Cogeneration is an environmentally sound alternative that should be considered. Energy conservation pays big dividends to the developer and the community.

SEWAGE CONCERNS

Disposal and treatment of sewage wastes in Hawaii has become a major concern. Monitoring of private sewage systems has been delegated to the County. They have no staff for this task. The recent case in

Hawaii Kai has shown private treatment without adequate monitoring to be a serious health hazard. We have received numerous reports of illnesses related to aerosol spraying of sewage on golf courses elsewhere on the island. No discussion is made concerning impacts of wind drifted aerosol spray on aquaculture development.

Sierra Club would like to suggest two possible approaches:

1. Relocate the present sewage treatment plant to a more central location and install sewage lines to the new resorts. An integrated waste management plan could then be used similar to the Big Island Resource Recovery Center approved by the Mayor. Costs could be shared by developers and would prove more economic than duplicate facilities.
2. Improve secondary treatment with chlorine levels sufficient to ensure pathogen kill and de-chlorinate prior to golf course irrigation. Tightly zone sprayed areas away from nearshore waters, aquaculture ponds, and habited areas. Have the developer pay for independent monitoring of operating and maintenance practices.

ANCHIALINE POND CONCERNS

A conflict exists between developer claims based on a helicopter survey and ground based reports as to the presence of ponds in the project area. Sierra Club concurs with Ernest Kosaka of the U.S. Fish and Wildlife Service that a better survey of anchialine ponds should be made taking into account seasonal tidal fluctuations. Observations during the short flora and fauna survey may not be adequate to resolve this issue.

FLORA AND FAUNA CONCERNS

Increased urbanization around the Kaloko-Honokohau area may drive away the waterbirds that the National Park Service hopes to preserve. The shorebird survey was done at a time of the year when many species are generally absent from the islands due to migratory patterns. Impacts of outdoor lighting on birds are not discussed.

LIGHT POLLUTION CONCERNS

No discussion of the impacts of outdoor lighting is made. Sierra Club is concerned about site quality preservation for the telescopes on Mauna Kea. The issue of light trespass on adjacent areas is not discussed. Sierra Club would like to make the following suggestions to mitigate for light pollution and light trespass:

1. All outdoor lighting should be low pressure sodium with the exception of areas with special needs.
2. Shielding on luminaires should project lighting downward.
3. Timing controls after 11:00 p.m. for areas not in use.

These suggestions reflect the need for energy conservation and will result in lowered costs if implemented. The project is sited near the end of the airport runway. Pilots are affected by ground glare.

ARTIFICIAL BEACH CONCERNS

Sand that is brought in artificially is carried off in time to nearby coral formations. Nearshore reefs act as the nurseries for benthic communities. This delicate balance of life is especially important on the Big-Island which is geologically very young and coral formations are just getting started. The DEIS does not mention possible impacts at the source of this borrowed sand. Shoreline modification is left as an unresolved issue in the DEIS and should be fully described in the final EIS.

SHORELINE ACCESS CONCERNS

Easement is left as an unresolved issue and should be addressed in the final EIS. If a public park is to be included, are roads to be paved and arrangements for trash collection made?

MARINE PARK CONCERNS

The exact nature of the marine park is left unresolved. Are dredge and fill operations involved? Is a channel to the ocean to be made? A better description of this concept should be included in the final EIS. Waters from the tanks may contain nutrients or contaminants which could impact nearshore biota if not properly treated. If the marine park concept is as tentative as the DEIS implies, perhaps it should be addressed in a subsequent EIS with further chance for public response. A sizeable portion of land in the project area is given to the marine park concept and alternate used of that land in the project area should be discussed in the final EIS.

Sierra Club does not oppose the marine park concept. We feel that it has possible environmental impacts that should be understood before approval is given.

HAWAIIAN CONCERNS

As stated on page 18 of Donham's report, there is significant data still to be collected from sites T-17, T-22, T-61, and T-67. We suggest that the "rich deposits of subsistence remains" are particularly vulnerable to disturbance, thus degradation of the data, and should be actively protected until data recovery can take place. Additionally, an ethnographic investigation should be undertaken to gain the most complete cultural record of the study area. This will yield information which will facilitate interpretive activities. It will, also, contribute to correct treatment of any "historic" burials that may be present in the study area.

A minimal effort in the area of ethnography would be to establish contacts with the Kona Office of Hawaiian Affairs.

Sierra Club requests to be consulted throughout the rest of the EIS and subsequent hearing procedures.

Aloha,

Stephen A. Holmes
Conservation Co-Chairperson
Mokuloa Group, Sierra Club

cc: Helber, Hastert, Van Horn & Kimura

22 September 1986

Mr. Stephen A. Holmes
Conservation Co-Chairperson
Mokuloa Group, Sierra Club
P.O. Box 1137
Hilo, HI 96721

Dear Mr. Holmes:

Environmental Impact Statement (EIS) for
Ooma II, North Kona, Hawaii TMK: 7-3-09:04

Thank you for reviewing the Ooma II Draft EIS. This letter addresses the comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 8 September 1986.

Comment: No alternative option was given to developing the project lands solely for aquaculture. This would seem an obvious alternative given the proximity to NELH and the HOST Park. As noted in the DEIS, the HOST Park is expected to fill up in five years.

Response: The Keahole Point area provides a unique confluence of resources, basic infrastructure, and scientific and commercial expertise to make aquaculture a good prospect for future economic development of the area. However, the ability to attract commercially viable tenants in any high technology aquaculture development still contains a high level of risk. It is difficult to predict the leasing performance and/or build-out of an aquaculture development. More specifically, it would be difficult to state definitively that the HOST Park is expected to fill up in five years and we do not recall noting such in the Draft EIS. The HOST Park has received a State Land Use boundary amendment to the Urban district and and, under the Land Use Commission regulations, is required to begin development within five years.

Devoting the entire 314 acres to aquaculture development or expanding the HOST Park, is a development alternative. However, it is not without the potential for adverse environmental impact, such as the disposal of used seawater. Another consideration is the large initial infrastructure cost required to make aquaculture operational. While the 50 acres currently planned would be an incremental addition to the total scope of the HOST Park development, 314 acres would almost double its size. At some points, economies of scale would be diminished if separate facilities are required, rather than up-sizing facilities. The low pay back of most agricultural/aquacultural activities would handicap the financial viability of this alternative.

Comment: We have had discussions with DLNR Aquaculture Development staff wherein they have expressed a strong interest in a land exchange to have more room for expansion.

Response: The State DLNR is currently processing a Conservation District Use Application (CDUA) for a conditional use that would allow consolidation and resubdivision of the Ooma II property and State lands, a precursor to further administrative action and legislation required to authorize a land exchange. The proposed land exchange involves approximately 85 acres in the northern portion of Ooma II for a comparable amount of land in the southern portion of HOST Park. Because the CDUA approval is still under consideration, and the subject of the Hawaii County General Plan amendment is the existing Ooma II property, the land exchange proposal was not included in the Draft EIS.

We are attaching a copy of the CDUA as Attachment 1 to this letter (Appendix J of the Final EIS). A subsequent refinement of the land use plan for the reconfigured Ooma II parcel is included as Attachment 2 to this letter (Appendix K of the Final EIS).

Comment: Given additional demands for electricity by other proposed resort developments, what are the cumulative effects on the environment and the existing electrical grid?

Response: Communications between the project's civil engineering consultant and Hawaii Electric Light Co. indicate the availability of excess electrical capacity with little impact on existing utility service. On the other hand, implementation of this project could accelerate any existing schedules for infrastructure expansion since a portion of the existing excess capacity would be utilized for this project.

Comment: No discussion is made concerning impacts of wind-drifted aerosol spray on aquaculture development.

Response: Mitigation measures to prevent human contact with aerosols (page VI-9) would also be employed to control wind-drifted aerosol spray on aquaculture development. We also noted suggested mitigation measures contained in your letter.

Comment: A conflict exists between developer claims based on a helicopter survey and ground based reports as to the presence of ponds in the project area.

Response: We are not aware of any helicopter or ground-based surveys that have identified anchialine ponds in the Ooma II project area.

Comment: Impact of outdoor lighting on birds are not discussed.

Response: According to biologist Winona Char, none of the native Hawaiian birds nest on the site. With the exception of the Plover, none are nocturnal so that night-time avian activities would not be disturbed by lights; the Plover is known to occur in urbanized areas and appears to have

adapted to lighted conditions. Char speculates that the largest impact may be on the Hawaiian hoary bat; however, because some food species, such as moths, are attracted to lights, the impact may be positive.

Comment: No discussion of the impacts of outdoor lighting is made. The issue of light trespass on adjacent areas is not discussed.

Response: Development of the Ooma II property will require the installation of outdoor lights where none exist at present. However, most of the lights within the Ooma development would be limited to the inhabited areas. And, in these areas, it is expected that architectural design criteria will be used to minimize the nuisance of glaring lights and that management practices will control the placement and times when lights are on to conserve energy. We further note that existing land uses on adjacent properties, NELH and Keahole Airport, in particular, are also lighted.

Comment: The DEIS does not mention possible impacts at the source of borrowed sand for creation of an artificial beach.

Response: Widening the existing beach with additional sand is being considered; however, the source of the sand has not been identified.

Comment: Shoreline modification is left as an unresolved issue in the DEIS and should be fully described in the final EIS.

Response: The developer recognizes the desirability of modifying the shoreline to improve access into the water from the beach; however, further studies are required to determine the feasibility of any such action which could range from cleaning up the lava rubble to cutting through the basaltic shelf. When more detailed studies are conducted, one basis for assessing the feasibility of shore modification would be the resulting impacts on the environment. The Army Corps of Engineers will be consulted as planning proceeds and requirements for environmental impact disclosure will be met.

Comment: Easement is left as an unresolved issue and should be addressed in the final EIS.

Response: By identifying as unresolved the issue of utility improvements in the easement through HOST Park, it was our intent to indicate that this issue must be addressed at the appropriate juncture when more detailed design plans have been developed.

Comment: If a public park is to be included, are roads to be paved and arrangements for trash collection made?

Response: Based on our discussions with the County, a public park on the Ooma II property is not favored. The project's preliminary land use plan contains provisions for two paved parking areas that would be accessible via paved roadways. Specifics, such as the number of parking stalls, provision

of trash receptacles and restroom facilities, and maintenance will be determined in conjunction with County park officials during the design phase of project development.

Comment: The exact nature of the marine park is left unresolved. Are dredge and fill operations involved? Is a channel to the ocean to be made? A better description of this concept should be included in the final EIS. If the marine park concept is as tentative as the DEIS implies, perhaps it should be addressed in a subsequent EIS.

Response: Discussions are currently in progress to determine the feasibility of the proposed marine park, the types of features it would include, and hence, its environmental consequences. The Army Corps of Engineers will be consulted as planning proceeds to ensure that applicable permit requirements are met. A supplemental EIS will be prepared for this aspect of the Ooma II development if required.

Comment: A sizeable portion of land in the project area is given to the marine park concept and alternate use of that land in the project area should be discussed in the final EIS.

Response: While conceptual in nature, the Ooma II land use plan reflects a "best mix" of land uses based on information about site opportunities and constraints available at present. Although the EIS discusses alternative development schemes, the entire project is viewed in an integrated manner so that alternate land uses for specific areas within the Ooma property are not proposed. However, during the early stages of the development approval process, specific land use boundaries are flexible and can be adjusted based on new information.

We appreciate your comments on the Ooma II Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately covers pertinent development issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Nancy I. Nishikawa

Nancy I. Nishikawa
Project Planner

Attachments

cc: Hawaii County Planning Department

APPENDICES

A. MARKET STUDY AND HIGHEST AND BEST USE ANALYSIS
(Excerpts)

The Hallstrom Appraisal Group, Inc.

Market Study

and

Highest and Best Use Analysis

for

313.66 Oceanfront Acres

Located at

Ooma II, North Kona, Hawaii

Prepared for

Mr. Norbert A. Schlei

c/o Heiber, Hastert, Van Horn & Kimura

Honolulu, Hawaii

May 1985

The Hallstrom Appraisal Group, Inc.

July 1, 1985

Mr. Norbert A. Schlei
c/o Heiber, Hastert, Van Horn & Kimura
2222 Kalakaua Avenue, Suite 1507
Honolulu, Hawaii 96815

Market Study and Highest and Best Use Analysis of 313.66-Acre Ooma II Oceanfront Parcel

Dear Mr. Schlei:

At your request, we have completed a comprehensive market study and highest and best use analysis for the bulk acreage holdings referenced above. The enclosed document represents Volume I (the Market Study) of this two-volume analysis of the subject property. The property is identified on State of Hawaii Tax Maps as Third Division Tax Map Key 7-3-9, Parcel 4.

In this volume, we identify the appropriate economic market sectors (General and Primary) and potential subject uses; discuss existing supply, demand and absorption trends (historic and projected) for the various land-use types; and, establish demand conclusions based on analysis of the data. Within the Highest and Best Use Analysis (Volume II), the adaptability of the subject property to the market-supported potential development scenarios is summarized, based on infrastructure, governmental, public and other concerns and restrictions. This volume will also contain our market absorption forecasts.

We appreciate the opportunity to have worked with you on this most interesting assignment.

Respectfully submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

James E. Hallstrom, Jr., MAI, SRPA

Tom W. Holliday

Tom W. Holliday

/gc

James E. Hallstrom, Jr., MAI, SRPA
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INTRODUCTION

The ensuing report represents Volume I of a two-phased Market Analysis and Highest and Best Use study for the identified bulk-acreage real property holding located at Ooma II, North Kona, Hawaii. Portions of the holding, identified within the letter of transmittal and discussed at length within our study, are being proposed for future development in accordance with expressed market demands.

Within our assignment, we have completed an overall Market Study, and Highest and Best Use Analysis, in order to establish the most probable and efficient use of the subject site under current and anticipated market conditions.

Competitive supply, historic and projected demand, and market absorption trends for the various possible subject uses are the focal points of our market study. Physical characteristics of the site, availability of off-site infra-structure, and community acceptance, are the primary concerns within our Highest and Best Use analysis. We acknowledge the coordinated efforts of Helber, Hastert, Van Horn & Kimura in establishing potential selected highest and best uses of the subject concurrent with this assignment. For this reason, certain characteristics are only briefly covered in our Highest and Best Use document, as they have been presented elsewhere.

In the market study portion of our assignment, we identify the major potential uses of the subject property; set forth parameters in regard to its effective general and primary economic market sectors; investigate the environs of the subject area; and, discuss the historic, current and projected status of the potential uses relative to supply and demand trends.

The Highest and Best Use analysis summary, which follows under separate cover, details the probability of efficient realization for the identified potential uses of the property for which a market demand has been projected. The adaptability of the subject parcel, the availability of public support, and the anticipated ease in resolution of various existing restrictions (or hindrances) for each use is addressed. Market absorption forecasts are also contained in this second document.

The indicators from our research and analyses were then correlated, giving greatest weight to those identified uses which would likely return the highest present value to the subject property based on market demand and pricing levels, and the timeliness of such developability.

SUMMARY OF CONCLUSIONS

Based upon our investigation and analysis of the identified General and Primary Economic Market Sectors, our conclusions regarding market trends and forecasts can be summarized as follows:

1. The South Kohala and North Kona Districts are experiencing general market expansion as a result of the ongoing economic recovery and (specifically) the increase in numbers of visitors and tourism-oriented investment to the region. Long associated with high-quality resort development (owing to Mauna Kea Beach and Kona Village Resort operations), the North Kona-Kohala coastline corridor from Keahole Point to Kawaihae has undergone major inventory plant expansion since 1981 (with 894 hotel and 103 condominium units added), while other statewide vacation destinations were experiencing stagnate construction and market activity. In recent months, construction has commenced or firm plans have been announced for an additional 1,560 hotel rooms and 247 condominium units to be completed within the three existing resorts over the next three to five years. Owing to this activity, and the natural attributes of the area, the Primary Economic Market Sector is anticipated to become a significant focal point for resort development in the State throughout the century.

2. Although land use types and their relative investment levels remain somewhat diversified within the General Economic Market Sector (oriented toward tourism and agriculture in North Kona and ranching/residential in South Kohala) the substantial majority of private capital investment and developed land uses in the Primary Economic Market Sector has been resort oriented. Based on all known proposed development plans by private land owners and public planners, this trend is anticipated to accelerate over the next decade. The only private, significant non-resort use evident in the sector, and also undergoing large-scale expansion relative to existing supply, is Light Industrial; with three projects currently being constructed/finalized in close proximity to the subject property.

3. Commercial Uses -- Commercial activity is primarily situated in the major population centers of Waimea and greater Kailua-Kona. Four major projects (including the 72,000 square foot Keauhou Shopping Center) are under construction, or have been recently finished, in the Kailua-Kona to Keauhou corridor, with several others in the preliminary planning stages. These developments are anticipated to meet the demands of the West Hawaii region for the next three to seven years, particularly in light of the practice by many commercial business to locate in industrial-zoned developments. There are no major commercial projects in the Primary Economic Market Sector, with future plans proposing such development only within, and in conjunction with, the expanding destination resorts. Due to the lack of proximate residential development, and the availability of approved better-located sites, free-standing, non-resort commercial development is not forecasted for the region, and is not considered a probable use for the subject property.

4. Industrial Uses -- Within the North Kona and South Kohala Districts, industrial land uses are concentrated within the Primary Economic Market Sector, the majority within eight miles of the subject property. Currently, there are only 69 subdivided industrial lots in the sector; however, on-going construction, and expansion plans scheduled, will add 275 lots more over the next eight to ten years. Despite the proliferation of commercial uses in industrial subdivisions (enhancing absorption potentials), this level of inventory increase will meet all foreseeable light industrial/service demands throughout (at least) the next decade.

5. Residential Uses -- Currently within the General Economic Market Sector, a substantial over-supply of vacant and improved residential properties exists. In the mauka Kalaoa-Kealakehe and Kailua-Kona communities, there is a potential estimated supply of developable, vacant lots equivalent to a minimum five years of strong, stable demand. Published Kona Board of Realtors listings provide sufficient supply for more than 2.5 years of improved homes at today's activity levels. Additional subdivisions are being planned for these areas which will add more than 3,600 residential lots to

the market in the next six to ten years, intensifying the over-supply condition despite projected population increases.

Due to the lack of historic access, and the prevailing climatic and soil conditions, the Primary Economic Market Sector has experienced minimal historic residential development, totaling only 321 homesites (existing or under construction) as of the report date. Success of these projects is heavily dependent upon strong locational/amenity attributes, with 84.11 percent of the lots in close proximity to the oceanfront, or within a resort complex. The high cost of infrastructure development, restrictions on shoreline use (the subject's primary desirable feature), and demonstrated limited demand, make free-standing (outside of a planned resort development) residential improvement improbable and, likely, economically unfeasible.

6. Resort Uses — The focal point of our study in light of research and analysis accumulations, resort development is anticipated to continue unabated in the Primary Economic Market Sector over the next decade, with potentials for increased expansion levels above current trends should the economy remain strong. Projects within the Kailua-Kona to Keauhou corridor (free-standing hotels, free-standing condominiums, and planned resort development) have fared poorly in recent years, with declining occupancy, market activity, and general demand indicators; although, numbers of visitors and some occupancy rates have substantially improved in 1984. Conversely, indicators (including the degree of proposed visitor plant increase) from the existing Primary Economic Market Sector developments (Keahole point to Kawaihae) are extremely positive. While new free-standing projects would be viewed as uncompetitive due to the lack of amenities available at existing planned resort destinations, we are of the opinion that sufficient demand does exist for additional resort-integrated hotel facilities at sites having prime locational attributes. Based on current market and projected growth trends, it is our opinion that absorption for circa 50 developed condominium units per year could be anticipated for projects within bulk acreage quality and distinctive resort communities (if competitively priced) located in the Primary Sector. Demand for residential homesites would be anticipated to be commensurate with locational attributes. A golf course, and extensive on-site amenity development is seen as integral to planned resort improvement on the subject.

7. Agricultural Uses — Due to poor soil conditions, high infrastructure development costs, availability of competing acreage in publicly-subsidized parks, and demonstrated limited demand, agricultural uses were not considered as probable for the subject properties following analysis.

8. High-Tech Industrial/Aquacultural Uses — The proposed 547-acre Hawaii Ocean Science and Technology Park is to be located on State-owned land northerly adjacent to the subject property. Although historic demand for such acreage has been limited, the field is experiencing rapid economic and product advancement. The facilities in the proposed park are to be state-of-the-art, among the finest in the world. Park studies indicate demand may fill the park in approximately five years; thereafter, the subject would be considered as the prime expansion area.

9. Based on our market study, we are of the opinion that greatest market demand within the Primary Economic Market Sector, generally, and for the subject property, specifically, is for planned destination resort development of a quality comparable with existing Kohala coast and statewide resort communities. Secondarily, due to its advantageous location, high-tech light industrial/aquacultural uses are probable based upon the level of demand projected for the proposed adjacent State-developed complex.

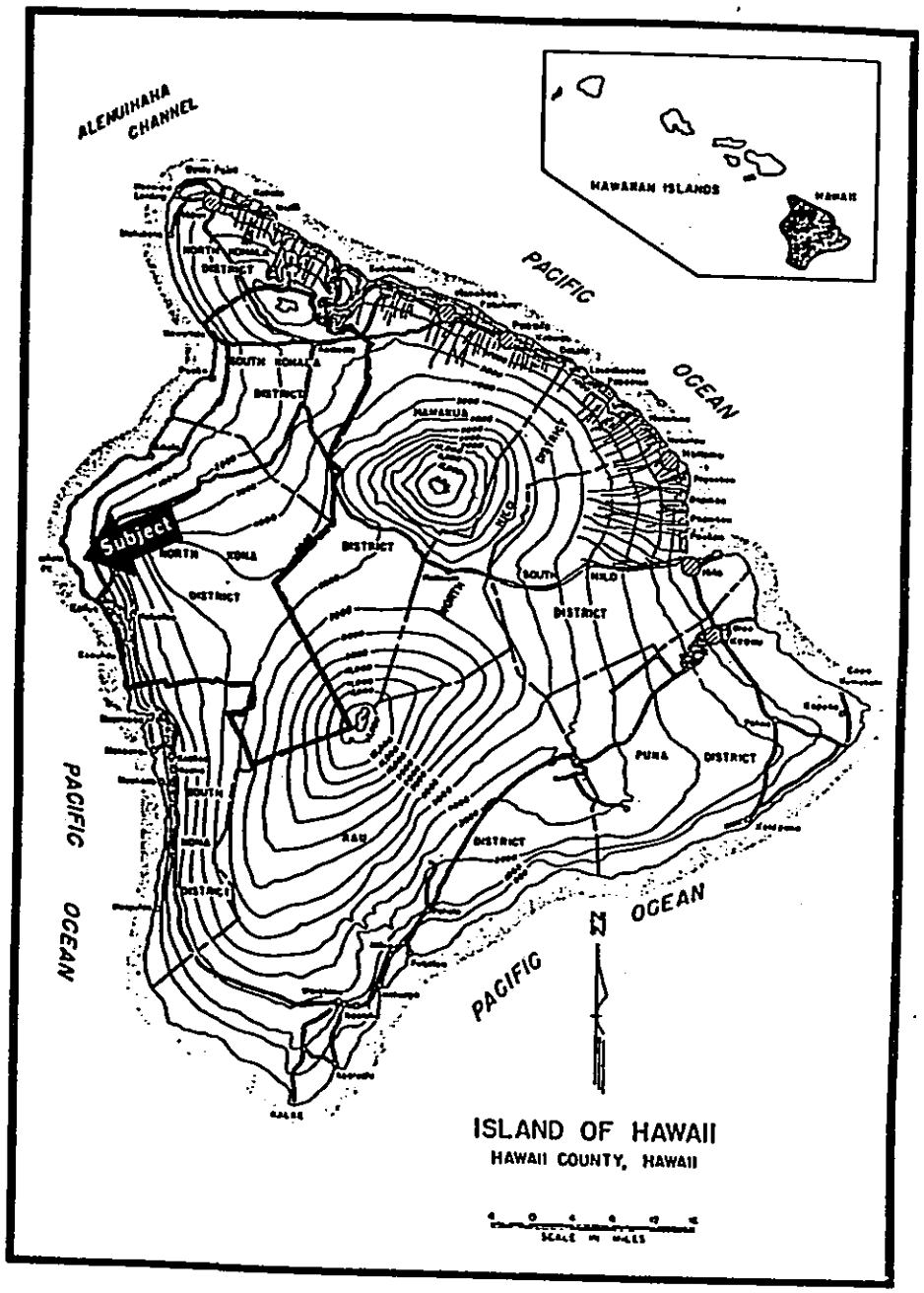
MARKET STUDY

Identification of Economic Market Sectors

The subject property is located on the leeward, or westerly, coast of the Island of Hawaii, between the community of Kailua-Kona and West Hawaii's Keahole Airport. The map on the following page displays the relationship of the site and the major landmarks in the area.

Due to the geographical boundaries presented by the Kohala Mountains, Mauna Kea and Hualalai; traditional district associations; and, common climatic and economic characteristics; the districts of North Kona and South Kohala (outlined in "green") are considered as comprising the General Economic Market sector of the subject properties. The other portions of the Island differ from this sector in regard to climate, soil and terrain conditions; historic and projected land uses; and historical and long-term economic growth potentials. While agricultural and conservation uses dominate the County's other seven districts (outside of urban Hilo), South Kohala and North Kona are undergoing consistent land-use transition from agricultural to resort, residential and other development types.

The Primary Economic Market Sector of the subject properties is the coastal corridor stretching from Kailua-Kona to Kawaihae, a distance of approximately 33.5 miles. This lava strewn region of the Island, shown in "red" on the map, is arid, sparsely vegetated and has relatively uniform development potentials. Queen Kaahumanu Highway, and the properties fronting both sides thereon, is generally considered the mauka (or inland) boundary of the Primary Market corridor.



General Economic Market Sector

1. The South Kohala District

Stretching from sea level to a height of 7,000 feet, the South Kohala district encompasses the majority of the west and southwestern slopes of Mauna Kea and the Kohala Mountains in the north-central portion of the Island of Hawaii. The district had a resident population of 4,607 according to the 1980 U. S. Census, divided somewhat equally between the upland Waimea-Kamuela area and the coastal plain surrounding Kawaihae Bay. Current population estimates for the District range upward of 7,000.

Historically, the present districts of North and South Kohala were considered as a single unit, with their greatest claim being the birthplace and early headquarters of Kamehameha I (the unifier of the Islands). The construction of the Pu'ukohala Heiau along the shores of Kawaihae Bay, one of many historic sites in the area, led to his gaining complete control of Hawaii. The harbor provided by the bay was the point where Kamehameha cleared all foreign arrivals to the islands. John Young and Isaac Davis, Englishmen who became the first foreigners of major importance in the Islands, served the King at Kawaihae, permitting Captains Vancouver and Cleveland to land the first cattle and horses, respectively, in the area, thus, early on establishing the ranching use and culture dominant in the area. Other prominent figures in the district's history include missionaries Lorenzo Lyons and Elias Bond, as well as John Palmer Parker, founder of the expansive Parker Ranch. While the character of Kohala has changed greatly through history, the relative isolation of the area has served to protect many of the ancient Hawaiian and early historic sites from destruction due to development. There were 11 sites in the area designated for protection and restoration by the County General Plan of 1971.

The district of South Kohala has two distinct physical environments: the upper elevation areas (2,000 to 7,000 feet above sea level), centered in Waimea, and characterized by grass-matted rolling hills with cooler temperatures and emphasis on agricultural and residential land uses; and, the coastal plain stretching from

the shoreline upslope to Waikoloa Village, which is typified as an arid region with Keawe trees, sparse vegetation and scattered resort-oriented development.

The coastal areas have an average temperature range of 73 to 90 degrees, with less than ten inches of rainfall per year. Temperatures decrease and rainfall increases at higher elevation levels, with Waimea receiving 40 inches of rain per year, and having an average temperature range of 62 to 67 degrees.

The watershed of the area is similarly divided. The Waimea Village watershed extends to the Kohala Mountains, which have high rainfall figures. Intermittent streams from this range flow into the Waimea area where they then turn westerly and dissipate into the permeable lava flows of Mauna Kea, running down the arid western slope to the Kawaihae-Aneho'omalu shoreline. This area has few defined channels and infrequent stream flows. The Waimea region is generally more susceptible to flooding than the lower slopes and coastal plain; however, high intensity storms periodically flood Mamalahoa Highway from Kawaihae to Puako, with the beachfront areas subject to inundation. The entire coastline of South Kohala is susceptible to tsunami action.

A-9

Due to the topographical extremes evident in the district, South Kohala has 17 "Natural Beauty" sites so designated by County General Planners. Typically, the sites are centered around the shoreline, with eight bays and three beach areas listed. The white sand beaches of this district represent the majority of extensive strands on the Island.

The primary economic activities in the area are cattle ranching, diversified agriculture, and the rapidly expanding tourism industry. Cattle interests utilize a majority of the district acreage, with pastures located along the upper slopes of Mauna Kea, stretching seaward. The largest of the holdings in the area is the Parker Ranch, with approximately 230,000 acres of grazing supporting roughly 45-50,000 head. Silage crops, such as corn and sorghum, cover increasing acres of previously grazing land. These crops are utilized by the cattle feed lot operations.

Additional farming is centered around Waimea, considered one of the Big Island's most productive areas. Cabbage, celery, lettuce, and other vegetables are grown in abundance, as well as melons and floral products. Experimentation using other diversified crops is widespread. The State maintains an agricultural research facility in the Lalamilo Agricultural Subdivision nearby the Waimea airport. The agricultural industry is viewed as a potential economic growth sector for the mauka, or up-country areas of the district; however, the competition for resources and land, bought about by tourism and residential development; the inconsistency of historic supply and demand levels for agricultural products in the State; and, the lack of sufficient inexpensive water supply, hampers the general large-scale expansion of farming.

According to State officials, there are approximately 1,500 acres currently cultivated in the Waimea area. This represents one-half of the potential for arable production farming in the region. In 1981 (the most recent final figures available), the Hawaii Agricultural Reporting Service estimated over 32,040,000 pounds of melons and vegetables worth $8,827,000 were grown on the Big Island. Over 90 percent of these totals are from Waimea or South Kohala's 200-plus full-time farmers.

Tourism, which is rapidly becoming the primary employer and economic force in the district, is geared toward the highly desirable warm, dry climate prevalent at lower elevations and along the coast. The renowned Mauna Kea Beach Resort, established in 1965, was the early, long-reigning foundation of the industry. Featuring an 18-hole Robert Trent Jones championship golf course, a luxurious 310-room hotel, condominium units, houselots, and other amenities, the 1,000-acre originally Rockefeller-financed resort began the now strongly-emerging movement to make South Kohala one of the neighbor island's favorite resort playgrounds. As discussed later in the report, this UAL-owned development has recently announced plans for large-scale, long-term expansion, with a second golf course and another luxury class hotel proposed.

The Mauna Lani Resort, its golf course opened in 1980, and an exclusive 351-room resort hotel in spring 1983, is anticipated to move into a rival position with the Mauna Kea Resort. This potential 3,200-acre development also features a full line of resort amenities, including high-priced condominiums (the second

development of which has been recently publicly presented) in addition to one of the world's classic beachfront golf courses.

The third major resort development in the District is located in the expansive 31,000-acre Trans Continental's Waikoloa holding which stretches upslope from Anaehoomalu Bay to above the 2,600-foot elevation level. The 500-acre beachfront resort currently contains the 543-room Sheraton Royal Waikoloa Hotel, with plans recently unveiled for construction of a $360 million 1,260-room Hyatt Regency in the project. In addition to the standard amenities, the resort is currently pre-selling units in its first condominium project. The residential/resort community of Waikoloa Village is located approximately eight miles inland from the beachfront development.

Low-density residential and a single multi-family project (Puako Beach Apartments) are scattered along other beachfront areas.

While other resort districts in the State experienced stagnation during the 1980 through early 1983 recession, with virtually no inventory expansion (hotel or condominium units) or other construction evident, South Kohala's visitor plant underwent large-scale expansion. Two luxury-class hotels (Mauna Lani Bay and the Sheraton Royal Waikoloa) and three condominium projects (Mauna Lani Terrace, Waikoloa Shores, and the Villas at Mauna Kea) were completed or announced in the period. Due to the climatic characteristics, scenic attributes and amenities available to the district, South Kohala is seen by many experts as being one of the focal points in State tourism over the long-term. Currently, there are approximately 2,700 hotel rooms and 388 condominium units (completed or firmly proposed) within the coastal resort region. A minimum of 2,500 and 800 additional hotel and condominium units, respectively, are additionally projected for the area in the next decade.

Kawaihae, with a current resident population of approximately 800, is the second largest community in the district. The residentially-oriented village has limited commercial facilities, with the interisland port of Kawaihae being the major industrial land use and focal point in the community.

Commercial activity in South Kohala is centered in Waimea and within the resorts, with lesser development in Kawaihae and Waikoloa Village. Major projects in Waimea include the Parker Ranch Shopping Center, the Kamuela Country Store complex, and strip-commercial developments along the main highways servicing the town.

The two major transportation facilities in the district are the deep-water port at Kawaihae and inter-island airport at Waimea. The former is anticipated to increase in importance as the area develops, particularly if plans for manganese nodule processing on the island are actualized. A commuter airstrip serving the Waikoloa and Mauna Lani Resorts has recently been opened along Queen Kaahumanu Highway near the vacation areas.

Public facilities located in South Kohala include the Waimea Medical Center, fire stations at Kawaihae and Waimea, and several public and private schools.

Recreation in the district is geared toward public and private facilities along the coast, maximizing the recreational potential of the ocean. The limited number of other quality beach facilities in the County places a premium on South Kohala's available parks, particularly Hapuna Beach State Park, considered one of the finest in the State. State and County parks are found at various elevations throughout the district with several hunting preserves in the higher regions.

Central Urban Area: Waimea--Waimea is situated in the saddle between the Kohala Mountains to the north, and Mauna Kea to the south, approximately 40 minutes driving time from the subjects. Despite the small size of the town and generally cool temperatures, the eastern portion is considerably damper and subject to greater winds than the western sector.

Established in order to supply support facilities for the Parker Ranch and to provide a cool, quiet retreat from warmer island climes, Waimea-Kamuela has a permanent resident population of approximately 1,200 within the 652 acre census-defined village. An additional 600 to 800 persons live in the ranching and farming community surrounding the town center.

The often fog-shrouded eastern area is less desirable for residential purposes according to the area's populace. Topography is typically rolling hills throughout; however, the northeastern portion of the community has a generally steeper slope with cut-pads required for home construction. The south and western portions of Waimea have a more even topography, consisting of rolling hills interspersed with plain areas. The entire region is further tilted as to gradually slope westerly toward Kawaihae Bay.

The majority of community attributes are described in the preceding section describing the South Kohala district, of which Waimea is the most populous residential, commercial, and agricultural area. Among the amenities not specifically mentioned are the Kahilu Community Theater, one of the finest performing auditoriums in the State, and the Hawaii Preparatory Academy (HPA), Hawaii's most respected private school. Currently having an enrollment of 530, HPA provides boarding facilities and is a major draw for residents of the area.

There are a variety of restaurants, shopping and service businesses in the community, with overnight accommodations available at the Kamuela Inn and the Parker Ranch Lodge.

In general, the town residents reside on lots ranging in size from 10,000 square feet to 20-plus acres, with the majority of parcels in the one-half to three-acre size range. Primary interests in the community are farming, equestrian, and other outdoor-related activities, taking advantage of the areas unique cool, mountain-like atmosphere.

2. The North Kona District

The Kona region, a primary component of West Hawaii, is divided into the North and South Kona districts, which stretch along the coastal plain and western flanks of Mauna Loa and Hualalai for nearly 80 miles. Relatively young geologically, the topography is characterized by lava soil gently sloping from the shoreline to the upper elevations of the inland mountains. Mauna Loa, partially within South Kona and seasonally snow-capped, is the second highest Pacific-island peak with a 13,677 volcanically-active summit.

Generally, temperatures in North Kona decrease and rainfall and vegetation increase the further mauka the location. Along the relatively barren coastal plain temperatures average from 72 to 80 degrees, with rainfall between 25 and 50 inches annually. In the central elevations of the district, from 800 to 2,300 feet above sea level, temperatures are approximately five degrees lower than at the coastline, with 60 to 70 inches of rain per year. The sunny Kona coastline appeals to tourists and retirees resulting in large-scale resort-type development; while the large majority of permanent residents prefer the cooler, agriculturally-oriented central elevation areas. Land above the 4,000-foot level is typically ohia-lehua and fern rain forest, and sparsely populated.

Kailua-Kona and Kealakekua, the major communities in North Kona today, are significant locales in Hawaiian history; central villages of the large native population which once resided along the Kona Coast. Captain Cook first landed on Hawaii at Kealakekua Bay in January 1779, and was later killed there.

The Town of Kailua (recently renamed Kailua-Kona) was made capital of Kamehameha the Great's kingdom in 1812. In 1820, the first missionaries arrived, and soon oranges, grapes, cattle, horses and other crops were established. The safe harborage available in the numerous coastal coves resulted in much whaling trade during the early decades of the 19th Century.

The 1980 census reported a total of 13,748 residents in North Kona, with current estimates ranging upward of 16,000. Kailua, one of the State's larger non-Oahu communities, recorded a 1980 population of 4,751; with Kealakekua and Holualoa, the district's next two largest towns at 1,033 and 1,243, respectively. As a whole, the region grew by 8,916 residents, or 184.52 percent from 1970 figures; which was 8.56 percent above 1960 levels. Governmental planners forecast a population for North Kona of 25,000 by 1990.

Tourism is the primary economic activity of North Kona, and the major economic stimulus for the entire District. Agriculture, still the main focus of South Kona, has been relegated to a secondary status in the North. Currently, there are approximately 4,509 transient units available in North Kona, comprising 62.55 percent of the Island's total inventory.

Visitor arrivals, an important economic indicator in the North Kona district, have fluctuated on the "Big Island" over the past several years. In 1984, 756,890 tourists stayed an average 4.64 days each, spending more than $410,000,000. The visitor count is down from the record 910,000 visitors of 1978. For a variety of reasons, ranging from the effects of Hurricane Iwa on Kauai to lower airfares and general economic recovery, 1984 experienced large increases in numbers of visitors, growing by nearly three percent for the year. The Stanford Research Institute (in studies prepared for the State) estimates the visitor count on the Big Island will increase to between 1.6 and 2.5 million annually in the next 15 years. Figures such as these, and the recent addition of direct mainland flights, encourage continued investment in all West Hawaii economic sectors. Average length of visitor stay is also expected to increase over present levels.

Many industries--real estate, commercial, service-oriented, and retail in particular--have benefitted and expanded due to the income generated through tourism. Property values, in general, have increased significantly over the past decade, a result of the influx of visitor, resident and retiree capital. This sharp rise in land prices has created concern in the agricultural community; however, the increased market size and additional public services have off-set some of these difficulties.

While the historic base of North Kona was ranching, fishing and diversified agriculture, the past decade has seen a transition in the socio-economic character of the region from an aguarian lifestyle to a resort and residentially-oriented community designed to meet the increasingly urbanized employment needs in the tourism-spurred Kailua-Kona to Keauhou development corridor. Yet, as tourism is generally oriented toward the warm sea coast area, away from upland residential/agricultural neighborhoods, a continued harmony between agricultural and urban/resort development is anticipated.

Ranching, considered a poor use of the rocky and relatively expensive land in the District, has given way to a variety of sub-tropical and temperate crop production agricultural uses, although (for tax purposes) many bulk acreage holdings are still used for grazing. There are expansive macadamia nut orchards in both North and South Kona, with avocados, coffee, citrus and floral/nursery products also

cultivated. Commercial and charter fishing is a traditional and continuing economic activity, and a strong identification source for the Kailua-Kona community.

The Big Island has become a focal point in the United States' search for alternative energy sources. A recent project successfully converting ocean temperature differences into energy (Ocean Thermal Energy Conversion) was conducted off Keahole Point. Other tests underway are investigating geothermal, biomass, solar energy and wind turbine power.

Keahole Airport, the State's newest facility, is located approximately eight miles north of Kailua-Kona and has been handling direct mainland flights (via United Air Lines) since July 1983. Expanded boat anchorage has been made available at Honokohau (adjacent to the subject properties), and Keauhou Bay harbors.

The North Kona water system is primarily supplied by four wells at Kahaluu and Waiaha Stream, with the Kahaluu wells providing the bulk of the water. Current source output capacity is approximately eight to ten million gallons per day, somewhat below the anticipated levels, thereby contributing to the current water shortage being experienced, limiting development. Most residences in the Kona area are serviced by individual sewerage (cesspool) facilities, with urban Kailua-Kona and Keauhou being serviced through municipal sewerage systems. Power and telephone utilities are available along major roadways throughout the district.

Central Urban Area: Kailua-Kona to Keauhou Corridor--Kailua-Kona, the population center of West Hawaii, is developed with hotels, condominiums and stores generally directed toward the visitor industry. In addition to tourism, the village is the commercial and residential hub for the agricultural and retiree communities in the surrounding areas.

The corridor between Kailua Village and Keauhou, stretching from the shoreline upslope to Mamalahoa Highway, is in a state of gradual transition, with properties along the ocean being improved with condominiums and high density residential projects. The cooler mauka areas are being developed into single-family residential subdivisions as State Land Use (SLU) and County zoning

designations are changed to permit such improvement, and water is made available. Commercial frontage improvement has been along Alii Drive and Kuakini Highway.

The 2,000-acre Keauhou resort area is currently experiencing its second phase of growth with planned residential and condominium development centered around the existing hotels, resort multi-family projects and the Keauhou Golf and Country Club. To date, 1,330 hotel rooms and 647 condominium units have been constructed in the project. Extensive non-tourist commercial development is only now occurring in Keauhou--an example of the gradual change taking place as businessmen and retailers move into the corridor from traditional Kealakekua and Captain Cook locales.

Educational facilities are provided by elementary and secondary schools located immediately north of Kailua-Kona, with an additional school midway between Kailua-Kona and Keauhou. A high school is located approximately 12 miles south of the village. All schools have bus service. Police and fire protection are located in Kailua-Kona.

Kona Village Resort, a 62-acre holding currently improved only with a 95-room hotel, 12 miles north of Kailua, is the only other master-planned resort area in the North Kona district. The isolated village has experienced historically high occupancy rates in recent years being operated as a polynesian-style low-key retreat destination. The Village is located approximately eight miles north of the subject property at Kaiuwai Bay, and its owners have recently sold adjoining bulk acreage to developers who have expressed a desire to expand the resort area and develop condominium or other uses in the holding.

Primary Economic Market Sector

The Kailua-Kona to Kawaihae Coastal Corridor

Arid and sparsely vegetated, the lava-strewn coastal corridor stretching from the northerly boundary of Kailua-Kona to Kawaihae is considered the primary economic market sector of the subject parcel. Properties within this 33.5-mile

strip, of which Queen Kaahumanu Highway is the general mauka (or inland) border, share similar climatic, soil, topographical, infrastructure and development potential characteristics. South of this currently underdeveloped corridor, the greater Kailua-Kona urban area and commensurate land-uses dominate. Northerly, past Kawaihae, the general slope of the land increases, as does precipitation and wind velocity, and ranching land uses predominate.

Pre-westernization, this region of the leeward Hawaii coastline was populated only along the shoreline, with fishing villages scattered among the various coves and bays in the area. The subject property has evidence of such use. Developed fishponds, natural brackish anchialine pools (which are found only in this area and on southwest Maui), and the ocean provided sustenance for the villages. However, the communities were plagued periodically by lava flows from Hualalai and Mauna Loa which continued until 1859. The corridor was considered as one of nine deserts within the island chain by ancient Hawaiians.

Following the decline of native villages in the late 19th Century, the region was barren and void of development save for sporadic use as second home, vacation retreats or fishing encampments. Two factors have contributed to the dramatic change undergone in recent years as the corridor has moved from an isolated unimproved area to being one of the most desirable visitor destinations in the State.

First was the establishment of the Mauna Kea Beach Resort and Hotel, which opened in 1965. A world-class facility developed by the Rockefeller family, it illustrated the adaptability of the corridor's physical features to well-designed projects. Furthermore, along with Kona Village Resort, which opened in 1966, it exposed the tourist industry to the positive climatic and recreational traits of the region.

The second factor contributing to the current vitalization of the area was the completion of public facilities, notably the completion of Queen Kaahumanu Highway through the coastal lava flows (connecting Kailua-Kona and Kawaihae) and the opening of Keahole Airport. A wide two-laned, high-speed thoroughfare, the Highway has opened previously inaccessible shoreline areas to use and

development and stabilized the region by permitting high-speed travel between Kawaihae and Kailua-Kona.

Despite these influences, the corridor is currently, to a large degree, undeveloped and in feral condition. A'a and Pahoehoe lava comprise the substratum throughout the region, with scattered soil pockets near the shoreline. For the most part, the area is unarable and not conducive to crop production in its existing state. Although more recent flows are void of vegetation, the older lava supports pili grass, Kiawe trees and Haole Koa, among other species.

Of the existing land uses evident in the Primary Economic Market Sector, resort-oriented development is primary. The map on the following page shows the location of the existing major projects relative to the subject property. Discussed within the General Economic Market Sector presentation, the four major resort-type holdings are summarized as follows:

Project Name	Kona Village	Waikoloa Beach Resort	Mauna Lani	Mauna Kea Beach
Size in Acres	62(1)	500	3,200	1,000
Year Opened	1966	1981	1982	1965
Hotel Rooms:				
Existing	95	543	351	310
Proposed(2)	—	1,260	—	300
Condominium Units:				
Existing	—	—	80	23
Proposed(2)	—	114	116	17

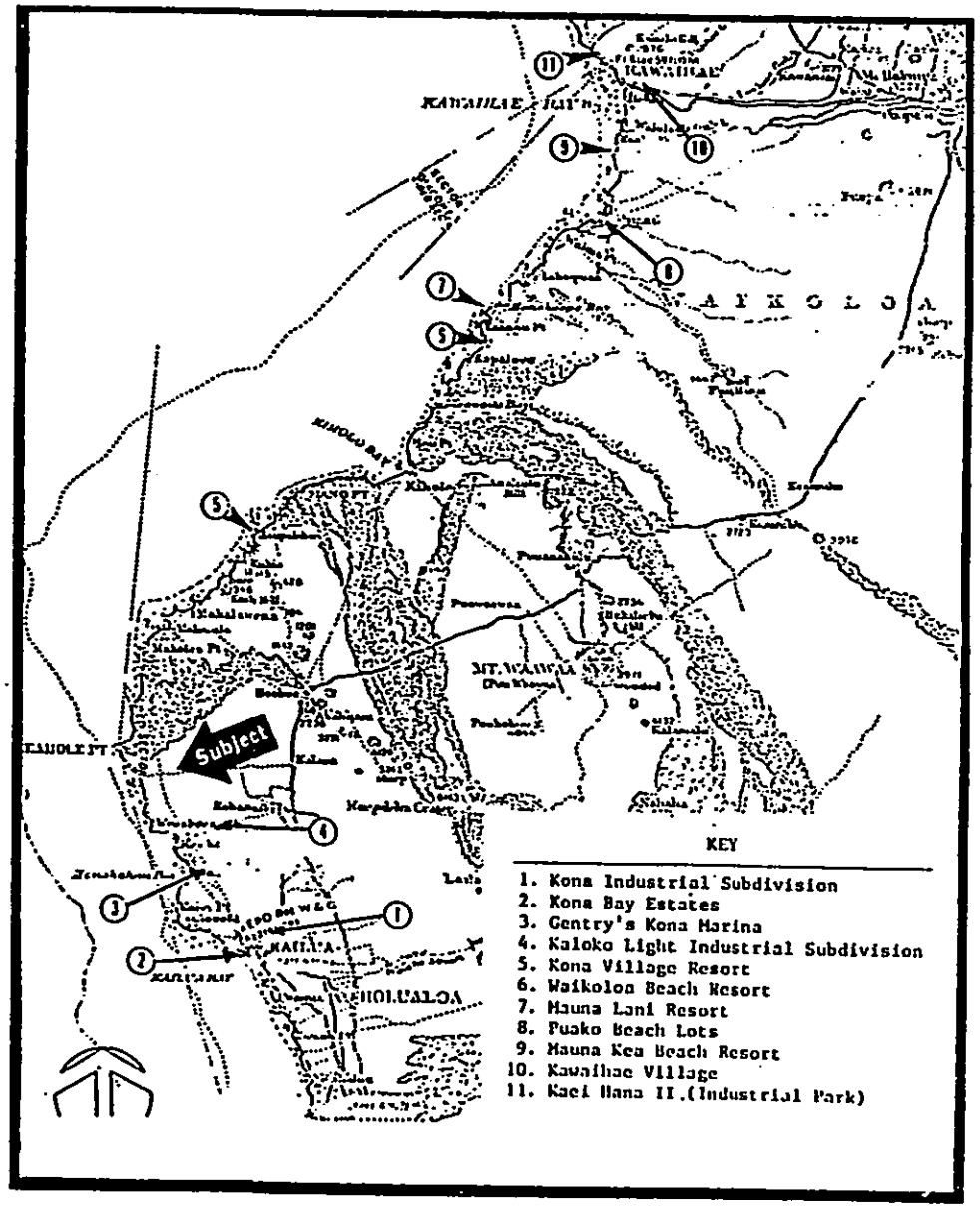
(1) Additional 318 acres nearby submitted for State Land Use change from conservation to Urban.

(2) With construction anticipated to commence within two years.

These developments will be addressed at length later in this report. Generally, the resort operators are optimistic regarding both short- and long-term tourism potentials in the area. All of the projects are of high quality, with three of the four existing hotels being considered as among the most exclusive in the State. Room tariffs, dining costs and condominium unit prices are commensurately high.

PRIMARY ECONOMIC MARKET SECTOR
DEVELOPMENT LOCATION MAP

Kailua-Kona to Kawaihae Coastal Corridor



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The secondary major land use in the corridor is industrial, with parks developed at either end of the area in Kailua-Kona and Kawaihae, and a third under construction fronting the mauka side of Queen Kaahumanu Highway one mile south of the subject. The Kaei Hana II Park, located in Kawaihae, is centered around spatial needs created by the inter-island port, while the Kailua-Kona development (planning its fifth phase of construction) has evolved into a mixed-use industrial/commercial area with wide ranging tenant types. The Kaloko Light Industrial Subdivision, near the subject property, is also scheduled for general industrial uses. The West Hawaii Concrete and Allied Aggregates quarries and batching plants are also located on the mauka side of the Highway nearby the subject property.

The only quasi-commercial development in the corridor, outside of the resorts, is Gentry's Kona Marina, a recently completed construction adjacent to the Honokohau Harbor. The project contains tackle shops, a restaurant, storage, boat repair and other commercial and light industrial facilities oriented toward marine service. Additional commercial projects are being developed in urban Kailua-Kona, just south of the Primary Economic Market Sector.

With the exception of the small Puako community (population of 257 in 1980) situated between the Mauna Lani and Mauna Kea Beach Resorts, residential uses in the Kailua-Kona to Kawaihae corridor are limited to scattered second homes and retreats along the shoreline or in resort development. For the most part, the outlying shoreline improvements are not serviced by county utilities. In all, the full-time resident population of the corridor is approximately 300. This relatively low total is mainly due to the intense heat of the region throughout the year; with residents generally preferring the cooler upland areas. A 40-lot luxury-oriented development, "Kona Bay Estates" with parcel sizes ranging from 7,052 to 26,337 square feet, has recently been completed on 11.51 acres situated at the extreme southerly portion of the Primary Economic Market Sector..

Public land use in the corridor includes: the Keahole Airport, servicing West Hawaii, a 780-acre project zone approximately one mile north of the subject holdings; Honokohau Harbor, a 165-berth small boat harbor immediately two miles south; and, the Kailua-Kona community solid waste disposal station (dump), with

the Humane Society adjacent, mauka of the Highway between the subject and Kailua-Kona. Additionally, the Natural Energy Laboratory is located on 10.25 acres at Keahole Point between the ocean and the airport.

The only agricultural land use in the primary economic market sector is Phase I of the 206-acre Keahole Agricultural Park across Queen Kaahumanu Highway from the Airport, currently containing 35 leasable lots. However, only seven of the parcels are currently in use; two planted in mango fruit (as yet unmature), one improved with shade houses, another recently planted with plumeria trees, and the remainder being developed. Aquaculture is also being attempted adjacent to the Natural Energy Laboratory on a quasi-experimental basis.

There are four public parks in the sector. The best developed are the Old Kona Airport Park (sporting fields, beach facilities, meeting house, canoe sheds) located at the southerly end of the corridor, and Hapuna State Beach Park (three miles south of Kawaihae), which is improved with cabins and picnic facilities. A public beach park is included in the Waikoloa Beach Resort development on Anaehoomalu Bay. The fourth public area, Wawaloli Beach Park, is adjacent to the subject property and is unimproved.

In summation, the Primary Economic Market Sector containing the subject property is generally under-developed. The significant majority of private capital invested in the area has been within the destination resorts along the coastline. While the expansion of urban Kailua-Kona will undoubtedly utilize some of the southerly portions of the defined corridor (for a variety of uses) all available indicators point to the continuing dominance of resort-oriented development. Climatic traits that are desirable among tourists; the increasing demand for quality neighbor island resort destinations created by the expanding visitor industry and the deterioration of Waikiki; and, the desires of governmental planners, are among the positive characteristics which contribute to this trend. The lack of a proximate resident population, the undesirability of the continually hot climate among residents, poor soil conditions, and availability of competing supply are factors which limit the potential of other large-scale uses over the short-term.

Identification of Potential Subject Use Types

Based on our investigation of the subject property's General and Primary Economic Market Sectors, and the commensurate obvious limitations which exist, we are of the opinion that there are five potential use-types which an informed individual may consider in development of all or part of the subject holdings. The uses are:

Commercial
Industrial
Residential
Resort (Condominium/Hotel)
Agricultural
High-Tech Industrial/Aquacultural

In the following sections of this report, we discuss each of these potential subject use-types in regard to existing and proposed supply; historic and projected demand; and, absorption and pricing trends in the marketplace. The analyses of the individual use-types are divided into General and Primary Economic Market Sector segments. Greatest emphases is placed on primary sector data acquisition and assimilation. For the purpose of conciseness, indicators and analysis from the Primary Economic Market Sector are precluded from the general sector presentation of each use type.

It is the intent of this market study to be macro in nature; i.e. addressing overall characteristics within the general and primary markets. Following identification of the use(s) which have the highest probability of achieving effective development within the Primary Economic Market Sector, the adaptability of the individual subject properties to such use(s) (in consideration of all factors) is investigated in the Highest and Best Use Analysis contained in Volume II.

MARKET ANALYSIS OF POTENTIAL USE TYPES

Commercial

General Economic Market Sector Development

The major communities in this market sector, previously identified, contain the significant portion of the available commercial inventory; both improved space and vacant, "zoned" properties.

Historically, Waimea (due to Parker Ranch influence) and Kealakekua/Kainaliu (serving the surrounding agricultural community) were the most commercially developed towns, with strip improvements located along the Hawaii Belt Highway and other major thoroughfares. However, the growth of Kailua-Kona in the past decade, and the projections for its continued urbanization, has stimulated business migration to the near-coastal area of the village fronting Palani Road, Alii Drive and Kuakini Highway.

The existing commercial (retail/service) developments in Waimea and Kealakekua/Kainaliu have efficiently met the demand of the communities in past years, and are not considered as either comparable or competitive with potential commercial use of the subject properties.

The Kailua-Kona to Keauhou urban corridor is currently experiencing a substantial expansion of available commercial space inventory, and these trends are considered as having impact on the potential for similar-type subject use.

In discussing retail/service space and land supply and demand, it is necessary to acknowledge the differentiation in the orientation of available properties. Although use-types may cater to a limited market of cross-over clientele, a market dichotomy exists between tourism and resident oriented businesses. Restaurant operations typically are targeted towards service of both visitors and the local populace, with overall emphasis dependent upon location.

Tourism-oriented commercial development is centered along Alii Drive, from Kuakini Highway to the Kona Hilton. Secondary facilities are located in the hotels within the Keauhou-Kona resort. The operations are intended to serve the more than 4,000 transient vacation units along the coastal plain in the corridor.

With the exception of the converted Kona Inn shopping mall (still undergoing final refurbishment) and the arcade at the Hotel King Kamehameha, the Alii Drive commercial improvements are one- and two-story low-rise structures containing from 6,000 to 25,000 square feet of leasable area. Although tenant turnover rates are relatively high (in comparison to typical retail market segments), fluctuating in accordance with the fortunes of the Island's tourism industry, there are currently few vacant spaces. With the exception of the King Kamehameha Square project (circa 12,000 gross square feet) currently under construction, and the Keauhou Shopping Village (72,000 square feet)--both attempting to solicit the resident and tourism consumers, are the only commercial projects planned for tourism service on a short-term basis.

The latter facility will be West Hawaii's largest shopping mall, and is anticipated to be the focal point of retailing activity in the region for many years. Although the anchor tenants (KTA Supermarket and Liberty House Department Store) have been signed, full absorption of space is projected by the developers to require a minimum of 18 months to two years, depending upon the continued expansion of tourism capital influx levels.

This project, along with the planned expansion of the Kona Coast Shopping Center (previously the area's largest) and the recent or proposed construction of the Sakamoto Electric complex, Territorial Centre and the W. F. Dillingham Medical/Professional Center, should provide a sufficient amount of supply to meet commercial demands in the greater Kailua-Kona urban area for five or more years. And, it is noted that several office/service commercial buildings, notably the Kailua Trade Center and Hualalai Center, both constructed in 1980-81, have large amounts of vacant space still available.

Preliminarily, a commercial complex is planned for the mauka area of the proposed Y.O. (TSA) bulk acreage development approximately four miles upslope

from the subject property, if governmental approval and market acceptance of the residential offerings is achieved.

Additionally, as discussed at length in the appropriate section of this report, a significant portion of the improvements in the Kona Industrial Subdivision are utilized by non-conforming commercial tenants. The availability of such less expensive space (particularly as the "rural-lifestyle" area residents have shown no displeasure in frequenting the light industrial subdivision) has hampered the demand for standard-quality commercial space. As the lower rents in the subdivision permit lower overhead and price levels, this trend is anticipated to continue over the short-term. The next phase of the development (76 lots) is going to emphasize this "mixed-use" concept to an even greater degree, and thereby fill the major supply space need for resident-oriented commercial space in the community for five to seven years, at a minimum.

Primary Economic Market Sector

There are currently no major commercial developments within the subject properties' Primary Economic Market Sector.

Within the identified resorts, there are shopping arcades contained in the existing hotels, and all have expressed a desire to develop a commercial facility to serve the growing destination communities. However, all plans are preliminary at this time, and dependent upon the successful implementation of their hotel and condominium projects.

There is a single "Mom and Pop" store in Kawaihae, and one counter-service eating establishment. There is also a convenience/general store six miles inland at Waikoloa Village.

Major commercial-use additions in this market sector outside of the resorts, will only be within the industrial projects detailed in the following section.

Summary

Based on the apparent trends within the marketplace, it is our opinion there exists insufficient demand to make large scale commercial development of the subject property feasible. The continuing concentration of inventory, and demand by area businesses, for urban Kailua-Kona locations, and the availability of traditionally-acceptable alternative sites and improvements in existing and proposed industrial projects, will undoubtedly fill general market expansion needs for the remainder of the decade.

At best, selected portions of the bulk acreage subject property could be viewed as having long-term commercial potential, if large scale residential development occurs in the Kalaoa area upslope; however, the difficulty in obtaining subdivision and governmental approvals, and the cost of infrastructure construction (particularly water) would likely make such use projections spacious.

Limited ancillary commercial requirements will exist within a resort development, were the subject so improved.

Industrial

General Economic Market Sector

There are no large acreage (more than 20 acres) industrial subdivisions or otherwise significant developments in the South Kohala and North Kona districts outside of the identified Primary Economic Market Sector.

In Waimea, individual lots are improved with industrial-type uses (often as grandfathered or non-conforming with the underlying zoning) along Mamalahoa and the Kawaihae-Waimea Highways. A majority of the developed uses are oriented towards the needs of community farmers and ranchers, and are often contained in older or lower-quality improvements.

Similarly, there are scattered industrial-type uses along Kuakini and Mamalahoa Highways in the southerly portions of the North Kona district near the towns of Honalo, Kainaliu and Kealakekua. Again, farmers contribute to much of the consumption demands.

While in past years the agricultural communities of Waimea and the identified North Kona villages represented a meaningful degree of industrially-oriented land use demand, the expansion of the tourism and service industries in the last two decades has resulted in the shifting of primary consumer market areas into the Kailua-Kona urban region. Over the short-term, there are no large industrial developments planned outside of the Primary Economic Market Sector, although the recent opening of several agricultural subdivisions, in addition to those still in planning (notably Waikii Ranch), could stimulate a limited, but increasing demand in the Waimea area during the next decade.

Primary Economic Market Sector

Within the Kailua-Kona to Kawaihae coastal corridor there are three existing or under-construction large acreage industrial subdivisions. A fourth, industrial/ commercial project, has also recently been completed adjacent to the Honokohau Harbor.

Summary

The previously "limited" inventory of industrial-oriented development that has historically existed in the Primary Economic Market Sector, is currently undergoing expansion that will potentially place more than 275 lots on the market over the next eight to ten years. This effectively quadruples the number of lots (69) completed as of the beginning of 1985.

Despite the positive economic factors evident in the South Kohala and North Kona districts, particularly the significant growth in the tourism industry, it is doubtful that demand will increase sufficiently to create a need for additional industrially-zoned lots beyond those planned during the next decade. Absorption of lots would have to occur at an average of over-25 units annually over the next ten years (a five-fold increase above combined historic trends) before a market sector "shortage" was created.

It is our opinion, that development of the subject into a bulk acreage industrial subdivision project is not sufficiently probable from an economic viewpoint to be considered as a potential Highest and Best Use alternative within our analysis. This is primarily due to the large increase in inventory currently proposed for the sector.

Residential

In analyzing residential real estate market trends within the identified economic market sectors, discussion of population and housing demand forecasts, and historic locational-specific demand is necessary in addition to summation of individual projects in the areas.

Traditionally, residential development in the South Kohala and North Kona districts has been generally along Mamalahoa Highway, in the 600 to 3,500 foot elevation range. As discussed in previous sections, this is due to the climatic desirability of these "mauka" regions, which experience significantly cooler average temperatures, more stable relative humidity conditions, and more abundant rainfall. This latter trait permitted improvement based on catchment water supply prior to the construction of public and private systems. Elevations above the 3,500 foot level are, for the most part, considered less desirable due to extreme rainfall levels, overcast/foggy conditions prevalent, chill factor, and access difficulties.

The opinion is generally expressed by area residents, that the climate of the coastal (or lower elevation) regions, while excellent for tourism/vacation home development, is consistently too hot ("oppressive") and alternately too humid/arid for mass appeal except in closely proximate shoreline properties.

In South Kohala, approximately 6,200, or 88.57 percent, of the district's estimated 7,000 current residents live above the 800 foot elevation level. Many of these individuals have residential or agricultural lots in or near Waikoloa Village (estimated population 400, 900 to 1,100 foot elevation) and Waimea (2,000 estimated population, and 2,000 to 3,400 foot elevation).

Puako, population 257 in 1980, which has all development within 100 yards of the shoreline, and Kawaihae, population circa 200, which is a bedroom community servicing port and resort employee housing needs, are the only permanent residential coastal communities.

The impact of urbanization and tourism demand has resulted in some residential development in the Kailua-Kona to Keauhou corridor not on either the shoreline or above the 600 foot elevation level. The availability of infrastructure, services, employment opportunities, as well as the overall population increase, contributed to this development type.

Cursory demographic analysis of purchasers in mid-range (between shoreline and the 600 foot elevation) subdivisions reveals a significant ratio of investors/speculators, retirees, and "second-home" parties. Lower to middle income purchasers and renters are also prevalent.

However, with the exception of these approximately 1,300 lots, within eight subdivisions, the large majority of residential improvement in the North Kona district has been in the mauka communities of Kalaoa, Holualoa, Keauhou, Kainaliu and others, or within a tightly defined shoreline strand of the urban corridor.

It is our opinion, the continued expansion of the greater Kailua-Kona area over the next decade (as forecasted by government planners) will result in increasing residential development within the Kailua-Kona to Keauhou urban corridor at all elevational levels, stimulated by the attributes of the area. However, the mauka and beachfront locations will continue to be considered most desirable, with mid-elevation range development resulting from the lack of vacant mauka and shoreline developable acreage, and available infrastructure.

Outside the defined urban corridor, residential development in the South Kohala and North Kona districts is anticipated to be largely oriented towards the mauka regions, and secondarily, within the coastal resorts.

Population and Housing Demand

Population — The South Kohala and North Kona districts have experienced resident population growth levels significantly higher than County-wide trends since 1960. The desirable lifestyle, climate, and expanding economy of the West Hawaii region resulted in an increase of 157.00 percent in full-time residents between 1970 and 1980. South Kohala registered a 99.44 percent increase, North Kona 184.52 percent.

Table 4 displays the historic and projected population trends for the two districts and the combined West Hawaii region.

As shown, the resident population of South Kohala in 1960 was 1,538 (or only three percent of the entire County). By 1970, the total number of residents had increased 50 percent to 2,310. Growth continued at an annual rate of 9.94 percent during the 1970s, so that by 1980, the population was 4,607, or roughly five percent of the Island residents.

The growth trend is anticipated to continue for at least the next 10 years spurred primarily by employment demands created in the expanding resorts, and the evolution of commuter lifestyles in the district.

Based on United States Bureau of the Census, and State of Hawaii Department of Planning and Economic Development data, we have projected a total resident population for South Kohala of 11,000 by 1990. This represents an increase of 139 percent from 1980 figures, or an annual compounded growth rate of 9.09 percent. The district will then contain approximately ten percent of all County residents.

The North Kona district was one of the neighbor islands fastest growing regions during the 1970s. A desirable climate and lifestyle, scenic views, and an expanding tourism-oriented economy were major contributing factors. The population increase between 1970 and 1980 of 8,916 individuals, or an annual growth rate of 18.45 percent, was significantly higher than the same figures for the previous decade of 331 numerical, and 0.86 percent average annual increase, growth trends.

Table 4 HISTORIC AND PROJECTED POPULATION TRENDS
West Hawaii

	1960	1970	1975	1980	1985	1990	1995
South Kohala							
Resident Population	1,538	2,310	3,048	4,607	7,000	11,000	16,500
Percent Average Annual Change	N/A	5.02%	6.39%	10.23%	10.39%	11.43%	10.00%
North Kona							
Resident Population	4,451	4,632	8,448	13,748	18,000	25,000	32,500
Percent Average Annual Change	N/A	0.66%	16.93%	12.58%	6.19%	7.78%	6.00%
TOTAL WEST HAWAII POPULATION	5,989	7,142	11,488	18,355	25,000	36,000	49,000
Percent Average Annual Change	N/A	1.93%	12.17%	11.96%	7.24%	8.80%	7.22%

Sources: U.S. Census Bureau, State of Hawaii Department of Planning and Economic Development, and The Hallstrom Appraisal Group Inc.,

The proportionate total of County residents living in the North Kona district has also increased substantially over the past 20 years. In 1960, 7.26 percent of County residents resided in North Kona; by 1970 the district represented 7.61 percent of the total; and, the 1980 population of 13,746 equated to 14.93 of the overall County level.

For similar reasons as South Kohala, the North Kona district is anticipated to continue in resident population growth over the next 15 years. Additionally, the synergystic forces resulting from the urbanization of Kailua-Kona during the past two decades should also enhance population growth potentials. Therefore, we have projected a resident population total of 25,000 for the North Kona district by 1990, an increase of 11,252 persons, or an average growth rate of 8.18 percent annually from 1980 levels. This would equate to an estimated 23.79 percent of the then projected total County resident population.

The County of Hawaii, as a whole, is forecasted to increase in population at a 1.42 percent average annual growth rate until the end of the decade, totaling 105,100 by 1990. This represents an increase of 13,047 over 1980 levels.

Housing Demand -- The anticipated population growth in the South Kohala and North Kona districts will create a significant demand for residential housing over the next ten to 15 years. Additionally, the increasing demand for second-home/investor units along the shoreline and in the coastal resorts will require the construction of significantly more housing units than would be needed by the resident population.

Further contributing to a need for residential units is the evident trend in the State toward smaller family (household) groups.

Table 5 shows the historic and projected housing demand for the South Kohala and North Kona districts from 1970 through 1995.

Our forecasts allow for a continued growth in the relative percentage of unoccupied region residences due to all factors. This allowance is to reflect the vacation-home development in the coastal resorts, second homes elsewhere in the

Table 5 HISTORIC AND PROJECTED HOUSING DEMAND TRENDS
West Hawaii

	1960	1970	1975	1980	1985	1990	1995
South Kohala							
Total Households	410	660	883	1,355	2,090	3,284	5,089
Housing Units Required	436	702	960	1,506	2,410	3,910	5,952
Average Annual Growth Needed (units)	N/A	26.60	51.60	109.20	180.80	296.00	408.40
Percent Average Annual Change	N/A	6.10%	7.35%	11.38%	12.27%	12.16%	10.45%
North Kona							
Total Households	1,187	1,381	2,446	4,044	5,373	7,463	9,848
Housing Units Required	1,263	1,469	2,718	4,702	6,396	8,885	11,724
Average Annual Growth Needed (units)	N/A	20.60	249.80	396.80	338.80	497.80	567.80
Percent Average Annual Change	N/A	1.63%	17.00%	14.60%	7.21%	7.78%	6.35%
TOTAL WEST HAWAII							
Total Households	1,597	2,041	3,329	5,399	7,463	10,747	14,848
Housing Units Required	1,699	2,171	3,678	6,208	8,826	12,795	17,676
Average Annual Growth Needed (units)	N/A	47.20	301.40	506.00	523.60	793.80	976.20
Percent Average Annual Change	N/A	2.78%	13.88%	13.76%	8.43%	8.99%	7.63%

Sources: U.S. Census Bureau, State of Hawaii Department of Planning and Economic Development, and The Hallstrom Appraisal Group Inc.,

area, and transient or vacant (unrented) units. For South Kohala, this rate of vacancy is estimated at ten percent in 1980, increasing to 12, 14 and 16 percent for the years 1985, 1990 and 1995, respectively. In North Kona, where a high percentage of transient/resort units are already located, the trend is anticipated to be stabilize between primary residential and other types of unit construction at circa 16 percent also. In 1980, the estimated rate of vacancy in residential units (not used by full-time residents) was 14 percent.

Based on our analysis, we have projected a housing demand equivalent to 765 units annually for South Kohala and North Kona during the period 1980 through 1995; totaling 17,676 lodging units by 1995. South Kohala is projected to need a total of 3,910 units by 1990, an 15.96 percent annual average increase from 1980. North Kona would require a total of 8,885 housing units by 1990, or an average growth rate of 8.90 yearly from 1980.

General Economic Market Sector

As previously discussed, the majority of residential development in the General Economic Market Sector is centered in Waimea, Kalaoa, and the greater Kailua-Kona urban area. Waimea is far removed (approximately 40 miles) from the subject properties, and with a significantly differing climate, and was not considered as a competing purchase opportunity, and therefore omitted from detailed study.

The Kalaoa-Kealakehe residential subdivisions, along Mamalahoa Highway and Palani Road, mauka of the subject; and the developments in the Kailua-Kona to Keauhou urban corridor, were considered potentially comparable, and a realistic indicator of anticipated market trends for a residential use of the subject properties. We have therefore analyzed the historic, existing and proposed developments in these areas, giving most emphasis to on-going subdivision and short-term trends.

The Kalaoa-Kealakehe Residential Subdivisions

Residential development began in the Kalaoa-Kealakehe area in the late 1960s on acreage previously controlled by large ranching interests. Stretching along Palani Road and Mamalahoa Highway for approximately five miles, commencing three miles north of Kailua-Kona; the majority of lots in this region are available in narrow subdivisions on the makai side of the highway (between mile markers "32" and "36") in the Kalaoa "bedroom community".

This area of North Kona is considered desirable by residents due to the cool, stable and relatively dry climatic conditions, view planes available, and ease of access to the Keahole Airport and the towns of Kailua-Kona and Waimea. The expansion of the Kohala coastal resorts has additionally created a demand for employee and management housing in these developments.

With regulation width streets, electrical, water and cable television services, and mail delivery (lacking in many Kona subdivisions), the lots permit modern lifestyles in a relatively rural environment. According to County planners, additional residential use in this region will be encouraged.

Development of the subdivisions has been sporadic, with several of the larger multi-phased projects (notably, Kona Palisades) experiencing periodic rapid absorption interspersed with significant cash flow problems.

As shown on Table 6, there are currently 16 major residentially-oriented subdivisions in the Kalaoa-Kealakehe area, comprising a total of 2,605 available lots. The parcels range in size from 3,500 square feet (within a single planned development) to 69,323 square feet.

Four of the projects listed are "agricultural", with lot sizes between one and two acres, but are included in this statistical analysis as, despite their underlying-zoning classifications, they are competitive within the residential market. Parcels of this size are not large enough to be generally economically viable for an agricultural use, and are (for the most part) merely larger homesites.

TABLE 6 MAJOR RESIDENTIAL SUBDIVISIONS(1)
Kalaoa - Kealakehe
Ooma II Market Study

Subdivision Name	Tax Map Key	No. of Lots	Range in Size (Sq. Ft.)		
Kona Ocean View	7-2-8 & 9	80	7,526	to	18,907
Kona Acres	7-3-5- & 46	161	43,560	to	76,223
Kona Highlands	7-3-11,12,37,38, 44 & 45	365	8,000	to	13,705
Kona Wonder View	7-3-13 thru 16	136	7,500	to	9,731
Ooma Homesteads	7-3-17	22	7,168	to	17,917
Kohanaiki Homesteads	7-3-18 & 19	40	7,632	to	11,845
Koloko Houselots	7-3-21	18	10,018	to	12,050
Kona Coast View	7-3-22,23 & 28	286	14,851	to	31,533
Kona Palisades	7-3-29 thru 35, 39 thru 42	777	10,000	to	15,518
Kona Heavens	7-4-47	80	43,560	to	61,356
Kona Hills Estates	7-3-50	36	43,560	to	69,323
Paniolo Country Estates	7-4-7	59	43,560	to	63,598
Kealakehe Homesteads	7-4-9 & 14	200	8,326	to	43,560
Queen Liliuokalani Village	7-4-11 thru 13	182	3,500	to	10,177
Kealakehe Houselots	7-4-17	45	10,000	to	12,747
Kona Chocho Estates	7-4-18	118	7,500	to	9,242
Totals		2,605			

(1) All area subdivisions with average lot size of circa one acre or less. List does include four "one-acre" agricultural subdivisions.

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

It is estimated that 30 to 35 percent, or circa 780 to 1,040 of the lots are vacant and unimproved; a range commensurate with figures "of nearly 1,000" available water permits on subdivided lots which have not been utilized. The quality of residences varies dramatically in the projects; however, most are of the "pole house" design type and have makai-facing (downslope) lanais.

Owner demographics include substantial numbers of retirees and investors, in addition to typical family groups. Rentals, currently experiencing high demand in the area, are also common.

Table 7 displays the historic market activity for residentially-oriented properties (improved and vacant) on a quarterly basis from 1981 through mid-1984. Although periodic percentile changes in the number of lots sold has been extreme, the composite range of quarterly transactions between the third quarter of 1981 and the second quarter of 1984, has varied from 39 to 56 lot sales, with an average of 48.83 sales per quarter, or 195.33 annually. Over the entire study period, 710 transactions were recorded, the equivalent of 50.71 transactions per quarter, or 202.86 annually.

As might be anticipated, the significant portion of the sales involve properties under 22,000 square feet.

The number of sales during the first two quarters of 1984 were below the 14-quarter average, and represent a drop-off from the consistently high levels registered over 1983. This decline in activity perplexed many realtors in Kona, who maintained the market was experiencing growth during this economically-up year. Many cite the continually strengthening economy as limiting the "distress" level of many potential sellers, who are now anticipating an appreciation period, and the high rental rates available (limiting holding costs), as factors inhibiting activity.

As of February 1985, there were 312 properties (vacant and improved) listed for sale in the area by the Kona Board of Realtors. Allowing an additional five percent for properties marketed by the owners or other, equates to a readily available supply for 1.61 years based on recent historic demand trends.

TABLE 7

HISTORIC MARKET ACTIVITY TRENDS
"Residential" Properties (1)
Kalaoa-Kealakehe Residential Subdivisions
Ooma II Market Study

	1981				1982				1983				1984	
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.
Parcels Under 21,000 Square Feet	46	51	32	33	30	39	37	36	42	31	44	43	35	29
Percent Quarterly Change	N/A	10.87	(37.25)	3.13	(9.09)	30.00	(5.13)	(2.70)	16.67	(26.19)	41.94	2.27	(18.60)	(17.14)
Parcels 22,000 Square Feet to One Acre	2	9	8	3	16	0	4	0	3	12	8	3	4	10
Percent Quarterly Change	N/A	350.00	(11.11)	(62.50)	433.33	(100.00)	N/A	(100.00)	N/A	300.00	(33.33)	(62.50)	33.33	150.00
Parcels One to Three Acres	5	11	9	10	5	5	8	6	8	12	9	5	8	5
Percent Quarterly Change	N/A	120.00	(18.18)	11.11	(50.00)	0.00	60.00	(25.00)	33.33	50.00	(25.00)	(44.44)	60.00	(37.50)
Total Number Parcels Transacted	23	21	19	16	21	16	13	12	16	23	21	11	17	14
Percent Quarterly Change	N/A	33.96	(30.99)	(6.12)	10.87	(13.73)	11.36	(14.29)	33.33	(7.10)	7.32	0.00	(26.42)	7.69

(1) Both improved and vacant parcels.

SOURCE: State of Hawaii, Realty Sales Service, The Hallstrom Appraisal Group, Inc., May 1985.

Market activity for improved residential properties in the Kalaoa-Kealakehe region from May 1980 through July 1984 is shown on Table 8. The effects of the 1981-1982 recession on activity is apparent. Although sales returned to pre-recessionary levels in 1983-84 (56 sales) and in the first quarter of 1984-85 (60 sales on an annualized basis), the listing and selling prices have steadily declined, and the marketing time required has remained high. The most positive characteristic is the increasing ratio of listed properties which have been successfully sold, up from 13.69 percent in 1982-83 to 29.41 percent during May-July 1984.

The average number of sales per year over the study period is 44.24, with an annualized average of 56.88 since May 1983.

Subtracting the average number of improved residential-type sales annually (44.24) from the average number of all residentially-oriented properties (vacant and improved) sold annually over a similar period (202.86), results in an indicated demand for vacant "residential" parcels of 158.62 annually in the area.

Based on the number of properties currently offered for sale (143 vacant, and 169 improved), there exists a readily marketable 330 day supply of vacant lots, and a 3.66 year supply of improved residences, available in the Kalaoa-Kealakehe subdivisions.

Additionally, several projects are in the final planning stages, awaiting County water service and final approvals. The Y.O. Corporation, a division of TSA International (a major landowner in the area), has recently received zoning approval for the first phase of residential subdivision, contingent on water availability. Up to 1,800 single-family lots are envisioned in the project over the next eight to ten years. Other proposed projects include a 125-lot "agricultural" (minimum one acre) subdivision in the northerly portion of the region.

Kailua-Kona to Keauhou Corridor

Secondary to resort oriented multi-family development throughout the 1970's, single-family residential properties in this area have increased in market acceptance since the beginning of the decade. While stagnate tourism indicators (until recently) have hampered the demand and development of condominium units, the economic expansion and urbanization of Kailua-Kona, has made the coastal corridor a desirable location; particularly for those enjoying a hot, dry climate. Homesites above the 600-foot level (the majority) have not only cooler climates, but also generally have excellent view planes.

The continuing growth of West Hawaii projected over the next 15 years is anticipated to result in increasing numbers of residential subdivisions within the Kailua-Kona to Keauhou corridor. Rural county residents, relocating for enhanced employment opportunities, immigrating families, retirees, and investors will constitute the significant majority of purchasers in the area.

Table 9 summarizes the major residential subdivisions in the greater urban area (Tax Map zones 7-5, 7-6, 7-7 and 7-8). The 2,531 lots accounted for constitute an estimated 85 to 90 percent of the available single-family parcels in the market sector. The subdivided lots within the 25 identified projects range in size from 7,052 to 89,898 square feet. It is noted that several of the developments contain some multi-family or commercial zoned sites.

It is estimated 20 to 30 percent of the lots are currently vacant within the subdivisions, with less than 15 percent unimproved within the remainder of the market (outside the identified subdivisions). Improvements vary widely in design and cost, with pole houses being the most prevalent. Most homes have makai-facing lanais.

Historic market activity (1981 through June 1984) for residentially-oriented properties (vacant and improved) is displayed on Table 10. As can be seen, the number of transactions per quarter varied dramatically over the study period, from 41 (first quarter of 1983) to a high of 219 (second quarter of 1981), with a

TABLE 8

IMPROVED RESIDENTIAL MARKET ACTIVITY
Kolaoa - Kealakehe Residential Subdivisions (1)
Ooma II Market Study

Item	May 1980 to April 1981	May 1981 to April 1982	May 1982 to April 1983	May 1983 to April 1984	May 1984 to July 1984
Number of Homes Listed	217	214	263	280	51
Percent Change	N/A	(2.30)	25.94	6.46	N/A
Number of Homes Sold (2)	51	30	36	56	15
Percent Change	N/A	(41.18)	20.00	55.56	N/A
Percentage of Listings	23.50	14.02	13.69	20.00	29.41
Dollar Sales Volume (3)	$6,134,850	$3,480,400	$4,432,025	$6,363,970	$1,380,300
Percent Change	N/A	(43.27)	27.34	43.59	N/A
Average Sales Price	$120,291	$116,013	$123,112	$113,642	$92,020
Percent Change	N/A	(3.56)	6.12	(7.69)	(19.03)
Percentage of Listed Price	87.82	94.60	87.22	93.51	91.93
Average Time on Market (in days) (4)	122.12	132.97	167.94	174.54	146.73
Percent Change	N/A	8.88	26.30	3.93	(15.93)
Average Listing Price (4)	$136,971	$122,640	$141,151	$121,532	$100,100
Percent Change	N/A	(10.46)	15.09	(13.90)	(17.63)

(1) Identified properties in Tax Map Key sections, Third Division, Zone Seven, Sections Two, Three and Four.

(2) Only properties having closed escrow during study period. An additional five to 20 percent of listings typically enter escrow.

(3) Dollar figures not adjusted for time.

(4) Units sold only.

SOURCE: Multiple Listing Service, The Hallstrom Appraisal Group, Inc., May 1985.

TABLE 9

MAJOR RESIDENTIAL SUBDIVISIONS
Kailua-Kona to Keauhou Corridor
Ooma II Market Study

Subdivision Name	Tax Map Key	No. of Lots	Range in Size (Sq. Ft.)		
Kona Bay Estates	7-5-5	40	7,052	to	26,337
Koalani	7-5-18	29	8,246	to	11,859
Lono-Kona (1)	7-5-22	169	7,500	to	30,294
Aloha Kona	7-5-23	67	7,500	to	8,844
Kona Orchard	7-5-25	36	21,782	to	60,002
Kona Heights	7-5-26 thru 29	260	7,507	to	14,183
Kona Hillcrest	7-5-30 & 31	100	7,520	to	13,333
Kailua View Estates	7-5-32 & 33	237	15,000	to	18,272
Alii Kai	7-6-16,18 & 19	211	7,698	to	33,665
Kilohana	7-6-20	79	7,500	to	8,795
Komohana Kai	7-6 & 7-7-Var.	229	10,000	to	20,073
Kona Sunshine	7-7-03	53	21,865	to	49,789
Sunset View Terrace	7-7-9,11 & 12	156	8,242	to	18,430
Holualoa Estates	7-7-13	68	10,000	to	24,993
Kualani Heights	7-7-14 & 19	115	9,807	to	18,668
Kona Sea View	7-7-15 & 16	178	7,500	to	9,730
White Sands Beach Estates	7-7-17 & 18	117	7,505	to	13,058
Kalani Sunset	7-7-20	70	10,000	to	11,580
Keauhou Uka	7-7-22	25	10,000	to	11,752
Kahaluu Beachlots	7-8-14	45	7,648	to	19,715
Kahaluu Houselots	7-8-15	34	21,720	to	89,298
Tanaka Houselots	7-8-17	24	9,967	to	21,098
Puuloa I	7-8-19	26	16,050	to	51,490
Keauhou	7-8-20	28	10,300	to	14,494
Keauhou Estate	7-8-10	135	15,000	to	20,000
Totals		2,531			

(1) Subdivision contains some commercial and multi-family zoned parcels.
SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

TABLE 10

HISTORIC MARKET ACTIVITY TRENDS
"Residential" Properties (1)
Kailua-Kona to Keauhou Urban Corridor
Ooma II Market Study

	1981 1st Qtr.	1981 2nd Qtr.	1981 3rd Qtr.	1981 4th Qtr.	1982 1st Qtr.	1982 2nd Qtr.	1982 3rd Qtr.	1982 4th Qtr.	1983 1st Qtr.	1983 2nd Qtr.	1983 3rd Qtr.	1983 4th Qtr.	1984 1st Qtr.	1984 2nd Qtr.
Parcels Under 22,000 Square Feet														
Percent Quarterly Change	67	202	140	80	87	71	56	66	38	32	37	29	35	49
	N/A	201.49	(30.69)	(71.43)	17.50	31.06	(21.13)	17.86	(42.42)	(15.79)	15.63	(21.62)	20.14	36.11
Parcels 22,000 Square Feet to One Acre	4	6	8	5	4	2	3	9	1	7	7	1	2	6
Percent Quarterly Change	N/A	50.00	33.33	(37.50)	(20.00)	(50.00)	50.00	200.00	(88.89)	600.00	0.00	(85.71)	100.00	200.00
Parcels One to Three Acres	2	11	9	3	5	3	4	15	2	8	8	4	8	2
Percent Quarterly Change	N/A	450.00	(18.18)	(66.66)	66.67	(40.00)	33.33	275.00	(86.67)	100.00	0.00	0.00	100.00	(75.00)
Total Number Parcels Transacted	73	219	157	88	96	78	63	88	41	47	48	34	45	57
Percent Quarterly Change	N/A	200.00	(28.31)	(43.95)	9.09	(18.75)	(19.23)	39.68	(53.41)	14.63	11.63	(29.17)	32.35	26.67

(1) Both improved and vacant parcels.

SOURCE: State of Hawaii, Realty Sales Service, The Hallstrom Appraisal Group, Inc., May 1985.

quarterly average of 75.07 sales. On an annualized basis, this would be equivalent to 300.29 transactions per year.

The total number of sales over the 14-quarter time-frame was 1,051, of which 910, or 86.58 percent were under 22,000 square feet.

Omission of the second and third quarters of 1981 (219 and 157 sales, respectively), skewed due to pre-sales closing in two large developments, results in adjusted averages of 69.33 sales per quarter, or 277.33 annually.

However, activity levels have fallen significantly since the fourth quarter of 1982, when 88 parcels transacted. For the four periods of 1983, and the first two quarters of 1984 to date, sales averaged only 44.83 per period, or less than 60 percent of overall study averages. The trend to fewer sales appeared to bottom-out in the fourth quarter of 1983, when only 34 residential-type properties sold. Since that time, transactions have steadily increased. Area Realtors anticipate a continuing increase in demand for lots in the corridor; with short-term activity approaching the average trends shown since the beginning of the decade (circa 75 transactions quarterly), and long-term (five or more years) demand projected to increase to 100 or more sites periodically.

As of February 1985, there were 302 residential-type properties listed for sale by the Kona Board of Realtors. Allowing an additional five percent for properties marketed by the owners or others, equates to a readily available supply of more than one year based on the demand trends illustrated by our study.

Market activity for improved residential properties in the Kailua-Kona to Keauhou corridor from May 1980 through July 1984 is shown on Table 11. As evidenced in our study of the the Kalaoa-Kealakehe subdivisions, the 1981-1982 recession substantially impaired the number of transactions. Total sales dropped 23.08 percent between 1980-81 and 1981-82, and by 35 percent in 1982-83. By 1983-84, activity levels had recovered, although during the first quarter of the 1984-85 accounting year, sales declined slightly.

TABLE 11

IMPROVED RESIDENTIAL MARKET ACTIVITY
Kailua-Kona to Keauhou Urban Corridor (1)
Ooma II Market Study

Item	May 1980 to April 1981	May 1981 to April 1982	May 1982 to April 1983	May 1983 to April 1984	May 1984 to July 1984
Number of Homes Listed	203	260	261	311	50
Percent Change	N/A	28.08	0.38	19.16	N/A
Number of Homes Sold (2)	52	40	26	50	9
Percent Change	N/A	(23.08)	(35.00)	92.31	N/A
Percentage of Listings	25.62	15.38	9.96	16.08	18.00
Dollar Sales Volume (3)	$8,817,892	$7,462,200	$3,932,700	$6,023,400	$2,765,000
Percent Change	N/A	(15.37)	(47.30)	53.16	N/A
Average Sales Price	$169,575	$186,555	$151,258	$120,468	$307,222
Percent Change	N/A	10.01	(18.92)	(20.36)	155.02
Percentage of Listed Price	92.76	88.01	90.11	91.03	90.02
Average Time on Market (in days) (4)	103.54	200.28	216.83	219.08	173.56
Percent Change	N/A	5.01	8.27	1.03	(20.78)
Average Listing Price (4)	$182,803	$211,974	$167,856	$132,385	$391,278
Percent Change	N/A	15.96	(20.81)	(21.16)	157.87

(1) Single-family residential properties in Zone 7, Sections 5 through 8.
(2) Only properties having closed escrow during study period. An additional five to 20 percent of listings enter escrow.
(3) Dollar figures not adjusted for time.
(4) Units sold only.

SOURCE: Multiple Listing Service, The Hallstrom Appraisal Group, Inc., May 1985.

Most indicators appear positive, with a greater percentage of listings being successfully marketed (up to a current rate of 18 percent from 9.96 percent in 1982-83), and a shortening marketing period. The indicated average sales price during the first quarter of 1984-85 was somewhat skewed (on the high-side) due to the inclusion of several high-priced properties.

The average number of sales per year over the study period is 41.65.

Subtracting the average number of improved residential sales annually (41.65) from the average number of all residentially-oriented properties (vacant and improved) sold annually over a similar period (300.29), results in an indicated demand for vacant parcels of approximately 258.64 annually in the area.

Based on the properties currently offered for sale (129 vacant, and 173 improved), there exists a six-month ready supply of vacant lots, and a 4 year supply of improved residences, available in the Kailua-Kona to Keauhou urban corridor.

There are several residential projects proposed for the corridor, although most are preliminary at this time, and dependent upon receiving a County water supply. The most notable subdivisions are: the under-construction 135-lot Keauhou Estates development, a major portion of the second phase expansion of the Keauhou-Kona Resort; and, the 180-acre Gamlon subdivision, with plans for nearly 550 single- and multi-family lots/units.

Primary Economic Market Sector

There are only four residential developments in the subject's Primary Economic Market Sector: Kona Bay Estates, a 40-lot oceanfront subdivision at the southerly end of the Kailua-Kona to Kawaihae coastal corridor; Puako Beach Lots, a 163-lot strip development along the shoreline four miles south of Kawaihae; the Fairways at Mauna Kea, a two-phased 67-lot project in the world-class resort; and Kawaihae Village, a 51-homesite inland development at the northerly extreme of the sector.

The first three of these projects are similar in that they are dependent upon a strong characteristic/amenity for market acceptance; the first two on oceanfront proximity, and the third on its location within a resort and having a scenic makai view plane. Kawaihae Village offers some ocean panoramas, but is generally inferior to the other projects, with its major attribute being its proximity to the interisland harbor, Kohala Coast resorts, and ease of access provided by the nearby junction of Highways 19 and 270, the major thoroughfares in the area.

It is doubtful if a development lacking a significant amenity (or combination of minor ones) could achieve market acceptance in the sector, due to the prevailing severe climatic and soil conditions.

Outside of the preliminary plans developed for single-family projects within the Waikoloa Beach and Mauna Lani resorts, discussed in the appropriate summation of each complex (which are several years from actualization), there are no substantial residential subdivisions planned for the Primary Economic Market Sector.

Summary

The projected expansion of the resident population at rates approximating 9.60 percent annually on an average basis over the next ten years (1985 to 1995) will create the demand for circa 885 additional housing units per year in the

General Economic Market Sector. Investor, vacation and second-home purchasers will also contribute to market activity.

Based on historical preferences, current economic/growth trends, and availability of infrastructure, it is highly probable that a significant majority of future residential inventory (sites and homes) will be added near the existing communities of Waimea, Kalaoa-Kealakehe, and the Kailua-Kona to Keauhou corridor.

The former two of these areas are considered desirable due to the prevailing cooler climatic conditions (a major factor), and the rural equestrian/agricultural lifestyles available. An estimated 500 subdivided residential/agricultural homesites are proposed or under improvement in the greater Waimea area, and plans to develop a minimum of 1,800 lots (the majority in the Y.O./TSA project) in the Kalaoa area are currently being discussed with County planners, and are to receive approval for subdivision as County water becomes available.

In addition to the planned projects, an estimated 1,000 existing lots (fully-improved with off-site infrastructure and water approvals) that are within the 16 major identified subdivisions in Kalaoa-Kealekehe are still unimproved. Based on historic demand trends in the area, for vacant and improved properties, there exists/is firmly planned a sufficient supply of developable lots for over 17 years (2,800 lots divided by 159 average transactions annually). These figures assume that all properties transacted are not returned to the market unimproved at a later time, that historic construction trends will continue, and that a high percentage of current owners (as yet not having improved the lots) would be desirous of selling their holdings.

There is currently a minimum of a 266-day supply of lots listed by area realtors.

Although the effects of the 1981-82 recession upon the "improved residential" market in the area have eased, with sales activity returning to 1979-80 levels during 1983 and 1984, demand is not forecasted to increase beyond 70 transactions per year over the short term (56 sales in 1983, average of 3.69 per month over last

51 months). Based on existing demand levels (approximately 60 transactions annually), there is currently a 2.7 year supply of homes listed for sale.

The expansion of the tourism industry along the Kohala Coast is anticipated to contribute to demand in the Kalaoa and Waikoloa "bedroom" communities; however, the existing and planned subdivisions should more than compensate for this increase.

In the Kailua-Kona to Keauhou corridor the oversupply condition is not as extreme but readily evident. It is estimated that a minimum of 600 to 800 existing lots are currently unimproved, or a market supply equivalent to 2.14 to 2.86 years based on historic/projected demand trends (under the assumptions listed above). Approved and under construction subdivisions will contribute an additional 800 lots over the next three to five years, effectively doubling the currently available inventory to upwards of five years of market supply.

Over the past 51 months, improved residences have transacted at the rate of 3.47 per month in the corridor. Allowing for the economic recovery and expansion over the past 20 months (50 sales in 1983), and continued anticipated growth, it is projected demand over the short term (three to five years) will be circa 60 homes annually. At this absorption rate, there is currently a 2.90-year supply of listings (173) with Kona realtors.

Within the Primary Economic Market Sector, the limited availability of subdivided homesites (321 total) both hampers the depth of analysis possible, and is indicative of the overall historic market demand to some degree. In past years, the lack of access to the sector (resolved with the completion of Queen Kaahumanu Highway), severely restricted residential (and general) development potential. The consistent high temperatures prevalent in the region, extremely poor soil conditions, lack of infrastructure, and distance from facilities/services are the existing primary factors limiting market demand.

The majority of the homesites (270, or 84.11 percent) subdivided in the area are oceanfront, in close proximity to the shoreline, or within a quality resort development. The remaining subdivided residential properties are older, lower

priced homes within a fully improved planned development having extremely small lot sizes.

It is apparent that successful residential development in the primary coastal corridor is dependent upon association with one or more strong locational amenities, specifically oceanfrontage. The strong success of Kona Bay Estates, which was effectively sold-out upon completion of infrastructure improvements (40 lots sold to "100 interested parties" approached over a three-year period), illustrates the continual demand for well-situated properties.

As a free-standing residential development, it is doubtful that a sufficient demand exists to justify the bulk acreage subdivision of the subject parcel into residential use; however, the near-shoreline areas would likely achieve market acceptance. This portion of the property is limited relative to overall size, and subject to severe restrictions for environmental and historical reasons. It is our opinion that the cost of infrastructure improvement coupled with locational-demand constraints, would make such subdivision of Ooma II unfeasible.

However, limited amounts of residential development might be included were these subject property improved as an integrated resort. Currently, seven of the State's 15 destination resorts contain single-family homesites, with four of the remainder planning subdivisions within the next three years. In all cases the lots are situated on interior resort parcels; with the demand for the properties being created by the availability of resort amenities. The degree of such improvements, and the potential market absorption parameters within the primary economic sector, are discussed within the Resort section of this report.

Resort

Having surpassed agriculture as the primary industry of West Hawaii, tourism is anticipated by private and public analysts and planners to expand its economic dominance throughout the century. Via capital improvement investment, purchased local goods, and creation of employment, the visitor industry stimulates a wide-range of business sectors in the community, notably construction, real estate, trade, transportation and financial concerns.

For these and other reasons, the County of Hawaii has been amenable to well-planned destination resort development during recent years. However, the individual improvement of single, smaller holdings typically resulting in denser, incongruous, aesthetically lacking strip development (as has occurred in the Kailua-Kona to Keauhou urban corridor, in Kihei, Maui, and elsewhere) is discouraged.

Resort development, whether on a bulk or individual lot basis, is dependent upon the relative health of the County of Hawaii tourism industry. During periods of increasing visitor arrivals and expenditures, a demand is created for finished hotel and condominium units, related resort uses, and similarly developable sites. Conversely, declining tourism indicators results in diminishing, often stagnate, demand for resort-oriented real estate, and generally an overhanging supply of available units.

In the following sections, the trends within the State of Hawaii and County of Hawaii visitor industry are summarized, and resort-type uses found in the identified economic sectors are discussed; according to classification as a Free-Standing Hotel, Free-Standing Condominium, or Planned Resort development.

Specific emphasis was placed on the existing destination resort projects located in the Kailua-Kona to Kawaihae coastal corridor.

The Tourism Industry

Our conclusions regarding the State of Hawaii and County of Hawaii tourism industries based on our investigation of the physical and economic components of the market, and analysis of historic and current operating and income trends, can be summarized as follows:

A. State of Hawaii

1. The State of Hawaii visitor industry has recovered quickly and strongly from the 1980 through mid-1982 economic recession which plagued the dollar-influenced world. While other tropical destinations are only now beginning

to achieve pre-recession levels, Hawaii posted record years in 1982, 1983, and 1984 in regard to number of tourist arrivals and visitor expenditures. In 1984 a total of 4,855,580 visitors spent an estimated $4.582 billion in the State, while enjoying an average length of stay of 10.5 days, the highest figure in more than 20 years. Preliminary 1985 data indicates this could be the most successful year ever for the industry, particularly for neighbor islands, with Kauai and the Big Island returning to late 70's record levels.

2. The major contributors to this increase, beyond the general expansion of the mainland economy, are the low air fares brought about by the deregulation of the airline industry, the publicized political and economic instability of competing vacation areas (notably Mexico and the Caribbean), and the pent-up demand for quality leisure time brought about by the stagnation and insecurity which were prevalent during the recession. The continued aggressive marketing of Hawaii is another factor in the recent resurgence of the tourism industry.

3. The visitor accommodation inventory (number of rooms available) has consistently exhibited continuing growth trends over the past decade despite the vagaries of the economy. At the last accounting, in February 1985, there were a total of 65,919 transient rental units available in Hawaii, with more than half (52.3% percent) located within Oahu's Waikiki Resort District. An emerging trend since 1977 has been the increasing percentage of condominium units in the lodging inventory. This is primarily due to three causes: 1) the potential for faster and greater returns to the developer in condominiums as opposed to hotel construction; 2) the demand in the world market for Hawaii resort condominiums as an investment tool; and, 3) the increased return, and hence smaller negative cash flow, available to owners through vacation as opposed to fixed-lease rentals. Condominium rentals are achieving continually greater occupancy success, particularly among return visitors, due to their typically larger size, more relaxed atmosphere, competitive pricing, and kitchen facilities (which are generally unavailable in hotel rooms). Currently, circa 32 percent of all transient rental units available are located in condominium projects; 68 percent in hotels. The number of condominium rental units has more than tripled since 1977, hotel rooms have increased by 11.50 percent over the same period.

4. While average daily room rental receipts have continued to climb during the course of our study period, other relevant income categories (occupancy rates, food and beverage revenues) have been erratic over the past several years. Preliminary 1985 figures indicate a returning to the growth trends experienced throughout the 1970's.

5. The short-term prospects in the State of Hawaii visitor industry appear strong. Should the economy continue its present rate of expansion, and competition among air carriers remain high, industry growth for the remainder of the decade should continue at five or more percent annually. The opening of the neighbor islands to direct mainland air service, and the continually increasing percentage of return travelers in proportion to all visitors, are factors anticipated to keep long-term growth prospects at an annualized rate of three to five percent per year until the end of the century. The economic and political emergence of the Pacific Basin as a factor in world-wide economic and United States affairs will also stimulate Hawaii tourism, particularly if expressed State goals of making the State the "crossroads of the Pacific" are realized.

Selected graphs depicting historic statistical trends for the years 1972 to 1984 (through June only), are contained in Addenda Exhibit III. The indicators analyzed include: Average Length-of-Stay, Room Rental Rates, Occupancy Rates, and Food and Beverage department revenue levels.

B. County of Hawaii

1. Following three successive years of declining or stagnate economic indicators, the County of Hawaii tourism industry has experienced strong recovery through 1984. However, this current expansion of the visitor trade has yet to result in indicator levels approaching the record figures established during the late 1970's. The number of visitors to the Big Island in 1984 totaled 756,890, according to the Hawaii Visitors Bureau, a

6.25 percent increase from the 1983 figure of 712,380, (which represented a 5.0 percent growth from 1982 levels). Through March of this year, 205,530 tourists had visited the County, a slight drop relative to the similar period during the previous year. The record visitor count was 905,000 in 1978. It has been estimated that tourism contributes more than $625 million annually to the County, and supplies more than 3,000 jobs, making it the largest island business. Continuation of the trends apparent in recent years would result in near-record totals for arrivals and expenditures in 1985, with short-term prospects highly positive.

2. Among the primary factors stimulating the resurgence (other than those addressed in summation of statewide influences), were: the commencement of direct mainland-to-Kona flights in early 1984, now running several times daily; the opening (and associated publicity) of the Mauna Lani Bay Hotel; the increasingly-recognized quality of the Kohala Coast resorts; the competitive pricing of many Kailua-Kona properties; and particularly, the continued deterioration of Waikiki encourages travelers to visit neighbor island destinations. A marketing campaign implemented in 1982 and 1983 targeted toward traditionally strong market segments is considered a secondary growth factor. The Hilo vacation area (located along Banyan Drive) has not experienced recovery to nearly the same degree as the Kona-Kohala region, and continues to be rated (according to Pannell Kerr Forster statistics) at or near the bottom of the ten statewide destination areas in regard to occupancy, room rates, and other economic data.

3. The number of units currently available on a transient basis in the County totaled 6,944 as of February 1985, a slight decrease from the previous year. (The cause for this loss in visitor rooms is due to the closing-for-conversion of the Sheraton Waiakea and Hilo Lagoon hotels.) Of the existing units, 4,336, or 62.44 percent are in the Kailua-Kona to Keauhou urban corridor; 16.83 percent, or 1,169 units, are located in Hilo; and, 1,439 rooms (20.72 percent) are located elsewhere, the majority (circa 1,250) within the Primary Economic Market Sector. The number of transient accommodation units in the County has not increased as rapidly over the past decade as experienced on other Hawaii islands, expanding to current levels from the

5,265 units available in June 1974; equivalent only to a 31.89 percent increase. However, the opening of two large hotels (Sheraton Royal Waikoloa and Mauna Lani Bay) and the beginning of condominium development in the Kohala resorts since mid-1981, has placed West Hawaii in the forefront for projected expansion during the coming ten years, while other neighbor island resorts have remained relatively stagnate. A significant addition to the County total will come with the completion of the 1,260-room Hyatt Regency scheduled for late 1987.

The Kona lodging plant has long been composed, to a large degree, by condominium units placed in rental programs by absentee owners. The result has been an evolution of the areas tourism industry around this condominium concept (and commensurate benefits) much to the chagrin of hotel owners in the Kailua-Kona community.

4. The average daily room rate (received) in 1984 showed an increase of 13.23 percent on a County-wide basis, up to $57.17 per night from 1983's $50.49 figure. This annual increase, the largest during the 12-year study period, followed four years of minimal growth from 1980 through 1983. During 1972 through 1980, steady annual increases of 10 to 14 percent were recorded. Major contributing factors to the significant increase during 1984 included the pent-up needs for increases muted by hoteliers during recent slow periods, and the relatively high occupancy levels achieved by the upper-priced Kohala resorts, particularly the Sheraton Royal Waikoloa and the Mauna Lani Bay Hotel. An anticipated increasing demand for lodging, created by the growth in visitor arrivals, the establishment of the Kohala Coast as an exclusive destination region, and the synergystic effects resulting from cumulative high-quality development, should result in continually increasing room rates over the short-term, at 12 to 20 percent annually. This figure would be anticipated to stabilize several years past the opening of the proposed Hyatt Regency at Waikoloa, which will likely influence the rate structures of many area operations.

5. Occupancy rates in the County have generally been the lowest of the State's four Districts over the study period. This is due to the creation of a large

condominium inventory in Kona at a faster pace than visitor arrivals increased, and the continued decline of Hilo as a desired destination. Although occupancy was at the highest average level during 1984 since 1979, the annualized figure of 55.58 percent occupancy was still, well below statewide averages. However, 1984 totals represent a significant increase from the 1982 and 1983 figures when occupancy rates fell to all-time lows of 44.15 and 44.66 percent, respectively. From 1972 through 1979, occupancy rates ranged from 56.02 (1977) to 63.66 (1978) percent. This stable range was the result of inventory development roughly equivalent to the expansion of the tourism industry. In 1980, when arrival totals began to fall, many Kona projects (planned during positive economic times) were still being constructed; coming on-line as the recession deepened, further aggravating declining occupancy levels. Occupancy rates are anticipated to continue climbing over the next three years, a result of the growth trend in Big Island visitor arrivals, the continuing establishment of the Kohala coastal resorts as pre-eminent destinations, and the lack of existing plans to increase average quality, non-competitive inventory during this time. However, the effect an operating Waikoloa Hyatt Regency will have upon future trends is not clear. The majority of individuals expressing opinions feel that the hotel will contribute greatly to the region, helping to form the "critical mass" necessary to fully establish West Hawaii as a premier resort area; yet, the potential does exist, if the tourism market again declines later in the decade, that such a recognized operation could damage other hotels unable to compete. It is our opinion, that the Hyatt Regency will positively impact the existing projects.

6. As with other industry indicators, the ratio of food and beverage sales per occupied room was also experiencing significant growth during 1984, following several years of stagnate or declining revenue totals. Through 1984, the County average for food and beverage sales per occupied room were at $26.44 and $10.40, respectively, (or $36.84 combined) per day, up 22.92 percent from 1983's combined total of $29.97, which was .63 percent below 1982 figures. With the exception of 1978, when totals dropped 3.98 percent from the previous year, the period from 1972 through 1981 experienced increases in food and beverage sales every year. Again owing

to the acceptance of the higher-priced resorts, and the current success of the visitor market, it is our opinion that these revenues will continue to climb over the next decade at growth rates of three to five percent annually, at or slightly above inflation levels.

In 1984, food and beverage revenues were equivalent to 64.44 percent of average daily room rate figures. In 1974, the ratio was 92.93 percent of room revenues. This downward ratio trend is evident in all sectors of the Hawaii tourism industry, a result of changing dietary habits, the prevalence of fast-food and non-hotel eating establishments, competition among hotel operators, and the increasing market share of condominium units (which contain kitchen facilities).

7. Despite the depressed indicators evident in 1982 and 1983, the current and long-term prospects for the tourism industry in the County of Hawaii look positive at this time; to a much more significant degree in West Hawaii (Kona-Kohala) than in Hilo. Through 1984 and the first quarter of 1985, the market has evidenced substantial recovery, and no lessening in demand is anticipated over the short term. The major contributors to this resurgence (previously discussed) provide a strong foundation for attracting visitors, with the deterioration of Waikiki having the greatest potential long-term impact. The probability of achieving optimistic goals has been substantially enhanced with the emergence of the Kohala Coast as a high-quality, self-promoting destination area; with the recognized possibility that the region could undergo massive growth as experienced in West Maui and other neighbor island resort communities. In light of the existing and projected trends, and other available studies, it is our opinion that the number of visitor arrivals and expenditures will increase at compounded rates of from three to five percent throughout the century.

Selected graphs depicting historic statistical trends for the years 1972 to 1984 (through June only), are contained in Addenda Exhibit IV. The indicators analyzed include: Available Rental Units, Room Rental Rates, Occupancy Rates, and Food and Beverage department revenue levels.

General Economic Market Sector Development

Free-Standing Hotels

There are nine free-standing hotel operations in the General Economic Market Sector; the six located in Kailua-Kona are summarized on Table 12. Cumulatively containing 1,336 units, or 22.23 percent of the total number of transient rental units in the West Hawaii inventory, the projects are all established and in generally fair to good condition. The last major free-standing hotel complex (the rebuilt King Kamehameha Hotel) was completed in 1976.

The three hotels located in Waimea, are small, one-story improvements designed to primarily service community-generated needs, and are not resort-type operations which would be considered as competitive with potential subject property development(s).

The Kailua-Kona operations have had erratic operational trends in recent years, with mostly declining indicators from the beginning of the decade until the growth being experienced this year. The traditional market for these hotels has been the group tours, first-time visitor, and, in the case of the Hotel King Kamehameha, interisland travelers.

Primary advantages of location in the urban area include the ready availability of commercial/service development and activities, proximity to the airport and Honokohau Harbor, centrality along the West Hawaii coast, and the synergy created by intense tourist-oriented development. Disadvantages include: the lack of supporting recreational facilities and beachfrontage that is available in competing resort areas; the disparate, uncoordinated style of development; and the general age and quality of the areas improvements.

Two factors have contributed to the relative scarcity of free-standing hotels in the Kailua-Kona area: the increasing popularity and competition created by rental of condominium units, particularly among returning visitors who comprise a significant portion of the tourist population; and, the intense competition from

Table 12

KAILUA-KONA HOTELS FEATURES SCHEDULE

Lodging Operation	Location	No. of Units	Restaurant	Separate Cocktail Lounge	Shopping	Meeting Rooms	Amenities
Hotel King Kamehameha	Oceanfront	460	Yes	Yes	Arcade	Yes	Pool, TV, A/C, Parking, Tennis
Kona Bay Hotel	Interior	125	Yes	Yes	Limited	No	Pool, TV, A/C, Parking
Kona Hilton	Oceanfront	446	Yes	Yes	Arcade	Yes	Pool, TV, A/C, Parking, Tennis
Kona Hukilau	Interior	100	Yes	Yes	No	Yes	Pool, TV, A/C, Parking
Kona Seaside	Interior	125	Yes	Yes	No	Yes	Pool, TV, A/C, Parking
Kona Tiki	Oceanfront	15	No	No	No	No	Pool, A/C, Parking

Source: Maxwell Visitors Bureau, DISCOVER HAWAII and The Hallstrom Appraisal Group Inc.

the high-quality, full-amenitied operations located in the South Kohala coastal resorts.

The result of these market trends has been lower occupancy rates, limited annual increases in advertised room rates, and substantial discounting from quoted rates to wholesalers, groups, and "Kamaainas".

The Hotel King Kamehameha and the Hilton Beach and Tennis Resort have both undergone ownership change during the past decade, in 1976 and 1984, respectively.

There have been no plans announced for development of additional free-standing hotels in the General Economic Market Sector; nor are any anticipated over the short-term. This is due to the increasingly-apparent advantages of locating in a destination resort complex.

Free-Standing Condominiums

In order to establish condominium market trends within the identified General Economic Market Sector, which currently contains the majority of the total inventory available on the island, we have completed an analysis of the entire County's condominium market, covering all projects whether free-standing or within destination resort projects.

We note however, and elsewhere discuss, the significantly higher levels of quality and price, and market reception the newer projects within the existing Primary Economic Market Sector resorts have received.

Relevant historic data include: number of units in inventory, timing of development, and, unit characteristics and mix. Present sales prices, marketing activity, and absorption trends were also investigated.

Supply Characteristics

Directly attributable to the State's limited land resources, condominium development has increased dramatically since the enactment of the Horizontal Property Regime on December 19, 1961, so that, through the end of 1982, 1,526 projects had filed for qualification(1).

As Table 13 illustrates, the decade from 1972 to 1982 saw an increase of more than 400 percent in the number of units constructed in the State of Hawaii, which now certainly total over 100,000. Of the 78,288 units developed from 1973 through 1982, 38,889 were located within high-rise projects. The remainder are spread somewhat evenly between townhouse and low-rise improvements. A nominal number of duplex and single-family condominiums were also constructed.

In 1975, the peak of condominium construction was reached, with 10,793 units added to the inventory, surpassing the record of 9,275 set the previous year. Slumping to only 3,321 and 3,210 new units added in 1977 and 1978, the market saw 9,704 units completed in 1981, an otherwise slow economic year, and an additional 7,795 added in 1982.

Several factors, particularly the strength of the State tourism industry and the economy in general, correlate directly with the amount of units annually constructed. Combinations of these variables: dwindling supply of developable sites, strict municipal regulations, industrial labor-relations problems, over building demand, and increasing improvement costs, are the generally expressed reasons for down periods, as experienced in 1977 and 1978. Accumulation of the aforementioned factors tend to favor development of quality-oriented projects creating unacceptable financial burdens for the middle and lower income purchasers for which the majority of condominiums had been traditionally designed.

(1) The most recent information available from State of Hawaii sources, as of the report date, is the 1982 year-end data.

TABLE 13

EXISTING RESIDENTIAL CONDOMINIUM UNITS 1970 - 1982
State of Hawaii

Year	UNITS ADDED TO INVENTORY: All Types	1 - Family and Duplex	Townhouse	Low-Rise	High-Rise	Units Standing Dec. 31
1970	4,908	6	939	874	3,089	15,320
1971	4,318	---	1,062	382	2,874	19,638
1972	2,835	12	770	914	1,139	22,473
1973	6,741	36	1,596	1,619	3,490	29,214
1974	9,275	235	1,775	2,112	5,123	38,489
1975	10,793	68	1,760	2,922	6,043	49,287
1976	7,357	112	655	260	6,330	56,644
1977	3,321	40	942	883	1,456	59,965
1978	3,210	4	604	810	1,792	63,175
1979	6,816	97	1,156	1,447	4,116	69,991
1980	10,441	74	3,263	2,553	4,551	80,432
1981	9,704	67	2,745	4,825	2,067	90,136
1982	7,795	201	2,398	3,544	2,752	97,931
Totals:	87,514	952	18,565	23,145	44,852	

SOURCE: State of Hawaii, Department of Planning and Economic Development
The Hallstrom Appraisal Group, Inc., May 1985.

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A more definitive indication of condominium growth within the effective economic market sectors of the subject properties is the number of completed units added each year in Hawaii County. Annual additions to the supply of condominiums on the Island of Hawaii are summarized in Table 14 and are further detailed on Table 15, which identifies and analyzes the projects constructed on an individual basis.

Prior to 1970, condominium activity in Hawaii County was limited, with only three completed projects containing 136 units. The years 1970 and 1971 each saw three new projects completed; 1972 began a surge with nine projects totaling 327 units. In 1973, 592 units were completed, representing a 78 percent increase over the then previous supply. This accelerated growth in development brought about by the first major expansion of the West Hawaii tourism industry resulted in 1,350 units within the County, a total sufficiently high enough to result in an over-supply of residential condominiums when the economy began slowing in late 1973.

As shown on Table 14, subsequent years from 1974 to 1978, were characterized by a steady decrease in condominium development. This was in reaction to the previous overbuilt market condition, and the mixed-nature of the visitor industry in mid-decade. A resurgent economy and tourist trade beginning in 1978 had the result that during the years 1979 and 1980, there was a significant development activity, and the addition of a total of 1,107 units in the two-year period. The contributing factor to this increase was the renewed interest in resort-oriented Hawaii County projects, particularly in the West Hawaii resort areas, and the absorption of the previously unsold inventory.

Despite the sharp economic downturn experienced in Hawaii County during 1981 and 1982, nine previously planned projects were completed. However, market absorption of the finished units has yet to be completed. A total of 285 units were added to the inventory in the five projects finished in 1981, with 156 spread among four complexes completed in 1982.

While the majority of State real estate markets remained subdued in 1983 due to uncertain economic and interest rate conditions, more condominium units were completed in Hawaii County than in all but two other previous single years; with a

TABLE 14 .

SUMMARY OF CONDOMINIUM COMPLETIONS(1)
Island of Hawaii

	Annually Projects	Annually Units	Percent Change From Previous Year	Cumulative Projects	Cumulative Units
Pre-1970	3	136	N/A	3	136
-1970	3	170	N/A	6	306
-1971	3	125	(26.47)%	9	931
-1972	9	327	161.60	18	758
-1973	10	592	81.04	28	1,350
-1974	9	450	(23.99)	37	1,800
-1975	4	379	(15.78)	41	2,179
-1976	3	286	(24.54)	44	2,465
-1977	4	197	(31.12)	48	2,662
-1978	4	129	(34.52)	52	2,791
-1979	8	475	268.22	60	3,266
-1980	13	632	33.05	73	3,898
-1981	5	285	(54.91)	78	4,183
-1982	4	156	45.26	84	4,339
-1983(2)	5	510	226.92	89	4,849
-1984	0	0	0	89	4,879

(1) Residential projects only.
(2) One project completed in 1983 contains both residential and commercial units.

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

TABLE 15

HAWAII COUNTY CONDOMINIUM SUPPLY

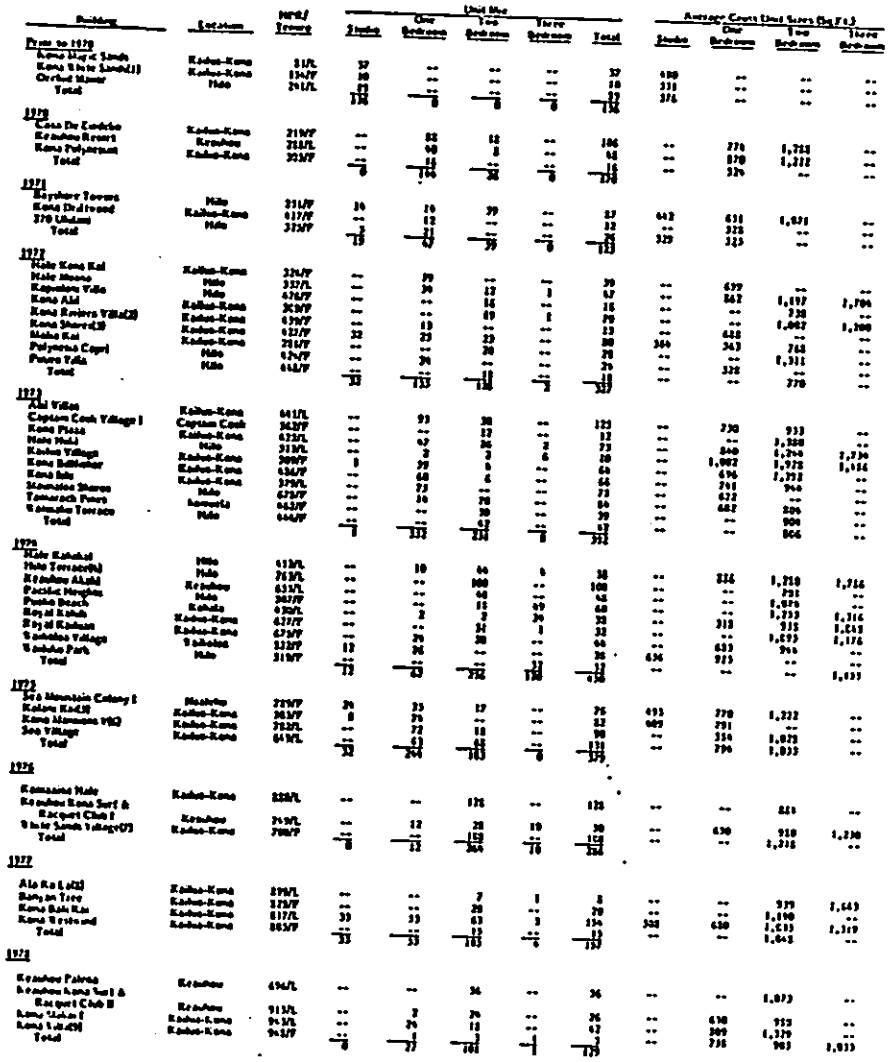

TABLE 15

HAWAII COUNTY CONDOMINIUM SUPPLY

Building	Location	1979/ Tenure	Units Built: Studio	One Bedroom	Two Bedroom	Three Bedroom	Total	Average Gross Unit Sales Price (Sq Ft): Studio	One Bedroom	Two Bedroom	Three Bedroom
1979											
Country Club Villas	Kaunaloa	Fee/Lease/Fee	--	--	116	--	116	--	--	1,333	--
Kona Islander (10)	Kailua-Kona	Lease/Fee	140	2	44	--	192	130	298	--	--
Kona Islander (11)	Kailua-Kona	Lease/Fee	--	28	44	1	73	--	310	349	349
Kona Vista II	Kailua-Kona	Lease/Fee	--	42	12	--	54	--	313	1,375	--
Waikoloa (2)	Kailua-Kona	Lease/Fee	--	--	18	1	19	--	--	715	1,032
33 Hualalai II	Hilo	Fee/Fee	--	22	--	--	22	--	451	--	--
Kona Shores	Kailua-Kona	Fee/Fee	--	--	12	--	12	--	--	--	2,300
Hale Kai Okoma	Kailua-Kona	Fee/Fee	--	--	--	8	8	--	--	--	2,342
Total			140	139	222	30	531	--	--	--	--
1980											
Pamoho Club I	Waikoloa	Fee/Fee	--	--	20	--	20	--	--	1,140	--
Pamoho Club II	Waikoloa	Fee/Fee	--	--	36	--	36	--	--	1,140	--
Keauhou Kona Surf & Racquet Club III	Keauhou	Fee/Fee	--	--	117	--	117	--	--	1,456	--
Waikoloa Villas	Waikoloa	Fee/Lease/Fee	--	--	20	4	100	--	1,063	1,401	1,520
Keauhou Pumehele I	Keauhou	Fee/Fee	--	--	32	4	36	--	--	1,460	1,623
Kona Coast Inn	Kailua-Kona	Fee/Fee	--	--	16	4	20	--	--	1,332	1,520
Keauhou Pumehele II	Keauhou	Fee/Fee	--	--	36	4	40	--	--	1,539	1,623
Keauhou at Keauhou Family Villas	Keauhou	Fee/Fee	--	32	30	--	62	--	1,111	1,323	--
Kona Palms	Kailua-Kona	Fee/Fee	--	6	6	--	12	--	823	1,041	--
Keauhou Kai	Keauhou	Fee/Fee	--	44	44	--	88	--	--	1,242	--
Keauhou Gardens I	Keauhou	Fee/Fee	--	56	56	--	112	--	1,101	1,122	1,333
Kona Sunset Villas	Kailua-Kona	Fee/Fee	--	20	20	1	41	--	--	1,830	--
Bahkan Gardens	Kailua-Kona	Fee/Fee	--	32	32	8	72	--	830	--	--
Total			0	118	470	22	610	--	830	--	--
1981											
Kona Hale	Kailua-Kona	Fee/Fee	--	--	10	--	10	--	--	1,600	--
Mahukona Bay Villas	Kailua-Kona	Fee/Fee	--	4	12	--	16	--	--	1,536	--
Kona By The Sea	Kailua-Kona	Fee/Fee	--	44	44	2	90	--	921	1,368	2,229
Kona Pacific	Kailua-Kona	Fee/Fee	--	38	38	1	78	--	843	1,311	--
Keauhou At Keauhou Ocean Villas	Keauhou	Fee/Fee	--	32	28	4	64	--	1,392	1,735	1,588
Total			0	118	132	7	257	--	1,392	1,735	1,588
1982											
Kaiulani Bay Resort	Kailua-Kona	Fee/Fee	--	42	22	2	71	--	631	962	1430
Alakahana Kai	Kailua-Kona	Fee/Fee	--	--	8	10	18	--	--	881	1241
Kaiulani Gardens	Kailua-Kona	Fee/Fee	--	--	12	1	13	--	--	1038	--
Keauhou at Keauhou Bay Villas	Keauhou	Fee/Fee	--	32	46	11	132	--	1392	1748	--
Total			0	74	88	24	186	--	1392	1748	--
1983											
Hale Lagoon Centre (1)	Hilo	Fee/Fee	140	42	32	8	244	130	633	963	--
Lanipuaki Kona	Kailua-Kona	Fee/Fee	--	--	8	--	8	--	--	1,125	--
Mauna Lani Terrace	Kohala	Fee/Fee	--	12	76	15	103	--	1,288	2,123	2,973
Royal Sea Cliff Club Villas at Mauna Kea (Phase I) (2)	Kailua-Kona	Fee/Fee	0	36	100	1	137	636	913	1,388	--
Total	Kohala	Fee/Fee	140	90	216	24	470	--	--	2,450	2,973
1984											
No projects completed											
AGGREGATE TOTALS			333	2,438	2,486	298	5,555				

(1) Built in 1966; converted in 1982.
(2) Built in 1969; converted in 1972.
(3) Built in 1961, 1970, and 1971; converted in 1972.
(4) Built in 1963; converted in 1976.
(5) Built in 1966 and 1971; converted in 1978.
(6) Built in 1973; converted in 1978.
(7) Phase I in 1974; Phases II and III in 1977.
(8) Built in 1971; converted in 1977.
(9) Built in 1972; converted in 1978.
(10) Built in 1969 as a hotel; converted in 1979.
(11) Built in 1975; converted in 1979.
(12) Built in 1971; converted in 1979.
(13) Built in 1972; converted in 1979.
(14) Converted hotel; includes 126 commercial and 124 residential units. All commercial units shown as studios.
(15) Unit indicated as three-bedroom columns as a single, four-bedroom unit.

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

total of 510 units spread between five projects. The figure is somewhat misleading, as nearly 40 percent are within the mixed-use Hilo Lagoon Centre commercial/residential complex (a converted hotel), and almost 25 percent are in the Royal Sea Cliff Club, a long-planned Kona resort project which has experienced severe marketing problems.

Conversely, the Villas at Mauna Kea (Phase I) and Mauna Lani Terrace, both ultra-luxury developments, achieved market acceptance unprecedented elsewhere in the State during the past three years. Despite being among the most expensive units in the State, the 103 units offered were fully absorbed during pre-sale (although several sales at Mauna Lani Terrace subsequently "fell-out" during escrow).

In 1984 there were no condominium units added to the Hawaii County inventory. In 1985 only one project, the Villas at Mauna Kea (Phase II) with 17 units, is scheduled to be fully constructed.

There are three projects which will likely be completed in 1986, totaling 190 units. The shores at Waikoloa, Phase I containing 66 units, will be the first condominium project within the Waikoloa Beach Resort, and has had good presale marketing success. The 116-unit Mauna Lani Point project, with asking prices ranging from $300,000 to $890,000, achieving only limited market acceptance, is planned for completion in mid-1986. And, the Malu Malu eight-unit development, outside Kailua-Kona, should be finished by the fall.

The only other announced project is the 450-unit Kohala Makai community (on the border of North and South Kohala), still in the approval process stage, and not likely to be completed before early 1987.

A continuing concentration of condominium development in the major resorts is seen over the short-term. This is due to the availability of amenities, market advantages, and overall increased desirability of the planned destination complexes. Construction in the Kailua-Kona to Keauhou urban corridor is anticipated to remain subdued pending absorption of existing units.

TABLE 16

CONDOMINIUM UNIT MIX
Island of Hawaii

	Annual Percent of Total Added				Cumulative Unit Composition			
	Studio	One Bedroom	Two Bedroom	Three Bedroom	Studio	One Bedroom	Two Bedroom	Three Bedroom
Pre-1970	100%	0%	0%	0%	136	0	0	0
-1970	0	85	15	0	136	144	26	0
-1971	15	56	27	0	155	191	53	0
-1972	10	61	28	1	187	326	293	2
-1973	0	59	39	2	188	478	474	10
-1974	5	13	57	22	200	740	730	150
-1975	9	69	22	0	232	938	855	150
-1976	0	4	92	4	232	996	1,097	190
-1977	33	55	105	6	263	1,051	1,202	194
-1978	0	21	78	1	263	1,072	1,303	195
-1979	30	27	38	5	403	1,207	1,453	169
-1980	0	17	76	7	403	1,317	1,961	213
-1981	0	33	65	2	403	1,468	2,090	220
-1982	0	38	55	7	403	1,527	2,176	231
-1983	29	26	43	2	533	1,650	2,406	240
-1984	0	0	0	0	533	1,650	2,406	240

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

Unit Mix

Hawaii County units are distributed according to model-mix at year of construction on Tables 15 and 16. Cumulative totals and percentages are also shown.

Again it is noted, there were no new condominium projects completed in the County during 1984.

As in most State resort areas, one- and two-bedroom units comprise the majority of Hawaii County's condominium inventory. Of the 4,849 units on the island, 4,056, or 83.65 percent, are of these types. This proportion has grown relatively steady since 1970 when 56 percent of the units were one- or two-bedroom models.

However, the relationship of these popular unit types has changed considerably in the same period. The 50 percent to 34 percent ratio of two- to one-bedroom models revealed by cumulative 1983 totals is almost exactly the reverse of the prevailing ratio evident a decade earlier.

Prior to 1970, 100 percent of the condominium supply consisted of studio units. This figure decreased steadily to 11 percent in 1974, and stabilized at nine percent as a result of 1975, 1976, 1977 and 1978 additions; however, due to the conversion of 142 hotel units, this number jumped to 12 percent during 1979. Between 1974 and 1983, no studio units were added to the Hawaii County condominium inventory. In 1983, 29 percent of the total number of units added were studio models, most in the Hilo Lagoon Centre commercial/residential conversion. In light of the current relatively low asking prices of one- and two-bedroom units in the Kailua-Kona to Keauhou urban corridor, where the majority of studio development has occurred, it is doubtful if there will be a resurgence of non-competitive studio units.

Three-bedroom units have comprised five to seven percent of the total inventory since shortly after their introduction onto the market in 1973. Experience has shown these large units are poorly suited to resort markets, with most three-bedroom units so located being luxury or specialty-oriented and therefore

	Percentage of Total				Cumulative			
	Studio	One Bedroom	Two Bedroom	Three Bedroom	Studio	One Bedroom	Two Bedroom	Three Bedroom
Pre-1970	100%	0%	0%	0%	136	0	0	0
-1970	0	85	15	0	136	144	26	0
-1971	15	56	27	0	155	191	53	0
-1972	10	61	28	1	187	326	293	2
-1973	0	59	39	2	188	478	474	10
-1974	5	13	57	22	200	740	730	150
-1975	9	69	22	0	232	938	855	150
-1976	0	4	92	4	232	996	1,097	190
-1977	33	55	105	6	263	1,051	1,202	194
-1978	0	21	78	1	263	1,072	1,303	195
-1979	30	27	38	5	403	1,207	1,453	169
-1980	0	17	76	7	403	1,317	1,961	213
-1981	0	33	65	2	403	1,468	2,090	220
-1982	0	38	55	7	403	1,527	2,176	231
-1983	29	26	43	2	533	1,650	2,406	240
-1984	0	0	0	0	533	1,650	2,406	240

commanding high prices, as those constructed in 1983 within the upper-end Mauna Lani Terrace and Villas at Mauna Kea projects. In light of this, it is not surprising that 135, or 56.25 percent of the 240, three-bedroom models in the County are in areas outside of the Kailua-Kona to Keauhou resort corridor, a disproportionate figure in light of the significant majority of condominium development which has occurred there.

It is anticipated that the unit mix trend will continue to strongly favor one- and two-bedroom models, which have historically been shown as the most marketable in a resort area. Two-bedroom units are particularly on the increase due to their acceptance level by residents and long-term investors.

Unit Size

Average gross unit sizes (in square feet) may vary dramatically from year to year without evident patterns, as is also displayed on Table 17. Individual projects are designed according to development and architectural considerations, and financial requirements, and not necessarily based on market-wide trends.

Studio units have ranged in size from 412 to 656 square feet, when constructed. Average one-bedroom unit sizes have fluctuated over the study period, between 774 and 1,048 square feet, with the latter peak reached in 1981. Two-bedroom units have steadily increased in size since the mid-1970's, a trend anticipated to continue, as this size unit has been successful in the newer luxury projects.

Current Supply

Table 18 is a recent list of the condominium units in West Hawaii (South Kohala and Kona) available for resale. Additional original units are still being marketed in several 1981-to-present developments. As might be anticipated one-and two-bedroom models constitute a majority of units available. The proportion of model types listed closely parallels the inventory as a whole. The Hawaii County condominium market is currently in a state of over-supply outside the destination resort communites, with many unsold new and resale units contributing to the

TABLE 17

CONDOMINIUM SUPPLY CHARACTERISTICS
Island Of Hawaii

	Pre-1970	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
No. of Projects																
Fee	3	3	3	9	10	9	9	9	5	4	8	13	5	6	5	0
Lease	2	2	3	7	6	5	2	2	2	0	5	6	4	5	0	0
	1	1	0	2	4	4	2	2	2	0	3	4	1	2	0	0
No. of Units																
Studios	136	0	19	32	1	12	32	0	55	0	140	0	0	0	148	0
One Bedroom	0	144	87	133	352	62	204	12	55	22	128	110	151	59	123	0
Two Bedroom	0	26	59	138	231	256	103	269	103	101	182	476	128	36	230	0
Three Bedroom	0	0	0	2	8	120	0	10	9	1	26	96	5	11	9	0
Cumulative Increase (%)	136	306	431	738	1,330	1,800	2,179	2,463	2,662	2,761	3,266	3,838	4,183	4,339	4,849	4,849
	0	125	41	76	78	33	21	13	8	5	17	69	7	4	12	0
Average Unit Size (Sq. Ft.)																
Studio	548	0	412	580	0	656	472	0	368	0	459	0	0	0	460	0
One Bedroom	0	778	563	672	716	813	728	650	650	765	676	1,048	958	765	769	0
Two Bedroom	0	1,238	1,071	969	994	963	1,043	1,032	1,060	1,092	1,139	1,422	1,490	1,359	1,402	0
Three Bedroom	0	0	0	1,432	1,348	1,212	0	1,230	1,405	1,055	2,287	1,851	3,386	1,726	2,053	0

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

TABLE 18 SUMMARY OF RESORT CONDOMINIUM LISTINGS
WEST HAWAII
Island of Hawaii, Hawaii

Project	Studio	One-Bedroom	Two-Bedroom	Three-Bedroom	Total
Tamarack Pines	0	0	5	0	5
Pansolo Club	0	0	7	0	7
Waikoloa Villas	0	2	12	4	18
Waikoloa Village	0	1	0	0	1
Mauna Lani Terrace	0	1	3	0	4
Puako Beach	0	1	0	6	7
Kona Kai	0	6	6	0	12
Kalanikai	1	5	0	0	6
Kona West	2	0	0	0	2
Kona Plaza	0	3	1	0	4
Kona Alii	0	0	1	0	5
Kona Islander Inn	10	0	0	0	10
Kailua Village Apartments	0	0	0	0	0
Kona Pacific	0	5	2	0	7
Maka Kai	0	1	0	0	1
Kona Billfisher[1]	0	0	0	0	0
Royal Kailuan	0	6	8	0	10
Lunapule	0	0	1	0	1
Kona Mansions	0	16	4	0	20
Hale Kona Kai	0	0	0	0	0
Kona Reef	0	17	2	1	20
Sea Village	0	9	10	0	19
Ala Kala	0	0	2	0	2
Casa De Emdeko	0	11	1	0	12
Kona Isle	0	6	0	0	6
Kona Riviera Villa	0	0	1	0	1
Kona Makai	0	13	8	0	21
Alii Villas	0	10	3	0	13
Kona Shores	3	1	6	0	10
Atahina	0	0	0	0	0
Kalana Gardens[2]	0	0	15	0	15
Kona Polynesia	0	2	0	0	2
Kona Bali Kai	0	9	6	1	20
Banyan Tree	0	0	0	0	0
Royal Kahili	0	0	2	0	2
Holualoa Gardens	0	3	0	0	3
Kona Nalu	0	0	2	0	2
Hale Kai O Kona	0	0	0	1	1
Holualoa Bay Villas	0	0	7	0	7
Kona Palms	0	3	1	0	4
Hale Pohaku	0	0	0	0	0
Kona White Sands	0	2	1	0	3
Kona Magic Sands	6	0	0	0	6
White Sands Village	0	0	22	0	22
Kona Onenalo	0	0	0	4	4
Kona Sunset Villas	0	0	5	0	5
Kona Villas	0	1	2	1	4
Kona Westwind	0	0	2	0	2
Keauhou Palms	0	0	11	0	11
Keauhou Resort	0	8	1	0	9
Kanaloa at Keauhou	0	5	17	1	23
Country Club Villas	0	0	14	0	14
Keauhou Akahi	0	0	7	0	7
Keauhou Punakele	0	0	7	5	12
Keauhou Kai	0	0	4	0	4
Keauhou Surf & Racquet Club	0	2	44	2	48
Kona Coffee Villas	0	0	6	0	6
Honalo Plaza	0	4	0	0	4
TOTAL LISTINGS	30	166	257	26	488
PERCENT OF TOTAL	6.16%	34.09%	54.61%	5.34%	100.00%

(1) Timeshare listings only.
(2) Shown units are listed for bulk purchase.

SOURCE: Multiple Listing Service, Hawaii Island Board of Realtors; The Hallstrom Appraisal Group, Inc., May 1983.

existing market overhang which must be absorbed prior to a general resurgence of construction activity.

Demand Factors

During the economically strong years for tourism and real estate in 1978 and 1979, the demand for units exceeded supply. The subsequent recession, concurrent with large-scale inventory expansion, resulted in a significant over-supply of units at a time of limited market activity. In 1981 and throughout 1982, price levels, speed of absorption and number of sales reduced considerably. High interest rates were a primary factor of market decline.

Many projects which were absorbed on a pre-sale basis in 1979 and 1980, failed financially, as buyers dropped out due to worsening economic conditions prior to project completion. Developers were forced to initiate discounting programs such as agreements of sale or other below market interest rate terms. Other projects have been indefinitely postponed until market conditions become more favorable. As an example, the Oneo Bay Villas project first entered the market in the fall of 1980, but due to the lack of acceptable, below market financing for the individual units, this project was withdrawn from the market. The developer hopes to begin marketing again when favorable financing becomes available.

While the current economic resurgence being experienced on the mainland has benefited the tourism industry, the real estate market has yet to recover to previous high activity levels. This is typical of the cyclical trends in the State, which generally lag 12 to 18 months behind mainland patterns.

A major contributor to a faltering market recovery has been the proposed tax reforms discussed since early 1984, which could limit mortgage interest deductions on second homes or investment properties. This potential has severely limited market response in most vacation areas.

The only positive trends in 1983 and 1984 were the success experienced by the ultra-luxury projects within the three primary Kohala Coast resorts. The 103 units offered for pre-sale in 1982 were spoken for within months, although several

TABLE 19

SUMMARY OF SELECTED CONDOMINIUM SALES AND LISTING PRICES*
Island of Hawaii

Project	Unit Description: Unit Type (BR/Bath)	Unit Description: Area (in Square Feet) Net Living	Lanai	Total	Price Ranges: Sales	Listings
Mauna Lani Terrace	1/2	1,058	315	1,373	$280,000 - $ 345,000	$389,000
Villas at Mauna Kea	2/2	2,683	1,279	3,962	$750,000 - $1,200,000	--
Sea Village	2/1.5	1,202	96	1,298	$120,000	$109,000 - $195,000
Banyan Tree	2/2	1,100	135	1,235	$140,000	$149,000 - $187,500
Hale Pohaku	2/2	1,047	246	1,293	$290,000	$325,000 - $350,000
White Sands Village	2/2	1,206	196	1,402	$102,000	$114,000 - $225,000
Keauhou-Palena	2/2	878	195	1,073	$ 89,000 - $ 110,000	$ 90,000 - $150,000
Country Club Villas	2/2	1,100	250	1,350	$135,000 - $ 250,000	$165,000 - $275,000
Keauhou Punahele	2/2	1,475	250	1,725	$225,000	$139,000 - $250,000

* Does not include units sold on a timeshare basis.

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

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Purchase Agreements subsequently failed to close. Additional unit pre-sales in other phases, or projects, have also been well-received, though at a lesser level. This market characteristic reflects optimistically on potential condominium development of the subject property, which is located within the same effective economic area.

It is noted, that (generally) a healthy luxury-oriented condominium market foretells of an increased activity period. Upper income individuals normally are less effected by recessionary periods and quicker to recover. The surprisingly strong market reception of the high priced and extravagant units at the Mauna Kea and Mauna Lani resorts in recent years is interpreted by many to be indicative of a returning "up-trend," should tax reform proposals fail to be enacted or are significantly altered.

Concurrent with the recovery, interest rates have declined sharply, a necessary action for stimulating the real estate market; although the levels remain high relative to past rates. A resurgence of inflation, typical of an economic recovery, would also benefit condominium demand as units make effective investments during such periods.

Prices

Table 19 summarizes recent sales and listing price parameters for selected West Hawaii County condominium projects. These developments represent many aspects of the West Hawaii County resort/investor market and differ in quality, size, location, land tenure, recreational amenities, etc. These price ranges have not been adjusted and represent either original or resale prices, and are included here only for purposes of providing a market overview perspective.

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Planned Resort Development

Keauhou-Kona Resort

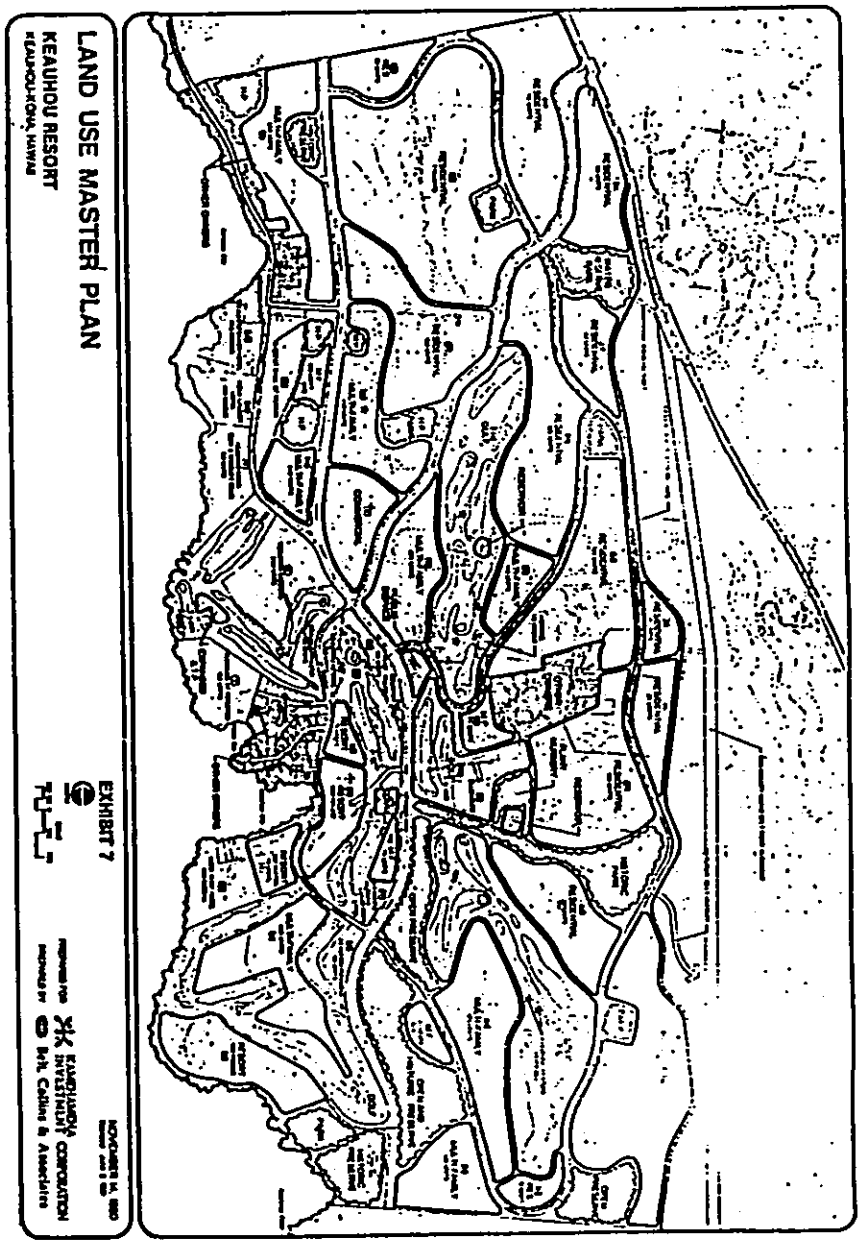
Developed by the Kamehameha Investment Company on 2,000 acres fronting Keauhou, Maihi and Kahaluu bays, five miles south of Kailua-Kona, the Keauhou-Kona resort currently contains 1,330 hotel rooms (in three facilities) and 845 condominium units spread among nine separate projects. Amenities include a golf course, archaeological sites, and shoreline parks. Additional development, including a $10 million, 72,000 square foot shopping mall (West Hawaii's largest), an additional golf course, and 135 single-family lots are scheduled for completion within six months.

The master plan for the resort is shown on the following page.

The Big Island's first general-market planned destination (discounting the limited and exclusive Mauna Kea Beach resort project), Keauhou-Kona has, in many respects (notably in hotel occupancies and overall recognition), failed to achieve the level of success experienced by other neighbor island resort developments. Generally, this is attributed to three factors: 1) a total lack of quality white-sand beachfrontage; 2) extreme competition from nearby condominium rentals; and, 3) the existence of non-resort, privately-owned parcels in the complex which create a disparate appearance and hamper a unified atmosphere. Additionally, Alii Drive and Kamehameha III Road, heavily traveled thoroughfares and the only access to the southerly portions of the Kailua-Kona to Keauhou corridor, bisect the resort and further serve to diminish the overall ambiance.

The characteristics of the three existing hotels in the development are summarized on Table 20. The Keauhou Bay and Kona Lagoon hotels are both standard-class operations located in the less desirable northerly portions of the resort, near Kahaluu Bay. The Kona Surf is a well-designed deluxe-class property on a headland of Keauhou Bay.

All three of the hotels have transacted on the open market at least once during the past 18 months, and were publicly acknowledged by the sellers to be



KEAUHOU-KONA RESORT MASTER PLAN
Ooma II Market Study

TABLE 20

KEAUHOU-KONA HOTELS FEATURES SCHEDULE
Ooma II Market Study

Lodging Operation	Location	No. of Units	Restaurant	Separate Cocktail Lounge	Shopping	Meeting Rooms	Amenities
Keauhou Beach Hotel	Oceanfront	317	Yes	Yes	Arcade	Yes	Pool, TV, A/C, Parking, Tennis
Kona Lagoon	Oceanfront	454	Yes	Yes	Limited	Yes	Pool, TV, A/C, Parking, Tennis
Kona Surf	Oceanfront	537	Yes	Yes	Arcade	Yes	Pool, TV, A/C, Parking, Tennis, Golf

SOURCE: Hawaii Visitors Bureau, DISCOVER HAWAII and The Hallstrom Group Appraisal Group, Inc., May 1985.

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TABLE 21

SUMMARY OF EXISTING CONDOMINIUM PROJECTS
Keauhou-Kona Resort
Keauhou-Kona, Island of Hawaii, Hawaii

Year Completed	Project Name	HPR/ Tenure	One-Bedroom	Two-Bedroom	Three-Bedroom	Total	Cumulative Total	Date of Marketing	Avg. No. Sold (Months)	Absorption Period (Months)
1970	Keauhou Resort	288/L	40	8	--	48	48	8/69	1.00	48
1974	Keauhou Akahi	655/L	--	48	--	48	96	9/74	9.60	5
1976	Keauhou Surf & Racquet Club I	749/L	12	28	10	50	146	4/75-5/76	3.85	13
1978	Keauhou Palena	696/L	--	56	--	56	202	6/76-8/77	3.70	15
	Keauhou Surf & Racquet Club I	913/L	2	24	--	26	228	12/76-5/77	4.33	6
1979	Country Club Villas I	948/F	--	67	--	67	295	12/77-1/78	33.50	2
	Country Club Villas II	971/F	--	49	--	49	344	2/78	49.00	1
1980	Keauhou Punahele I	1012/F	--	32	16	48	392	9/78	38.00 (1)	1
	Keauhou Surf & Racquet Club III	1020/F	--	117	--	117	509	8/78-9/78	58.50	2
	Keauhou Punahele II	1051/F	--	30	16	46	555	9/78	36.00 (1)	1
	Kanaloa @ Keauhou (Fairway Villas)	1075/F	12	50	--	62	617	4/79	62.00	1
	Keauhou Kai	1152/F	--	18	--	18	635	9/79	18.00	1
	Keauhou Gardens I	1157/L	60	46	6	112	747	(2)		
1981	Kanaloa @ Keauhou (Ocean Villas)	1216/F	12	30	4	46	793	(3)		
1982	Kanaloa @ Keauhou (Bay Villas)	1447/F	12	40	--	52	845	(4)		

(1) Ten units per increment were retained by the developer during the initial marketing.
(2) Project taken back by lender following poor pre-sale response. Units currently being offered on original sales basis.
(3) Sixteen (16) units were sold in a 20-month period beginning in 2/80. Eighteen (18) units were included in syndication discussed below, and 12 units are still available for original sale.
(4) Following poor reception of ocean villas phase, the 52 units in this phase along with 18 units in Ocean Villas were sold in bulk syndication to be operated on a transient rental basis for a minimum of seven years before marketing as individual units.

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

unprofitable at the time of sale. In general, the operations have historically experienced low annualized occupancy levels; consistently under 60 percent for the Surf, and ten to 20 points lower for the other two properties. Actual room rates in recent years have been heavily discounted from advertised rack rates, with the result being that the Bay and Lagoon hotels achieve among the lowest actual rates in the State.

Currently, the Kona Surf and Keauhou Bay (as a result of refurbishment undertaken by short-time owners, Summit Hotels) are in good condition. The Kona Lagoon is in poor condition, with dated and aging furnishings, fixtures and grounds.

Competition from central Kailua-Kona hotels and similarly-priced area condominium rentals has significantly denuded the success of the Keauhou Bay and Kona Lagoon operations, which being well-removed from the resort's golf course and other quality improvements, offer minimal amenities. The opening of the Sheraton Royal Waikoloa and Mauna Lani Bay hotels along the Kohala Coast substantially diminished the market share available to the Kona Surf, which was originally intended as a similar-class facility.

Management at the three hotels have undertaken various new promotional techniques including: heavy marketing directed toward group travelers; aggressive targeting of Japanese tourists; extremely low "Kamaaina" rates for State residents; and, in the case of the Kona Surf, an "Orchid Class" service. In this campaign, orchids are placed throughout the facility; up to 20,000 per day according to General Manager Bob Herkes.

Condominium development has periodically fared more successful, experiencing cyclical market activity trends similar to those within other resort areas in the State.

Since 1970, a total of 845 condominium units have been offered within the resort. Table 21 summarizes the nine projects (15 phases) and their original marketing absorption.

From late 1978 through mid-1979, market absorption of units on a pre-sale basis was extremely rapid, with seven consecutive offerings in the resort achieving sell-out within two months. Several projects, notably Kanaloa @ Keauhou (Fairway Villas) which sold out within one business day, required even less time.

However, outside of this peak period, absorption has been prolonged, with the most recently offered units as yet having failed to achieve total sell-out. In fact, the failure of the marketing program at Kanaloa @ Keauhou (Ocean and Bay Villas phases) was so acute, 80 units were sold in syndication to a group who will operate the units on a rental basis for a minimum of seven years before again releasing them on the market.

In general, over the past four years activity has been stagnate with prices and numbers of sales falling.

Despite its apparent lack of significant success within the visitor-oriented hotel and condominium market, save during the bullish investment period of the late 1970s, the Keauhou-Kona Resort has been relatively well-received among Hawaii County residents. Retirees and upper-income individuals have shown consistent interest in re-locating to the resort complex, and the available condominium units have demonstrated strong appeal to leased rental tenants.

In light of the lifestyle demands of area residents, and the continued urbanization of the Kailua-Kona to Keauhou corridor, this trend should prove beneficial to the development over the long-term regardless of the mediocre response within the visitor market.

The on-going expansion of the resort further emphasizes this movement toward a residential-resort community. The fee simple lots within Keauhou Estates are among the most expensive homesites on the Island, and marketed toward Hawaii residents. The nearly-completed shopping center is being filled by retail and service tenants oriented around local needs, as opposed to tourism demands; although, several such retailers have expressed interest.

Primary Economic Market Sector Development

Free-Standing Hotels

Currently, there is only one free-standing hotel within the Primary Economic Market Sector: the Kona Village Resort, a 95-room retreat located at Kaupuhelu, North Kona, eight miles north of the subject properties. Additionally, transient rental units are available at the Puako Beach Apartments, a condominium project addressed elsewhere in this section of the report.

Although labeled a "resort", Kona Village is actually only a single hotel operation, and lacking many of the amenities commonly associated with modern planned destination resort development, such as a golf course(s), condominium and extensive infrastructure improvements.

However, Kona Village may not remain a free-standing operation over the long term. The Barnwell Corporation, owners of several Hawaii County bulk acreage holdings, purchased over 1,200 acres surrounding the existing hotel, and have announced their preliminary intent to develop a destination resort community.

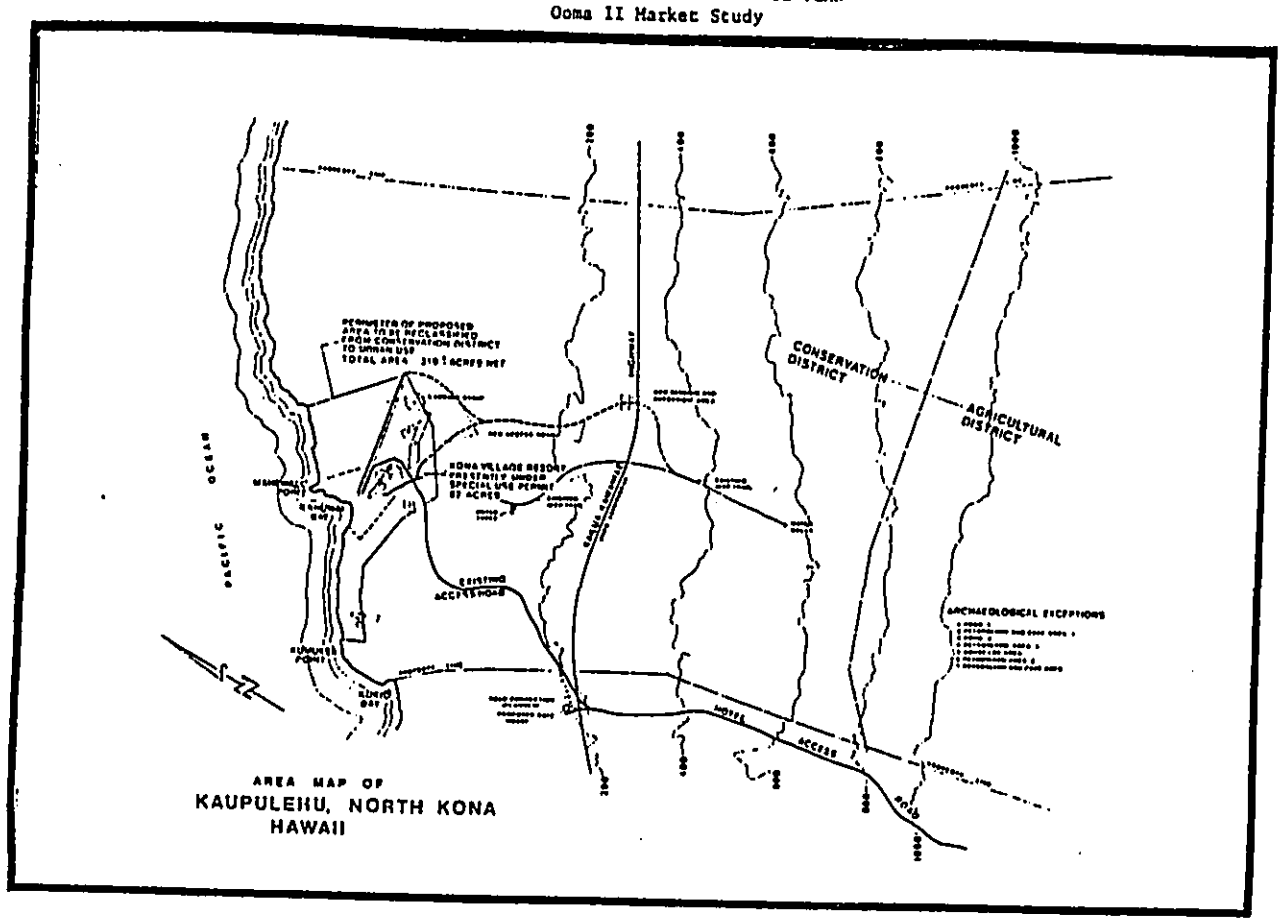
According to Greg Leong, project administrator, formal plans detailing use and intensity have yet to be completed pending further market study (currently on-going). Past designs have included a golf course, hotel, condominium and residential sites, and, commercial facilities. Leong said the most recent concepts omitted residential and commercial projects.

The map on the following page displays the site of the existing hotel and the 318 acres Barnwell is interested in developing.

Achieving necessary land use classification changes is the primary need prior to development, says Leong, in addition to drilling a second water well to service the enlarged resort area.

Although Leong optimistically forecasts a three to five-year approval period, he acknowledged the difficulty of Hawaii's (State and County) land use change

KONA VILLAGE RESORT LAND USE PLAN
Ooma II Market Study



AREA MAP OF
KAUPULEHU, NORTH KONA
HAWAII

process: "...a jungle which could take upwards of six to eight years." Leong says Barnwell hopes to have inventory (hotel and condominium sites) available on the market within six years.

Further complicating this proposed development is the evolving relationship between the existing Kona Village Resort owners/operators and the Barnwell Corp. In order to preserve its ambiance, Kona Village is desirous of keeping "modern development as far away from our operation as possible," according to Fred Duerr, general manager of the Resort.

Duerr said, that to date, the relationship has been successful, with Barnwell submitting various design scenarios to the Kona Village management for review and critique. However, Duerr is quick to point out that should plans fail to be mutually agreeable, the Resort has the option to purchase an additional 29 beachfront acres adjacent to the existing grounds in order to maintain distance from other development. This option is viewed as a form of leverage by the Resort to insure cooperation from Barnwell, as their bulk acreage holding has generally poor quality oceanfrontage; with minimal existing beach area, and few sheltered coves where a man-made beach would prove effective.

No plans have been announced, or are projected, for development of additional free-standing hotels within the Primary Economic Market Sector either on a short- or long-term basis. Furthermore, there are no sites outside of the existing resorts, other than three parcels adjacent to the Honokohau Small Boat harbor slated for acquisition by the National Park Service, that are currently designated for resort-oriented use; and, the County of Hawaii planning department has expressed a strong desire to keep additional hotel development inside the identified, or future planned-resort, developments.

The Kona Village Resort facility and operation is discussed at length on the following pages.

Summary

Tourism has replaced agriculture as the primary industry within the General Economic Market Sector over the course of the past 15 years. All statistical visitor business indicators, and the desirability of the area among Hawaii travelers, results in near-unanimous industry expansion projections by knowledgeable individuals.

Within the Primary Economic Market Sector, which is forecasted to be the focal point of Big Island tourism development throughout the century, resort projects represent the overwhelming portion of non-public capital invested. Development progressed strongly during the recent-past recession, which severely hampered investment and construction in all other resort sectors in the State. While neighbor island vacation regions were experiencing stagnating condominium market activity levels and declining prices, the first resort projects offered along the Kohala coast achieved strong market acceptance and unprecedented average prices. Hotel development, also stymied elsewhere in the State, effectively tripled the number of rooms available in the area in the past three years.

Development proposed over the next five years will again double the size of the visitor plant. This is not viewed as a hindrance to potential subject development, but, due to the cumulative attraction created in a currently under-developed area, is considered as having a significantly positive impact on probable and most economically advantageous uses of the subject properties. As a result of the income-producing potentials of a quality resort hotel operation, and the high returns possible on multi-family developable resort sites, it is generally considered desirable for a property to have large scale resort potentials and land use clearances.

The following sections summarize the current market standing and requirements for efficient resort development in the identified market sectors, according to the classifications previously presented: free-standing hotels, free-standing condominium, and planned resort development. This latter category, due to competitive influences is given greatest emphasis.

It is noted, that the synergystic impact of proximate quality resort development, can result in highly accelerated market activity levels, particularly during periods of general economic expansion. For this reason, the trends evidenced in other neighbor island resort regions (notably West Maui) are cited herein. Many real estate professionals in West Hawaii and the State expressed adamantly optimistic opinions regarding the potential in the Primary Economic Market Sector over the next ten to 15 years, and would consider our summarized conclusions, following, as conservative. However, the tourism industry is currently experiencing its strongest year in history, which coupled with the level of construction in the region in the past 36 months, may contribute to the tendency of others to make more liberal future expansion forecasts.

Free-Standing Hotels

With the exception of the uniquely-amenitied and themed Kona Village Resort, there are no free-standing hotels in the Primary Economic Market Sector, and none are planned at this time. Such hotel operations within the General Economic Market Sector, particularly in Kailua-Kona and the Keauhou-Kona Resort, have been experiencing subdued demand and operational levels in recent years due to

the heavy competition presented by available (and larger) equitably-priced transient condominium unit rentals, and the full-amenitied, high quality resorts along the Kohala shoreline.

As the subject properties would require substantial infrastructure and amenity improvements to achieve comparability with the increasingly-successful resort hotel facilities, it is doubtful a free-standing hotel could generate the returns necessary to justify the large investment required.

Free-Standing Condominiums

In the General Economic Market Sector, there are 3,109 free-standing condominium units within 60 projects, the large majority of which have been experiencing subdued market activity and declining prices over the past four years. For similar reasons as identified for free-standing hotel development, and owing to the generally disparate, incongruous appearance of most existing non-resort condominium developed areas, it is anticipated that all but the highest quality, best located free-standing projects will have difficulty competing with the projected improvements scheduled for the heavily amenitied resort developments. However, a strongly expanding tourism industry and general economy, would create a certain degree of demand for such units, although it is probable activity would be primarily centered within the existing resorts.

Due to the level of amenities necessary to compete in the condominium market, it is unlikely that free-standing condominium projects would be developed on the subject property, although, such uses would be considered integral in a planned resort development. The level of projected demand for which is summarized following.

Planned Resort Development

The three existing bulk acreage destination resort projects in the Primary Economic Market Sector are indicative of the highest quality of development achieved in the State, and are anticipated by many to be competitive with the widely-recognized West Maui resort areas by the mid-1990s. The prospects of

such potentials are dependent upon continued and accelerated expansion of the tourism industry (and the economy in general), and a many-fold increase in capital investment and construction from pre-1980 levels.

It is our opinion that the County of Hawaii visitor business will increase at rates of five to seven percent annually over the next six to ten years, with trends dropping to three to five percent for the remainder of the century. And, owing to the locational attributes of the region and the expressed desires of County planners, the significant majority of inventory additions will be within the primary market area, with secondary growth in the already heavily-developed Kailua-Kona to Keauhou Corridor. Hilo, which has suffered severely in regard to number of visitors and expenditures since the late 1970s, is gradually losing hotel room inventory to condominium conversion, and will not be a growth center during the foreseeable future.

A total of 1,560 proposed hotel rooms and 247 condominium units have been announced for the destination complexes for the next three years. Additional projects are currently in the preliminary planning stage.

The relative high-intensity of the actual and proposed resort development in recent years is the primary factor cited in predicting the North Kona-Kohala coast will become the next accelerated vacation market area in the State. The requisites for such consideration is an ample, quality visitor plant; desirable physical attributes; and availability of complete amenities.

Expansion periods in other neighbor island vacation areas achieving this critical mass of facilities and attraction level has resulted in rapid inventory growth and market absorption. For example, from January 1969 through mid-1979, 5,593 condominium units were constructed in West Maui (a ten-fold increase over then-existing numbers) and fully absorbed by the market; an average of 532 units per year in an area less than one-half the size of the Primary Economic Market Sector, and containing only two major planned resort projects.

Due to the desirability of resort-available amenities, the esthetic qualities associated with integrated development, and the lack of remaining prime sites, it

is projected that the significant majority of future resort-type improvement will be within the planned communities. The fact that the subject properties have existing land use designations encouraging such development within an expanding sector, the only vacant properties so classified, must be considered a generally positive indicator.

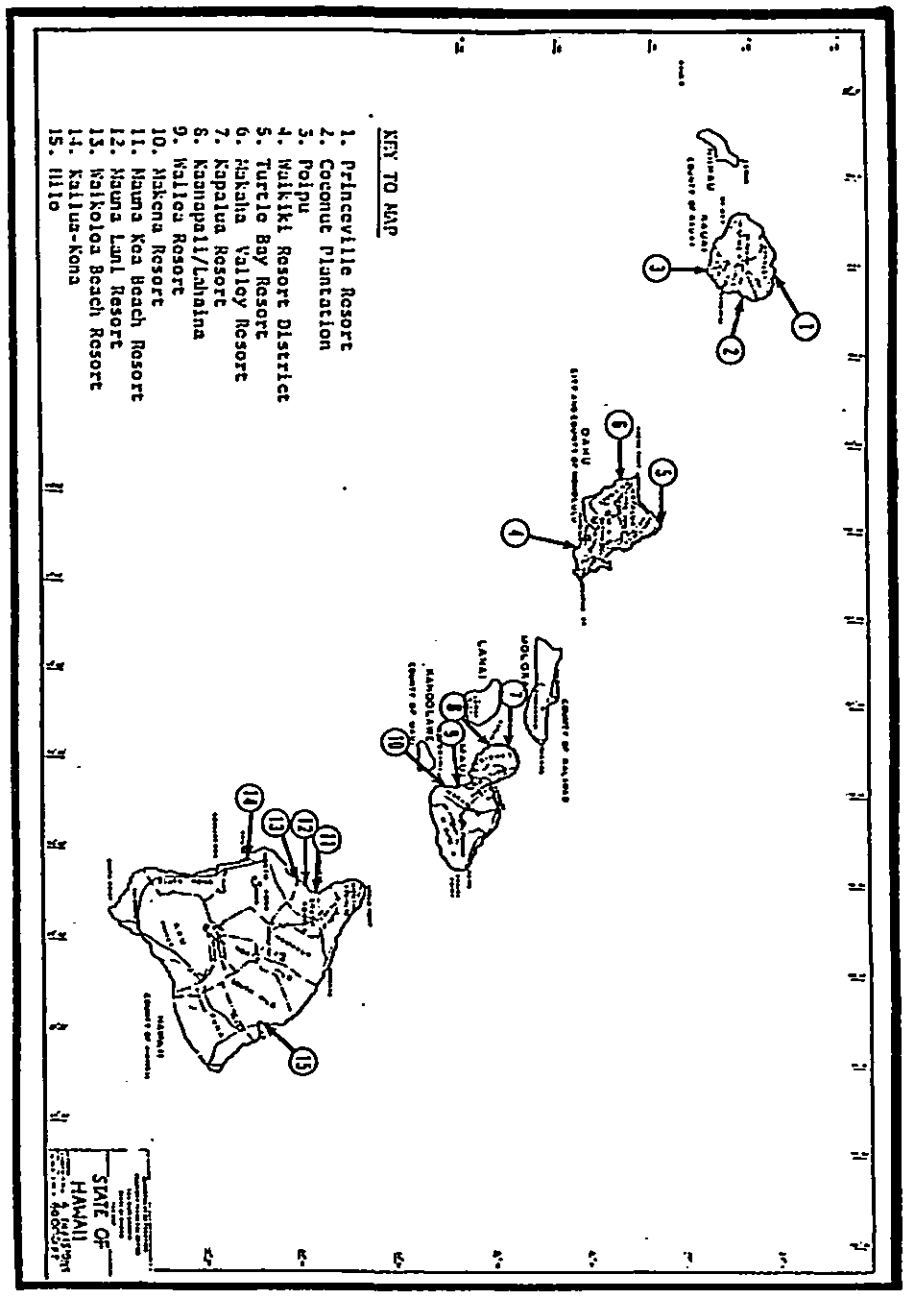
Although the cumulative attraction of massed resort development does substantially enhance market recognition (and hence, operational levels), a planned development must offer sufficient attributes to draw and establish a clientele on a relatively independent basis. Market success, is thus a product of the interplay between location, amenities, design and promotion.

Table 28 summarizes the existing major resort destinations/areas in the State. Of interest are the general locational characteristics (12 of the 15 identified areas are situated on the sunnier, more arid, leeward and southerly regions of the islands), and the ratio of hotel rooms and condominium units to each other, and golf course development.

The subject property enjoys excellent locational characteristics. From a general standpoint, it is a leeward site with proximity to the Keahole Airport and the services available in urban Kailua-Kona, while still retaining the benefits of relative isolation; and is situated in a healthy, expanding market sector. Specific to the property, are a significant sandy beachfrontage; relatively well protected, high-quality off-shore conditions; established "natural" amenities and various other features; and, numerous of archaeological sites, which are considered as contributors to a resort's ambiance, landscaping concepts and overall marketability.

Individual subject property locational characteristics, relative to adaptability to resort-use, particularly as it would effect potential hotel sites (the focal point of destination development), are discussed at length within the Highest and Best Use Analysis (Volume II).

The most costly, obvious, and integral amenity in Hawaii planned resort development is the golf course. Not only is a course(s) an expected recreational



MAJOR TOURISM DESTINATIONS AND RESORT AREAS
State of Hawaii

TABLE 28

MAJOR RESORT AREAS IN HAWAII
State of Hawaii

Island	Resort Name	Location	Area (Acres)	Name of Hotel (H) / Condominium (C)	No. of Rooms/ Units	No. of Single Family Lots	Ratio of Hotel to Condo Units	Existing No. of Golf Holes	Golf Hole Ratio: Hotel Rooms Per Hole	Golf Hole Ratio: Condo Units Per Hole
Oahu	Turtle Bay	North-Windward	880	Turtle Bay Hilton (H)	487	0	1.33	18	27.06	20.39
				Kuilima Estates (C)	367					
	Makaha Valley	Leeward	700+	Sheraton Makaha						
				Makaha Valley Towers (C)	195	0	.17	18	10.83	6.33
				Makaha Valley Plantations (C)	316					
Maui	Kaanapali	Leeward	1,169	Hyatt Regency (H)	372					
				Maui Surf (H)	820	350 (1)	2.96	36	104.25	33.19
				The Whaler (C)	356					
				Kaanapali Beach (H)	360					
				Sheraton Maui (H)	430					
				Maui Eldorado (C)	503					
				Royal Lahaina (H)	204					
				Maui Marriott (H)	226					
				International Colony Club (C)	220					
				Hale Kaanapali (C)	66					
				Kaanapali Plantation (C)	228					
				Kaanapali Royal (C)	62					
				Kaanapali Alii (C)	105					
	Kapalua	North-Leeward	750	Kapalua Bay (H)	269					
				Ironwoods (C)	196	32 (2)	.53	36	5.44	10.19
				Golf Villas (C)	40					
				Kapalua Bay Villas (C)	186					
					101					
	Wailea	South-Leeward	1,650	Inter-Continental (H)	360	250 (1)	1.69	36	29.72	16.61
				Wailea Ekahe (C)	298					
				Wailea Ekahi (C)	168					
				Wailea Elua (C)	132					
				Stouffers Wailea Beach (H)	330					
	Makena	South-Leeward	1,023	Maui Prince (H) (2)	800	0	4.33	18	44.44	10.22
				Makena Surf (C)	184					
Hawaii	Seamountain	South	400	Colony One (C)	28	160 (1)	N/A	18	N/A	1.56
	Keauhou	South-Leeward	2,000	Keauhou Beach (H)	318	28	1.57	18	73.89	46.94
				Kona Surf (H)	350					
				Kona Lagoon (H)	462					
				Keauhou Resort (C)	48					
				Keauhou Akahi (C)	62					
				Keauhou-Kona Surf & Racquet Club (C)	193					
				Country Club Villas (C)	116					
				Keauhou Palena (C)	56					
				Keauhou Punahele (C)	96					
				Kanaloa at Keauhou (C)	160					
				Keauhou Kai (C)	13					
				Keauhou Gardens I (C)	112					

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TABLE 28 (Continued)

MAJOR RESORT AREAS IN HAWAII
State of Hawaii

Island	Resort Name	Location	Area (Acres)	Name of Hotel (H)/ Condominium (C)	No. of Rooms/ Units	No. of Single Family Lots	Ratio of Hotel to Condo Units	Existing No. of Golf Holes	Golf Holes Per Hotel Room	Golf Holes Per Condo Unit
Hawaii (Cont'd.)	Waikoloa Beach	Leeward	500	Sheraton Royal Waikoloa (H) Waikoloa Shores (C) (2)	545 110	0		18	33.03	16.36
	Mauna Lani	Leeward	7,200	Mauna Lani Bay (H) Mauna Lani Terrace	355 320	0	1.11	18	50.70	28.13
	Mauna Kea Beach	Leeward	1,000	Mauna Kea Beach (H) Villas at Mauna Kea (C)	310 60	67	5.17	18	58.06	11.23
Kauai	Coconut Plantation (3)	Windward	-	Islander Inn (H) Kauai Beachboy (H) Plantation Hale (C) Sheraton Coconut Beach (H) Islander on the Beach (H)	199 243 143 311 199	-		18	90.45	36.00
	Poipu (3)	South	-	Poipu Beach (H) Sheraton Kauai (H) Kiahuna Plantation (C) Poipu Kai Resort (C) Poipu Village (C) Alohakona (C) The Waiohai (H)	192 600 333 96 96 228 440	-		27	140.63	81.00
	Princeville	North	1,200	Alii Kai I & II (C) Cliffs at Princeville (C) Hotel Hoi (C) Hanalei Bay Resort (C) Ka'Eo Kai (C) Makai Club (C) Mauna Kai (C) Pali Ke Kua I-III (C) Palmeira (C) Puu Poa (C) Sandpiper Village (C) Searidge I & II (C) Princeville (C) Quail I & II (C) Quintabella (C) Kalihiwai Villas I-III (C) Kamalihaha (C) Hanalei Bay Villas (C) Panoele (C) Sheraton Princeville (H) (2) Hanalei Plantation (H) (2)	113 202 60 134 69 96 48 74 74 84 126 97 74 269 82 37 56 300 300	550 (1)	-.11	27	19.47	35.67	49.37
Molokai	Kaluo Koi	Leeward		Sheraton Molokai (H) Paniolo Hale (C) Ke Nani Kai (C)	250 77 130	16	1.47	18	16.11	10.94

(1) Some proposed.
(2) Under construction.
(3) Vacation area, not specifically delineated resort development.
(b) Public course available nearby.

NOTE: Many resorts have long-term plans for large numbers of additional single-family lots and condominiums not reflected in this table. Golf course additions are also planned at Princeville, and all Hawaii Island resorts except Seamountain.

SOURCE: The Hallstrom Appraisal Group, Inc., May 1985.

facility utilized by many vacationers, and a scenic attribute, but also provides a valuable frontage for interior multi-family and residential sites. All 15 of the identified resort destinations in the State have a minimum of one golf course either within the development (for planned resorts) or nearby the generally defined area. Even Waikiki, an urban resort district, has ready access to the Ala Wai public course, making those links reputedly the busiest in the world.

All of the destinations, with the exception of the secondary developments at Makaha, Seamountain, Kuloa Koi and Coconut Plantation, anticipate golf course expansion over the long-term.

It is our opinion, based on the traits and potentials of the sites, and assuming governmental approval, that a market demand exists/is readily createable for a major hotel development(s) on the subject property if planned destination resort improvement is undertaken. (A major hotel is one having more than 300 rooms, and associated retail, restaurant, meeting and recreational amenities).

Although, as noted, planned resort condominium development in the State has been cyclicly received by the market, with periods of extremely rapid absorption interspersed with stagnate activity and periods of declining prices (as dictated by the general economy); the offered developments within the primary market have achieved stable acceptance in otherwise poor market times.

Based on the recent experiences of the three resort projects which would be competitive with subject resort development, the weighted marketing trends evidenced in Keauhou-Kona projects, and conservative assimilations of past growth trends in other State destinations, it is our opinion that market absorption for quality condominium units on the subject property (as an individual destination resort-type development) would be circa 50 units per year on an annualized basis. It is acknowledged that sales would likely be sporadic over the term of any large-scale development.

Planned resort residential development typically is considered a secondary land use, utilizing mauka or generally less desirable sites than hotel and condominium projects. Only six (five major) of the 12 destination resort projects in the State

currently have homesites available, although several others have expressed plans for such offerings. Residential subdivisions are typically improved later in the life-span of resort development, following basic infrastructure, hotel and condominium construction.

Based on the acceptance of amenitied-residential development in the Primary Economic Market Sector (notably Kona Bay Estates), and the historic trends experienced in existing planned resorts (notably Kaanapali, Wailea and Princeville), a demand for residential development on the subject property (if so developed) would be estimated at circa seven to ten lots per year, but dependent on locational attributes and pricing.

Due to the relative size of potential resort development on the subject holding, and the proximity of urban Kailua-Kona, it is doubtful if sufficient demand would be created for major commercial facilities on the property outside of the hotel operations and perhaps a convenience store and realty office.

Quantification of probable development intensity (number of units) of the various uses for each subject property (largely a matter of size and regulatory constraints) is addressed in Volume II of this study.

Agriculture

General Economic Market Sector

As previously discussed, the districts of South Kohala and North Kona, have established agricultural traditions, which (though lessening in import relative to tourism) is experiencing real economic growth. Diversified products (macadamia nuts, avocados, citrus, coffee and other fruits), vegetable/truck crops and floral products are producing increasing quantities of goods, and utilizing increasing amounts of arable land. Only ranching has failed to keep pace with the general agricultural expansion.

However, existing agricultural is almost exclusively limited to elevations above the 800 foot level, where there are cooler conditions, greater amounts of soil and rainfall, and less salt air.

Due to the high cost of land (resulting from tourism demand) in the Kailua-Kona coastal corridor, the extremely poor geologic conditions in the low elevations of the South Kohala District, and the cost of water development/supply, no agricultural development is anticipated in the comparable regions of the General Economic Market Sector.

Primary Economic Market Sector

A single agricultural subdivision, the State and County sponsored Keahole Agricultural Park, is located in this defined market sector.

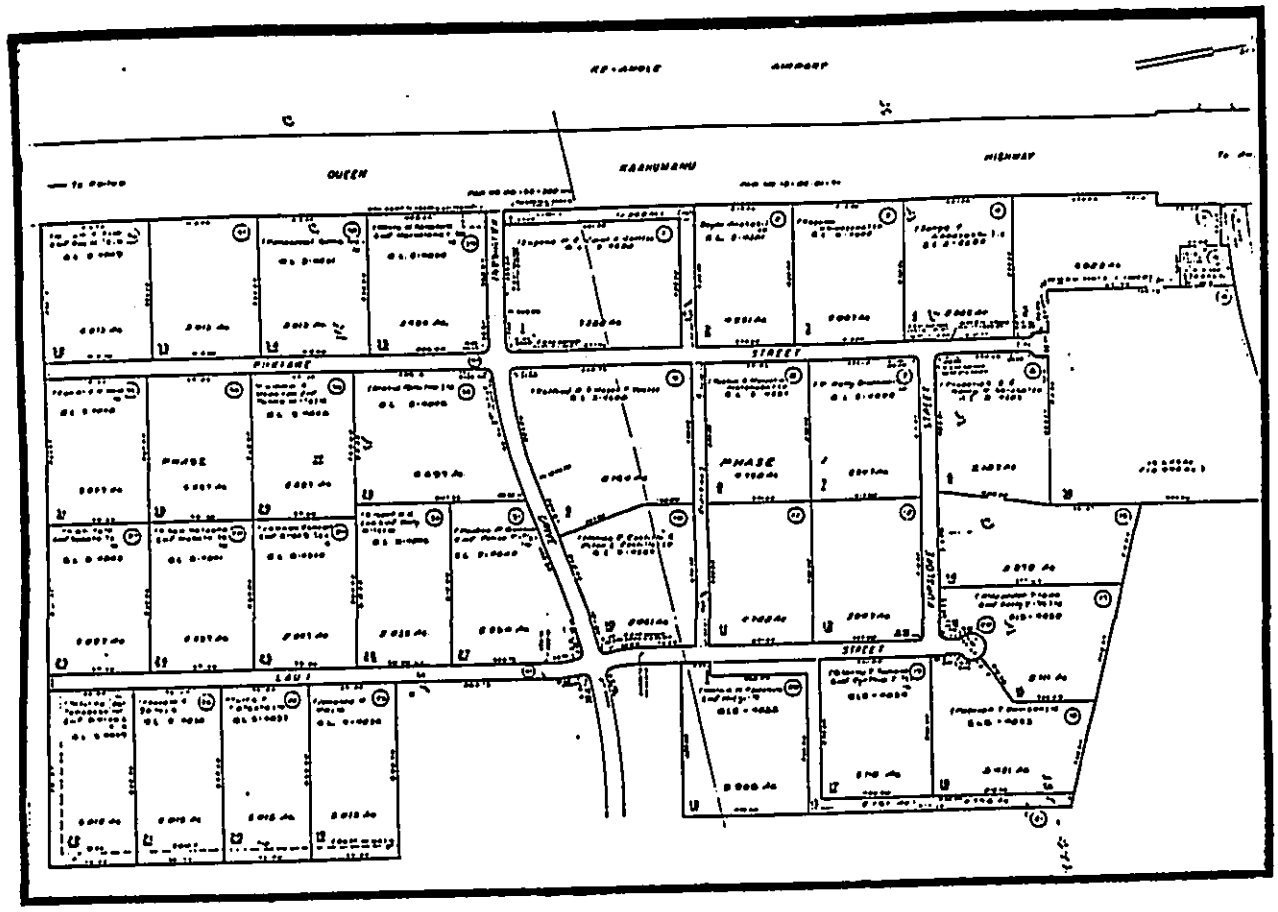
The project, heavily dependent upon public funds for infrastructure (water) development, is located opposite the Keahole Airport, and was intended to be used for production of floral and specialized fruit crops which would benefit from close proximity to the air freight potentials available at the airport. A map of the subdivision is shown on the following page.

There are a total of 35 leasable lots in the park, ranging in size from 4.552 to 15.643 acres. Currently, 28 are leased, although only seven are improved (or in the process thereof). A common complaint among lessors (in addition to the extremely poor soil conditions--raw A'a lava), is the very low water pressure evident, hampering irrigation potential; particularly if more sites are improved.

Aquaculture development is being attempted within the Natural Energy Lab holding at Keahole Point. However, the project is considered as experimental (to a large degree) and heavily dependent upon funding grants and subsidized land costs.

There are no other agricultural developments proposed or commonly envisioned for the Primary Economic Market Sector in the foreseeable future.

KEAHOLE AGRICULTURAL PARK
Kaloko-Honokohau Market Study



Summary

It is our opinion, that due to the climatic and soil conditions evident on the subject property, the cost of developing infrastructure, and the competition for existing limited demand from the State subdivision, there is insufficient demand for agricultural use of the site to be considered as a viable land use option.

High Tech Industrial/Aquacultural

Because of its unique, advantageous location abutting the proposed Hawaii Ocean Science and Technology Park, the subject enjoys a use-potential not shared by other properties in the region. The 547-acre park will be situated on State-owned land between the subject and the Keahole Airport and Natural Energy Laboratory of Hawaii, and will be developed by the State of Hawaii High Technology Development Corporation.

A comprehensive analysis entitled "Hawaii Ocean Science and Technology Park Marketing and Feasibility Studies" was released by the State in January 1985, addressing the design of, and demand for, the park. Excerpts from this study follow.

Description of Proposed Park

The site for the Hawaii Ocean Science and Technology Park is just south of the Keahole Airport and consists of 547 acres of undeveloped State-owned land on the makai side of the Queen Kaahumanu Highway. The western end of the site abuts the Natural Energy Laboratory of Hawaii (NELH), and access is provided by the NELH road which bisects the upper portion of the property. The site is lava covered and slopes gently from sea level to approximately 120 feet in elevation at the highway nearly a mile inland.

The proposed Hawaii Ocean Science and Technology Park complements the existing Natural Energy Laboratory of Hawaii by providing the space and facilities required for the commercialization of projects developed at the NELH.

By locating the Hawaii Ocean Science and Technology Park on the adjacent property, the transition between demonstration and full scale commercial operations is greatly facilitated. Test data and research findings are directly transferable from NELH to the commercial facilities since the conditions are identical. The park provides the "missing link" in the development cycle and offers greater potential benefits to the State because it can provide more jobs and larger revenues. Together, the NELH and the Ocean Science and Technology Park form an attractive and highly complementary package to high technology corporations which may be interested in establishing their operations in Hawaii.

The master plan for the development of the Hawaii Ocean Science and Technology Park calls for the lower portions of the site to be used for aquaculture operations and the upper portions by low volume or non-ocean water users. The NELH access road is to serve as the main spine road for the site with cul-de-sacs extending from it to serve the individual tenant sites. Underground power, communications and domestic water are to be provided within these road rights-of-way. The intersection at the Queen's Highway will be improved with left turn and acceleration/deceleration lanes. Irrigated landscaping will be provided along the main spine road, and a landscaped entry feature will be placed at the intersection. A restroom/shower facility and small paved parking area will be constructed for public use along the shoreline, and a site will be provided for a future visitor center and possible restaurant and/or oceanarium.

The first phase of improvements for the park site will include the following:

Intersection and landscaping improvements at the highway;
Underground utility installation and landscaping along the NELH road;
Stub roads and utilities at each cul-de-sac location;
Restrooms/showers and parking along the shoreline;
Cold and warm water piping and disposal systems to the lower portions of the site.

It is intended that the first four items listed above be completed by the time the park is opened and ready for tenants. The cold/warm water piping and disposal systems should be constructed to meet the initial tenants' needs, and therefore,

should not be constructed until those needs are known (which may or may not coincide with the opening of the park.)

These Phase I improvements will make nine sites available for tenant use, three of which will have immediate access to ocean piping systems.

Market Demand

The Market

In assessing the potential market for this project, the unique resources and features which the site and the State have to offer were identified. These include:

Cold ocean water (less than 50 degrees F) pumped from 2000 feet below sea level which is nutrient rich and pathogen free.

Warm ocean water which is clean and, when mixed with the cold water in varying proportions, permits precise temperature control.

High solar radiation (one of the highest levels in the U.S.) year round with very little cloud cover.

Semi-tropical temperatures with light diurnal breezes which keep the temperatures relatively constant and comfortable while providing a near hurricane-free environment.

Good access, with Keahole Airport, which is now being served by direct Mainland flights, adjacent to the site, Honokohau Small Boat Harbor within three miles, and Kawaihae Harbor within a forty-five minute drive on a recently completed limited access highway.

Close proximity to the NELH facilities which can serve as a research and pilot location for budding ocean science industries.

Available sites in an improved, waterfront, ocean science and technology park with state-of-the-art infrastructure, proper zoning, and management operations in place when the park opens.

Available labor force of both technical and non-technical nature to support future hi-tech industries.

University graduates and programs which are highly respected nationwide in the areas of engineering and marine sciences.

Government support as expressed by the backing of this project by both the Governor of the State and the Mayor of Hawaii County.

Political and economic stability along with reliable utility systems and strong environmental controls which are major assets when competing with comparable sites in other semi-tropical countries around the world.

The types of companies which have been identified as potential occupants of the park are in the fields of:

High intensity aquaculture
Alternate energy
Marine biotechnology
Pharmaceutical development
Genetic engineering

Although the market study focused primarily on high intensity aquaculture because of its direct application at this site and time, the other industries also have great potential, particularly those which make use of aquaculture products. Illustrative of the diversity of possible park tenants, representatives interested in the following operations have contacted the High Technology Development Corporation regarding park space during the brief course of this study.

Construction of an OTEC facility to provide electricity and possibly refrigeration to other park tenants;

Assembly of solar panels for electrical generation;

Parmaceutical development and processing using aquaculture products;

A science and technology institute focusing on the needs of Pacific Island emerging nations;

Production of desalination units based on a new technology; and

Computer software development.

Assuming the park has a net leasable of 400 to 450 acres, the marketing study foresees a need for a minimum of 14 sites ranging up to 40 acres in size which could be absorbed within a five- to ten-year period. Preliminary projections indicate that for those sites requiring ocean water, approximately 20% of the demand will be from the cold, deep water system and 80% from the warm, nearshore system (although this may change to a more even distribution when actual tenant needs become more clearly defined).

Based on the State-sponsored study, it would appear a market demand for high-tech sites (as an expansion to the park) could be anticipated within five to ten years from the park's opening, or circa seven to ten years from the present. Because of the current infancy of the field, and the heavy subsidy to be provided by the State to park tenants (in the form of low ground lease rents and level of facilities), direct competition with the park is not considered economically favorable or possible.

Demand for subject acreage would result only as the State park achieved capacity and/or major production and marketing gains are made in the effective industries. However, we do consider high-tech industrial/aquacultural uses to be a viable use for the northerly and mauka portions of the subject (nearly the park) over the development time frame of the site.

The Hallstrom Appraisal Group, Inc.

July 1, 1985

Mr. Norbert A. Schlei
c/o Helber, Hastert, Van Horn & Kimura
2222 Kalakaua Avenue, Suite 1507
Honolulu, Hawaii 96815

Market Study and Highest and Best Use Analysis of 316.66-Acre Ooma II Oceanfront Parcel

Dear Mr. Schlei:

Enclosed is Volume II of our Market Study and Highest and Best Use Analysis of the above-identified bulk acreage holding located at Ooma II, North Kona, Hawaii. Volume I, previously submitted, was a comprehensive market investigation and analysis of historic, current, and projected market development supply and demand trends within the subject property's effective economic market sectors. Probable subject uses for which a market demand was projected were discussed in that earlier document.

Within this report (Volume II), identified potential subject uses are analyzed in regard to likelihood of actualization based on existing constraints and limitations of the properties. Physical characteristics of the sites, availability of off-site infrastructure and services, governmental land use restrictions, and the impact of community reaction were the focal points of this analysis.

Our conclusions quantify the probable intensity desired/permitted of the identified land use types, and the time constraints in achieving necessary adaptations for various development factors.

We note that significant portions of our highest and best use analysis (specifically those sections addressing property descriptions, governmental land use classifications, and logistics and availability of off-site infrastructure) were prepared simultaneous to, and in conjunction with, efforts by the planning firm of Helber, Hastert, Van Horn & Kimura, who have presented our joint findings under a separate cover. For this reason, these portions of our analysis are omitted from this document. If you so desire, this narrative will be supplied.

James E. Hallstrom, Jr., MAI, SRPA
Donald L. Hallstrom
233 Merchant Street, Suite 401
Honolulu, Hawaii 96813
Telephone
(808) 526-0444

Thank you for the opportunity to have worked with you on this most interesting case study.

Respectfully submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

James E. Hallstrom, Jr., MAI, SRPA

Tom W. Holliday

Tom W. Holliday

/gc

The Hallstrom Appraisal Group, Inc.

Market Study
and
Highest and Best Use Analysis
of
313.66 Oceanfront Acres

Located at

Ooma II, North Kona, Hawaii

Prepared for

Mr. Norbert A. Schlei
c/o Helber, Hastert, Van Horn & Kimura
Honolulu, Hawaii

July 1985

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INTRODUCTION

Based on our market analysis of the subject property's General and Primary Economic Market Sectors, it is our conclusion that the principal land use for which widespread market acceptance can be readily projected, and which will efficiently utilize a substantial portion of the subject site, is integrated intermediate-sized resort development. Additionally, because of its location adjacent to the proposed Hawaii Ocean Sciences and Technology Park, demand for commensurate high-tech/aquacultural uses in the northerly and mauka portions of Ooma II can be projected as expansion area as the park achieves capacity.

Master-planned resort development typically contains hotel and resort condominium projects, a commercial village and lesser numbers of single-family residential lots (when sufficient acreage is available). In order to be competitive, a resort complex must also contain a sandy beachfrontage (preferably white), golf course(s), tennis and other recreational facilities within a unified atmosphere. In the subject's effective market, successful resorts additionally have protected/refurbished archaeological and historic sites, and maintain high quality standards.

As the ocean sciences field is experiencing rapid economic expansion in conjunction with innovative product development, specific high-tech (light industrial) uses cannot be forecast for the subject at this time.

The most desirable use-types would be those which could prove beneficial to the park and also be integrated into a resort atmosphere. A conference center, offices, laboratory/research space, and hygienic aquaculture would be among the compatible applications. If creatively planned such uses could provide points of interest and/or thematic advantages to the nearby resort community.

In the ensuing report, our primary emphasis is in assessing the likelihood of actualizing a resort complex on the subject property. High-tech development, while considered a contributive component to overall site improvement, is only briefly addressed herein. This is due to several factors: the economic efficiency of subject development is substantially dependent upon the success of its resort portion; the sole use-demand is a product of the site's advantageous location; and, there exists minimal market data

A comprehensive marketing and feasibility study of the Hawaii Ocean Science and Technology Park, commissioned by the High Technology Development Corporation, was completed in January 1985, and is the basis of our forecasted demand for high-tech subject use. Excerpts from the public report are contained in Volume I. In this volume, comment on high-tech use is reserved, except where impacting resort concepts.

There are four constituent elements in assessing the probability of successful resort development of a site, the interplay of which sets forth the potential time and cost parameters involved with improvement of the property to its highest and best use.

Assuming a demonstrated market demand exists for such resort use (see Volume I), the elements are: physical desirability/adaptability of the property for resort use; logistical concerns and the availability of supportive off-site infrastructure (water, access, sewage, etc...); land use and other governmental constraints and restrictions; and, the impact of community reaction. Primary concerns in our analysis are the time necessary to achieve needed planning, land use approvals, and community support, and quantification of development intensity (recognizing competitive and other needs).

Our report is divided into four sections, commensurate with the highest and best use elements listed above. We note that in regard to several of the categories, notably zoning and certain infrastructure needs, we have relied heavily upon discussions with appropriate public agencies, and past experience of developers in the area. In many instances, time frames and probability ranges are the most accurate data available, with more specific conclusions dependent upon development of design/planning concepts which could be reviewed by the various concerned parties.

It is assumed that infrastructure, planning and governmental requirements for high-tech development of the subject would be available from, and commensurate to, resort approvals and construction. Any other specific demands are assumed available from the proposed park's infrastructure.

Again, because major portions of this analysis have been presented in conjunction with, or solely by, others, some sections are only noted or capsulized in this document.

PROPERTY DESCRIPTION

It is our understanding a detailed description of the subject property, both in its existing state and as proposed for development, has been prepared for Helber, Hastert, Van Horn & Kimura, and presented under separate cover. In the interest of brevity and non-repetition, we have therefore omitted such a description from this document.

LAND USE CLASSIFICATIONS

There are three levels of land use classifications governing the use/development of non-military lands in the State of Hawaii; they are: State Land Use, administered by the Hawaii State Land Use Commission; the County of Hawaii General Plan, and the County of Hawaii Zoning Code, both of which are administered by the County of Hawaii Planning Department and City Council. Proposed developments must achieve compatible classifications on all levels (in the order listed) to receive necessary permits.

Additionally, the shoreline, and certain nearby areas are within a County of Hawaii Special Management Area (SMA) described as the Coastal Zone Management (CZM) program.

The need to change one or more designations, often a time-consuming and (therefore) costly process in Hawaii, can be a critical factor in ascertaining the probable Highest and Best Use(s) of the subject property. Conversely, a site with compatible existing land use classifications can anticipate priority development plan review, and thereby shorten or forego various hindrances to development which may arise.

Our findings and a substantial portion of our descriptive narrative are contained at-length within reports prepared jointly with the firm of Helber, Hastert, Van Horn & Kimura. We note the significant ranges summarized on the following table. Our opinions are represented at the upper end of the range; however, we have tempered them in accordance with the optimism expressed by the planners that applications could be expedited as the General Plan is currently under review. The low-end of the ranges reflect these opinions. Additionally, the planners may seek accelerated processing by submitting petitions simultaneously to the General Plan and SLU reviews. Typically, the General Plan applications precedes SLU submittals.

Land Use Agency	Existing Classification	Action Required	Estimated Time Required for Action[1]
State Land Use Commission	Conservation	Change to Urban	9 to 36 Months
Hawaii General Plan	Open/ Conservation	Change to Resort and Industrial	18 to 24 Months
Hawaii Zoning Code	Open	Change to Resort- and Industrial-Type Uses	6 to 18 Months following General Plan approval
Special Management Area (Coastal Zone Management)	Within SMA	Approval	Coincidental with zoning approval

[1] If all submittals are complete, and the action is viewed favorably by the respective agency.

Based on the existing land use constraints affecting the subject property and demonstrated market demand, it is our opinion that the use-type most probable and likely to receive the most-ready acceptance by County officials would be intermediate-class resort development with high-tech industrial in the areas adjacent to the proposed park. SLU and General Plan amendments and a zoning change would be required for such development of the site. It is estimated that the entire land use approval process would require from 24 to 60 months following original submission of plans and documents. It is assumed that land use approvals will be expedited with due haste, and a General Plan amendment permitting subject resort/industrial development would be sought simultaneously with a State land use change. A variety of time frames are possible; the most probable are presented later in this report.

It is noted, that the conceptual development and actual design of a resort project can require upwards of two to five years before plans are of final submission quality. The failure to adequately prepare all necessary plans, studies, or otherwise required documents could result in a substantially longer approval time-frame. Based on experience of similar projects in the State, a minimum of six months planning would be required prior to commencement of land use changes and approvals. Following submission, planning and governmental action continues simultaneously.

ADAPTABILITY OF SUBJECTS' PHYSICAL CHARACTERISTICS FOR RESORT USE

The desirability of an individual site for resort development is the result of both macro and micro characteristics, assuming necessary infrastructure is available (or can be constructed) and land use classifications permit.

Among the macro, or general, attributes are location within a recognized and/or expanding resort region, a sunny arid climate, proximate transportation facilities and access thoroughfares, generally calm water conditions, and availability of natural and scenic features.

As discussed within the Market Study, the Kona-Kohala coastline contains all of these positive characteristics; and the subject property is considered favorably located in regard to these traits. Due to its proximity with the Keahole Airport (enhancing accessibility for potential guest and recognition for passers-by) and Kailua-Kona village (and all the tourism-oriented services and facilities therein), the subject enjoys additional general locational benefits. However, the periodic noise factor created by the former, less than one mile north of the subject, could be considered detrimental to resort development in the northerly/mauka areas of the site (this is another strong factor favoring high-tech industrial development in this portion of the subject).

A complete study and analysis of airport noise impact on potential subject resort development has been prepared by others. The overall effect on the areas designated for resort use was considered minimal.

Favorable micro, or specific, site characteristics for resort improvement typically include: an extensive white (or golden) sand beach; protected swimming and diving areas, with high degrees of water clarity; quality makai and shoreline viewplanes, and ample slope to permit such views for interior parcels; and, sufficient acreage to allow development of necessary recreational amenities (golf course, tennis garden) and infrastructure.

Additionally, particularly for West Hawaii projects, significant archaeological and historic sites are desirable, unless they are intrusive or constrictive upon development.

These identified site attributes provide not only entertainment/enjoyment to guests, but also serve as an effective marketing tool which can easily be expressed through brochures and presentations, and often provide focal points or themes for the development. The beach, view, protected swimming and similar site amenities furthermore act as the "resort" diversions for non-golf, or tennis enthusiasts, and are the type of features which enhance the likelihood of repeat visitors.

The sole desirable physical characteristics for industrial development of the type envisioned for the subject are location in an area of demand (adjacent to the proposed high-tech park), and a relatively level topography (which it has).

Micro Characteristics

In regard to the identified micro characteristics, the subject property is summarized in the following paragraphs.

<u>White Sand Beach</u>

As presented in descriptions of the subject property prepared by others, the site has relatively extensive white sand beachfrontages for the North Kona District, and is one of the closest widely used major strands to urban Kailua-Kona. Additional sand pockets are located in near-shoreline, and close-offshore areas. The beach is widest, and most desirable, fronting the Puhili Point and at the northerly edge of the property.

In the course of site development for resort use, some beach enhancement would be required, similar to that undertaken within the Mauna Lani Resort (though not as extensive), and as is currently being done in conjunction with the Sheraton Princeville Hotel project on Kauai. Sufficient, readily-available sand would appear to exist on-site to complete an enhancement operation. An improved

beach on the property (based on its current extent and attributes) would be one of the finest in leeward Hawaii.

Water Recreation Potentials

Relative to all existing West Hawaii resort developments, and most neighbor island destination areas, the subject enjoys good to excellent water recreation potentials, the major activities being swimming/bathing and snorkeling/diving.

Wawaloli Bay in the area fronting the subject is exceptionally clear, with visibility underwater typically exceeding 100 feet. This clarity factor, coupled with the type of scattered coral formations and sand and rock sea floor which is found close offshore (through outside of the near tidal zone), create superior diving conditions. Additionally, being in the lee of Hualalai, the bay is protected from the majority of disturbing tradewind action which plagues the Kohala resort projects.

Swimming potentials are poor to average fronting the northerly and central areas of the site, due to tidal zone rock reefs and staggered shelves. Near Puhili Point conditions improve, and bathing potentials range from average to good. Again, as at Mauna Lani and other resorts, shoreline swimming lagoons could be developed using existing coastal formations. Offshore, swimming conditions are good due to the lack of unified reef formation. However, the lack of such a protective reef does permit occasional high surf to strike the northerly portion of the subject shoreline. Although Keahole Point does provide some protection from the severe winter swells (from out of the northwest) the subject is open to summer wave action (out of the south), which is typically not as extreme. Generally, surf conditions are "flat" in this area of the island (although a favorite local surfing spot is the break near Puhili Point), and despite its "unprotected" quality, the subject shoreline is less susceptible to strong wave action than Keauhou-Kona, Kona Village, or the Mauna Kea Beach resorts.

The major bathing problem is two-fold: 1) the relatively steep slope of the undersea shelf fronting the site, dropping to more than 60 feet in depth within 100 yards of the shoreline; and, 2) the presence of tidal zone rock reefs, which

(due to wave action) can make entrance into the water difficult in some areas. The latter problem can be addressed through careful selection of beachfront improvement and limited excavation (if permitted), the former deficiency cannot be resolved.

View Potentials

The subject property has good makai and shoreline views. Honokohau and Wawaloli Bays provide admirable view amenities of closely proximate scenes, while the leeward flanks of Hualalai and Mauna Loa serve as a southerly backdrop. Additionally, the boating activity in the bays (from Honokohau Harbor) enhances daily panoramas. Mauka views are mixed, with a stark contrast between the spectacular upper, forested slopes of Hualalai and the residential, agricultural and industrial development (though scattered) on the mountains lower slopes. Effective conceptual and structural planning, and screening using landscaping techniques, should mitigate the impact of these latter undesirable view characteristics.

In respect to this trait, although the subject is fairly competitive with other West Hawaii resort properties, it has only average views relative to the West Maui and Princeville resort areas.

The subject property would appear to have minimally sufficient slope to permit interior sites to have strong ocean view potentials, particularly if development is set back from the shoreline (as would likely be required), and structures are of the low-rise type.

Sufficient Size to Permit Development

Based on discussion with land planners, and review of development within other resort areas, it is our opinion that the larger parcel is of sufficient size to permit development necessary for a competitive intermediate-sized resort.

However, the inclusion of industrial acreage could impact the ability of resort development to achieve economic numbers of units and still maintain competitive

density levels. Through effective planning, hotel and condominium unit densities of up to 30, and up to 15 units per acre, respectively, could be considered marketable. Higher intensities would negatively impact market acceptance. We note that these densities are greater than those within the competitive marketplace, and the maximums stated are not necessarily most desirable as the ability to change prime room tariffs and condominium unit prices could be impaired. It is our opinion the optimum density level would be eight to 12 condominium units per acre, and circa 20 hotel rooms per acre.

Thus, the amount of acreage committed to high-tech expansion, which would otherwise be used for multi-family residential development, directly effects the economic viability of the subject. If a large demand for industrial sites exist, and the acreage is rapidly absorbed, the overall impact would be beneficial. However, should the market be stagnate for such uses, it would be our recommendation to seek re-zoning permitting residential improvement on the industrial-designated parcels.

For this reason, optimum resort development on the subject should include more hotel rooms (which can remain competitive in higher densities) than condominium units. This is slightly counter to the typical West Hawaii resort development (such as Waikoloa Beach and Mauna Lani) which have master-planned hotel/condominium unit ratios circa to one to one (one hotel per one condominium unit), and statewide resort ratios of .73 to one.

The list following contains the land use types projected as necessary for successful subject development. Specific acreages are to be provided by Helber, Hastert, Van Horn & Kimura.

Land Use	Comment
Hotel	Up to 600 rooms at up to 30 units per acre(1)
Condominium	Up to 450 units at up to 15 units per acre(1)
Golf Course	18-hole championship course
Commercial	Small retail/restaurant village in middle/mauka resort area. (12,000 to 20,000 square foot gross leasable area)
Open/Reserve	Shoreline, parks and other setbacks
Industrial	Northerly/mauka areas of site
Roadways	Throughout development

(1) Number of units and densities dependent upon allocation of acreage for high-tech expansion and its absorption over time.

We note that due to the limited size of the subject property, there is no allowance for single-family lots in the resort project. This is not viewed as a problem, because resort developers consider residential acreage as secondary to hotel and condominium sites; and is generally developed toward the latter-end of the resort improvement process. It is a type of residual, in that lots are sold at the middle to end of the sales programs and are not integral to a successful resort project. A high probability of eventual successful marketing of lots will not justify a resort development if there is no profitable demand for hotel and multi-family use.

Archaeological Points of Interest

As the center of ancient Hawaiian civilization, the Big Island contains significantly more sites of historical interest than any other island. The leeward coast of Hawaii is particularly endowed with important archaeological artifacts and structure remains.

Due to the relative inaccessibility of the coastline (prior to the opening of Queen Kaahumanu Highway) and the historic negligible demand for development in the area (a factor which destroyed many sites on other islands), the majority of important sites are relatively intact, and offer the most comprehensive insights available into the lifestyle of the native culture. These historical attributes are

considered an extremely positive trait, not only for historical perspective purposes, but also as a strong visitor attraction. The ability to entwine a sense of ancient history with the delights of a tropical vacation, places Hawaii in the forefront of tropical destinations, and contributes to the "foreign country" atmosphere of the State.

During the late 1960's and early 70's, the conflict between developers and historic activist groups created many confrontations regarding the importance and handling of identified sites. However, in recent years, both parties have come to realize the mutual benefits available through cooperation. Resort developers by providing funds and land to protect, refurbish and maintain designated sites have created amenities for the resort, and potential for themed improvement. Activist groups, recognizing the difficulty of restraining all potential development of historic sites, have cooperated (often by merely taking a passive stance) with well-intentioned developers, thereby permitting timely improvement.

As discussed in Volume I, three of the four resort operations in the subject's Primary Economic Market Sector are situated on significant historic sites. This is due to the fact that the few choice areas along the lava strewn Kona-Kohala coastline also were appealing to the ancient Hawaiians. In all cases, through studious planning and research, the facilities have created a strong amenity out of the artifacts available. Over the long-term, as the region is fully developed (as projected), the benefits arising from archaeological concern and restoration will make the resorts more competitive with other neighbor island destinations.

In regard to this site characteristic, the subject property has many points of interest, although it is not among the more favorable locations available.

As the high-tech uses are "clean" industrial types, their effect on subject archaeological sites would likely be no severe than a resort use. It is noted that quality high-tech development could provide an additional point of interest for the neighboring resort community.

Summary

Particularly in light of its relatively expansive white sand beach strands available, an extremely desirable commodity for West Hawaii resort development, the subject property appears to contain the requisite physical attributes for efficient integrated resort development; and, in fact, is very favorable in many aspects.

We see no reason, with the exception perhaps of efficient development cost (not addressed in this study), that the subject property could not support the market defined intermediate resort use concluded in our Market Study (Volume I).

LOGISTICS AND AVAILABILITY OF OFF-SITE INFRASTRUCTURE

In this portion of our analysis, we researched the availability of utilities and other infrastructure which would be required in order to actualize an integrated resort development on the subject property. The primary areas of concern were water supply and transmission, waste water (sewage) handling, electricity, and access.

The focal point in discussion of these areas is the time frame necessary to provide subject development (either on a public or private basis) with the service, and the general cost parameters (where available) which may be encountered in improving the needed infrastructure.

We assume any industrial development of the subject would be serviced by the resort infrastructure, with any additional requirements available from the adjacent high-tech park.

As with our analysis of land use classifications. our findings and a substantial portion of our descriptive narrative are contained within reports submitted by Helber, Hastert, Van Horn & Kimura. Our mutual conclusions are summarized as follows:

Water Supply

Despite the existing North Kona water-service moratorium, public water service could be anticipated for subject development, with relatively high degree of probability within three to four years of the date of this report. Private systems could be developed in a shorter time frame, commensurate with site improvement, but would result in significantly higher service construction expenses and per unit costs to consumers.

Waste Water Disposal

Pubic sewage service is currently unavailable in the subject area; however, there are plans for an extensive treatment plant adjacent to Honokohau Harbor. Assuming transmission lines are in place, the plant would be available to service subject development in five to eight years from the current date.

A privately developed system as an alternative is a highly probable solution. To date, most neighbor island destination resorts have been developed using a private sewage treatment system. The impact of private construction is the cost, versus time before public-serviced availability. It is noted that many individual resort condominium projects in the State have constructed private sewage systems. Additionally, the treated discharge from a plant can be beneficially used for irrigation (particularly golf courses).

Access

Currently, vehicular access to the subject is available via the access road to the nearby (northerly) natural energy lab, or using a jeep trail extending makai from Queen Kaahumanu Highway. The former is a two-laned macadam surfaced roadway in good condition, although it is controlled by a gate (secured nightly) and does not abut the subject parcel. The unimproved trail easement (if it is fully on the subject—currently in question) could potentially be used as a major accessway for subject development, if so improved, and permitted by law. According to the subject owners, a 30-foot wide access easement leads from the highway to the site. This would be insufficient for the conceived development, and would require expansion.

Access rights are a major subject problem, and the need to acquire or clean-up access easements could hamper the timeliness of site development, as governmental agencies would not grant land use classification changes without dedicated access. For the purpose of our time-frame calculations, we have assumed access rights can be secured during the original planning (pre-submittal) stages.

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COMMUNITY REACTION

Community reaction to a proposed resort-type development of substantial portion of the subject property would be anticipated as being focused in three areas: maintenance of the fragile ecosystems of the near shoreline areas; preservation of significant historical sites; and, public access to beachfront areas. Additionally, there would likely be some general opposition from various vocal individuals and small groups who have long-standing anti-development commitments.

For the most part, opposition would be expressed and resolved within the governmental approval process; which requires public hearings. Based on our interviews with representatives of the respective land use control agencies, it is our opinion that there is less-than-average probability that subject resort development would not be permitted. The impact of negative public response would conceivably be to lengthen the time period before approval is granted.

However, if sensitive and detailed plans are submitted (a time-consuming preparation process), addressing the foreseen concerns, there is little reason approvals could not be achieved within the time frames projected by the regulatory agencies.

It is noted that a comprehensive Environmental Impact Statement may be required, a compilation that may take a minimum of four to six months.

In light of the proposed Hawaii Ocean Science and Technology Park, there would likely be minimal negative community reaction towards similar uses of abutting subject acreage.

The three significant community concerns, listed above, would be anticipated as being addressed as follows:

Ecosystem Maintenance

For the most part, this concern is already substantially mitigated by the conservation zone that has been established near the shoreline; forbidding major improvements in this defined area. The ability of the Waikoloa Beach and Mauna Lani resorts to achieve acceptance under more fragile site conditions is seen as an extremely positive factor in potential reaction to subject development. There is the potential that the developers may enlarge the defined area, beyond the existing boundaries, to further placate concerned individuals, and expedite the approval process. It has been our experience that this concern (as that following) typically becomes problematic only when a lack of sensitivity is demonstrated by the developers.

Historical Preservation

This factor has the potential to create the most severe public reaction due to the significance attached to the subject property. However, as discussed in a previous section of this report, the ability of capital investment from resort use to preserve and refurbish archaeological sites is acknowledged by developers, planners and activists alike; by providing needed funding where none else exists. The concern of the activists is to insure the integrity and non-desecration of important sites, something that cannot be accomplished through mere isolation as has been the case of the near-past. All parties realize that the expanding use of the site by an increasing Kona population serves only to contribute to the demolition of the artifacts; for this reason, if the proper individuals are consulted and careful planning undertaken, this concern would be anticipated to be neutralized at worst, supportive of development, at best. Additionally, as discussed in the section regarding adaptability of the subject property for resort use, it is in the best interest of a developer from a thematic and attraction standpoint to enhance the historical sites and significance of the project.

Beach Access

Currently unrestricted, this concern would undoubtedly be the source of the most vehement opposition to subject development. The reason for this is three-fold:

resort operations in the sector (notably Mauna Kea Beach and Kona Village Resorts) have severely restricted access to choice beaches in past years, despite government intents; planned expansion at Mauna Kea and Mauna Lani will further crowd available beaches and limit access; and, the current users of the subject shoreline would object to any change in the existing status quo. However, it can be reliably anticipated that many Kona residents would welcome development of the site if open beachfront access is insured; as the subject strand is one of the only major white-sand beaches with close proximity to the urban Kailua-Kona area. Development would also give easier access to the shoreline (currently a difficult four-wheel drive from the natural energy lab access road), and would be considered favorable by many local residents who now refrain from using the area due to the prevalent isolation and lack of facilities. The protests which would be forwarded by the current-users to maintain the property in its existing state, mainly for surfing and fishing use, would not likely be viewed as significant by County planners. If adequate design measures are undertaken, perhaps including a public beach park (as was developed within the Waikoloa Beach Resort), it is our opinion that the beach access issue can be readily resolved.

Summary

Although vocal opposition would undoubtedly arise upon proposal for development of the subject property, such is typical of all major coastal improvement in West Hawaii. Owing to the fact that the demand for resort properties is increasing in the area (see Volume I), we see no community reaction concerns which could not be adequately resolved during the development time frame projected, as long as sensitive and publicly open planning is undertaken.

CORRELATION

Based on our Market Study of the effective economic market sectors (contained in Volume I) which demonstrates a primary demand for resort-type land uses and secondary potential for high-tech industrial development, and our Highest and Best Use Analysis (contained herein) which illustrates the adaptability of the subject property for such uses, it is our opinion that the highest and best use of the site is in integrated intermediate-size resort development with compatible light industrial uses in the mauka and northerly portions.

Our conclusions can be summarized as follows:

Land Use

The table below displays the probable use intensities which would be anticipated for the proposed development on the subject property.

Use	No. of Units	Location
Hotel	Up to 600	Near shoreline (up to 30 rooms/acre)
Condominium	Up to 450	Near shoreline and golf course frontage
Commercial	12,000 + 20,000 Sq. Ft. Gross Leasable Area	Middle/mauka of resort community
Industrial	---	Northerly and mauka areas of site
Golf Course	18 Holes	Interior of site
Open/Reserve	---	Shoreline, archaeological sites, other
Roadways	---	Throughout

Absorption

Assuming two hotels are constructed on the property, and that the first along with the first condominium project are constructed by the developer (as is typical), or by an outside party secured during the planning/approval process, absorption of the resort improvements from the date of market offering is anticipated as follows:

Use	No. of Units(1)	Absorption Period in Years	Comments
Hotel	600	6-7	Achievement of stabilized occupancy in two hotels at circa 75-80 percent. Construction of first operation to take 24 months from granting of approvals. Second hotel to be constructed after first has been operated for one year, or 36-months from approvals.
Condominium	450	9	Sales period based on 50-unit sales per year. Sales not anticipated to begin until completion of first hotel facility.
Commercial	12,000-20,000 Sq. Ft. Gross Leasable Area	2	Available for tenant occupancy one year following completion of the first hotel. (12 months construction period
Industrial	—	2	Demand based on projected absorption of adjacent park in five years from opening, say two years from present.

(1) If maximum number are developed. It is doubtful that both maximum levels will be achieved, as total numbers of units are dependent upon absorption of industrial acreage. Circa 900 total units most probable. Optimum densities are at eight to 12 condominium units per acre and circa 20 hotel rooms per acre.

Timing

Our estimates and those provided by Helber, Hastert, Van Horn & Kimura, regarding the timeliness of achieving necessary governmental approvals and lapse before availability of public utilities are displayed following. Where ranges are indicated, the mid-point is shown. All time frames are beginning from date of this report, or from the submission of plans for orderly approval.

Item	Action Required	Anticipated Length in Months	Comments
A. Development			
Site Planning	None	36	Developer initiated. Six months minimum required prior to submission for first governmental approvals; considered computed by report date.
Financing	None	--	Commensurate with planning.
Construction	None	18-24	On-site infrastructure and off-site connection improvements.
B. Land Use Designations			
State Land Use	Approval	9-36	For change from conservation to urban classification.
General Plan	Approval	18-24	For change from open/ conservation to resort and industrial designations.
County Zoning	Approval	6-18	For change from "Open" to resort- and industrial-type classifications.
SMA	Approval	6-18	Commensurate with zoning approvals.
C. Infrastructure*			
Water Supply	Development	36-48	Dependent upon County source development.
Waste Water	Development	60-96	Dependent upon State/County facility development.
Electricity	None	--	Readily available.
Access	None	--	Assumed to be readily available by commencement of land use change process.

*Based on public supply. Private supply could be undertaken during "construction" time frame; however, it would be substantially more costly.

We have constructed three potential development time-line scenarios for the subject property, as shown on Tables 1 through 3. They can be summarized as follows:

Table No.	Assumptions	Probability
1	Mid-range approval timing; private sewage development	High
2	Accelerated approval timing; private sewage development	Medium
3	Conservative approval timing; public sewage development	Low

It is noted that the foregoing conclusions relate only to the development of the subject parcel as is proposed.

TABLE 1

PROJECTED CHRONOLOGY FOR SUBJECT DEVELOPMENT
Ooma II Market Study and Highest and Best Use Analysis
North Kona, Hawaii

Scenario 1: Mid-range land use approval timings, public water and private sewage facilities.

ITEM	YEAR 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Planning	.....*																			
State Land Use			.....*																	
General Plan				.....*																
Zoning/SMA					.....*															
Water						.....*														
Sewage							.....*													
Site Construction							.....*													
Hotel Development								.....*												
Condo Dev. & Sale									.....*											
Commercial Dev. & Lease										.....*										
Industrial											.....*									

"*": Commencement of activity.
"**": Completion of activity.

Source: The Hallstrom Appraisal Group Inc., May 1985.

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Planning	*	-	-	-	*															
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General Plan					*	-	-	-	-	-	-	-	*							
Zoning/SMA									*	-	-	-	*							
Water									*	-	-	-	-	-	-	-	-	-	-	*
Sewage									*	-	-	-	*							
Site Construction									*	-	-	-	*							
Hotel Development											*	-	-	-	-	-	-	-	-	*
Condo Dev. & Sale											*	-	-	-	-	-	-	-	-	*
Commercial Dev. & Lease											*	-	-	-	-	-	-	-	-	*
Industrial											*	-	-	-	-	-	-	-	-	*

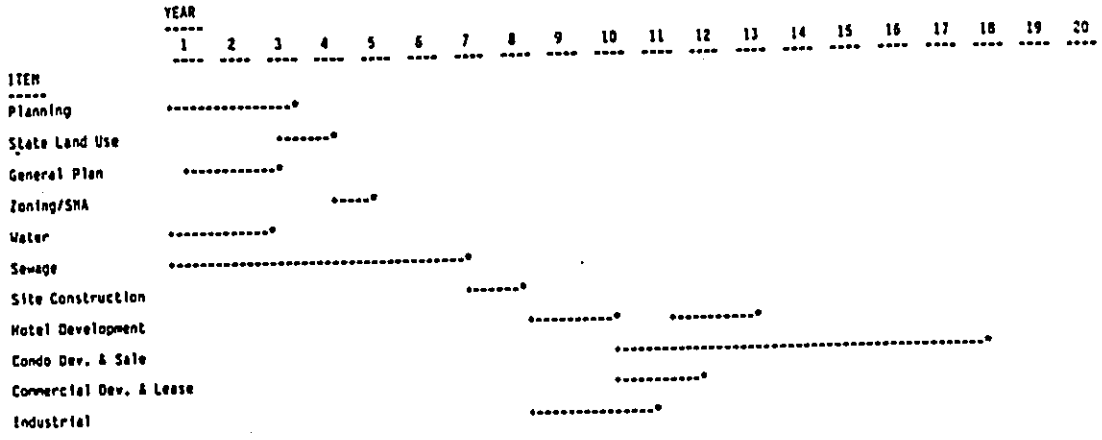
"*": Commencement of activity.
"-": Completion of activity.

Source: The Hallstrom Appraisal Group Inc., May 1985.

TABLE 3

PROJECTED CHRONOLOGY FOR SUBJECT DEVELOPMENT
Ooma II Market Study and Highest and Best Use Analysis
North Kona, Hawaii

Scenario 3: Mid-range land use approval timings, public water and public sewage facilities.



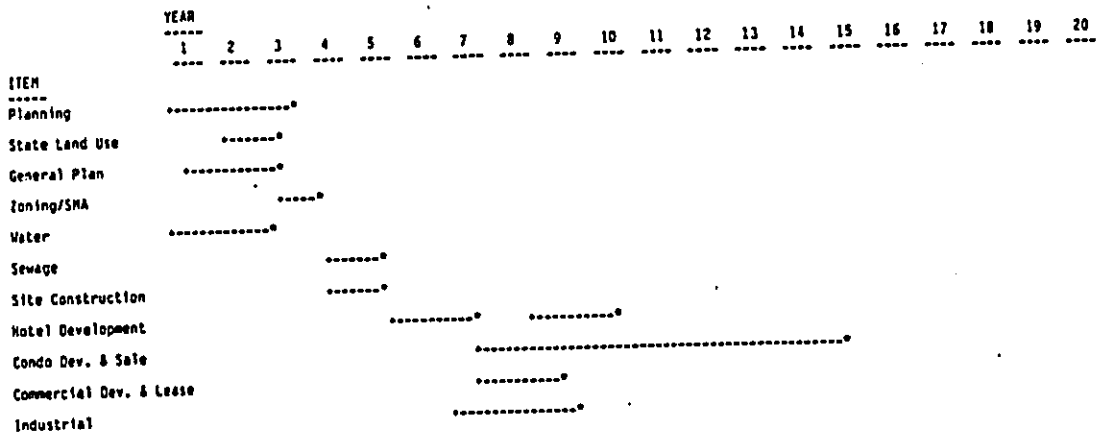
"•": Commencement of activity.
"•": Completion of activity.

Source: The Hallstrom Appraisal Group Inc., May 1985.

TABLE 2

PROJECTED CHRONOLOGY FOR SUBJECT DEVELOPMENT
Ooma II Market Study and Highest and Best Use Analysis
North Kona, Hawaii

Scenario 2: Accelerated land use approval timings, public water and private sewage facilities.



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"•": Completion of activity.

Source: The Hallstrom Appraisal Group Inc., May 1985.

The Hallstrom Appraisal Group, Inc.

PROFESSIONAL BACKGROUND AND SERVICES

The Hallstrom Appraisal Group, Inc., is a Honolulu based independent professional service organization that provides a wide scope of real estate counseling services throughout the State of Hawaii with particular emphasis on valuation studies. The purpose of the firm is to assist clients in formulating realistic real estate decisions. It provides solutions to complex issues by delivering thoroughly researched objective analyses in a timely manner. Focusing on specific client problems and needs, and employing a broad range of tools including after-tax cash flow simulations and feasibility analyses, the firm minimizes the financial risks inherent in the real estate decision making process.

The principals of the firm have been professionally trained, are experienced in Hawaiian real estate, and are actively associated with nationally recognized appraisal and real estate counseling organizations such as the American Institute of Real Estate Appraisers (AIREA) and the Society of Real Estate Appraisers (SREA).

The real estate appraisals prepared by The Hallstrom Appraisal Group accomplish a variety of needs, and function to provide professional value opinions for such purposes as mortgage loans, investment decisions, lease negotiations and arbitrations, condemnations, assessment appeals and the formation of policy decisions. Valuation assignments cover a spectrum of property types including existing and proposed resort and residential developments, industrial properties, high rise office buildings and condominiums, shopping centers, subdivisions, apartments, residential leased fee conversions, special purpose properties and vacant acreage, as well as property assemblages and portfolio reviews.

PROFESSIONAL QUALIFICATIONS OF JAMES E. HALLSTROM, JR., MAI, SRPA

Business Background

President, The Hallstrom Appraisal Group, Inc., Honolulu, Hawaii
Vice President, The Hallstrom Property Group, Inc., Honolulu, Hawaii
Former Senior Vice President and Treasurer,
Hastings, Martin, Hallstrom and Chew, Ltd., Honolulu, Hawaii
Former Vice President, Pacific Area Realty, Ltd., Honolulu, Hawaii
Former Real Property Appraiser and Analyst; Administration, Inc.,
a subsidiary of C. Brewer and Company, Limited, Honolulu, Hawaii
Former Partner, Hallstrom and Gentner, Madison, Wisconsin
Former Senior Real Property Appraiser and Analyst,
Opitz Realty, Madison, Wisconsin

Education

M.S. (Real Estate Appraisal and Investment Analysis) 1971, University of Wisconsin at Madison
B.A. (Economics) 1969 Brigham Young University at Provo
Additional Real Estate Studies include credit for the following:

AIREA Course IA - Basic Appraisal Principles, Methods and Techniques
Course IB - Capitalization Theory and Techniques
Course II - Urban Properties
Course II-3 - Standards of Professional Practice
Course VI - Introduction to Real Estate Investment Analysis
Comprehensive Exam - Composite Examination Prior to Being Awarded MAI Designation

SREA Course 101 - Introduction to Appraising Real Property
Course 201 - Principles of Income Property Appraising
Course R-2- Residential Case Study

Numerous professional seminars and clinics.
Recertified with the American Institute of Real Estate Appraisers through 1986.
Instructor for Society of Real Estate Appraisers Course 101, "Introduction to Appraising Real Property" and Course 201, "Principles of Income Property Appraising".

Contributing author to the "Hawaii Real Estate Investor" magazine.

Association Memberships

MAI Designation (1976) - American Institute of Real Estate Appraisers (AIREA)
Chapter President for the year 1982.
SRPA Designation (1975) - Society of Real Estate Appraisers (SREA),
Chapter President for the year 1980-81.
Realtor - Honolulu Board of Realtors; Hawaii Association of Realtors

B. PRELIMINARY ENGINEERING UTILITIES REPORT

PRELIMINARY ENGINEERING
UTILITIES REPORT
FOR THE
PROPOSED O'OMA II DEVELOPMENT

Prepared for:

Helber, Hastert, Van Horn & Kimura

Prepared by:

M&E Pacific, Inc.
Engineers and Architects
1001 Bishop Street
Honolulu, Hawaii 96813

July 1986

CONTENTS

TABLES

FIGURES

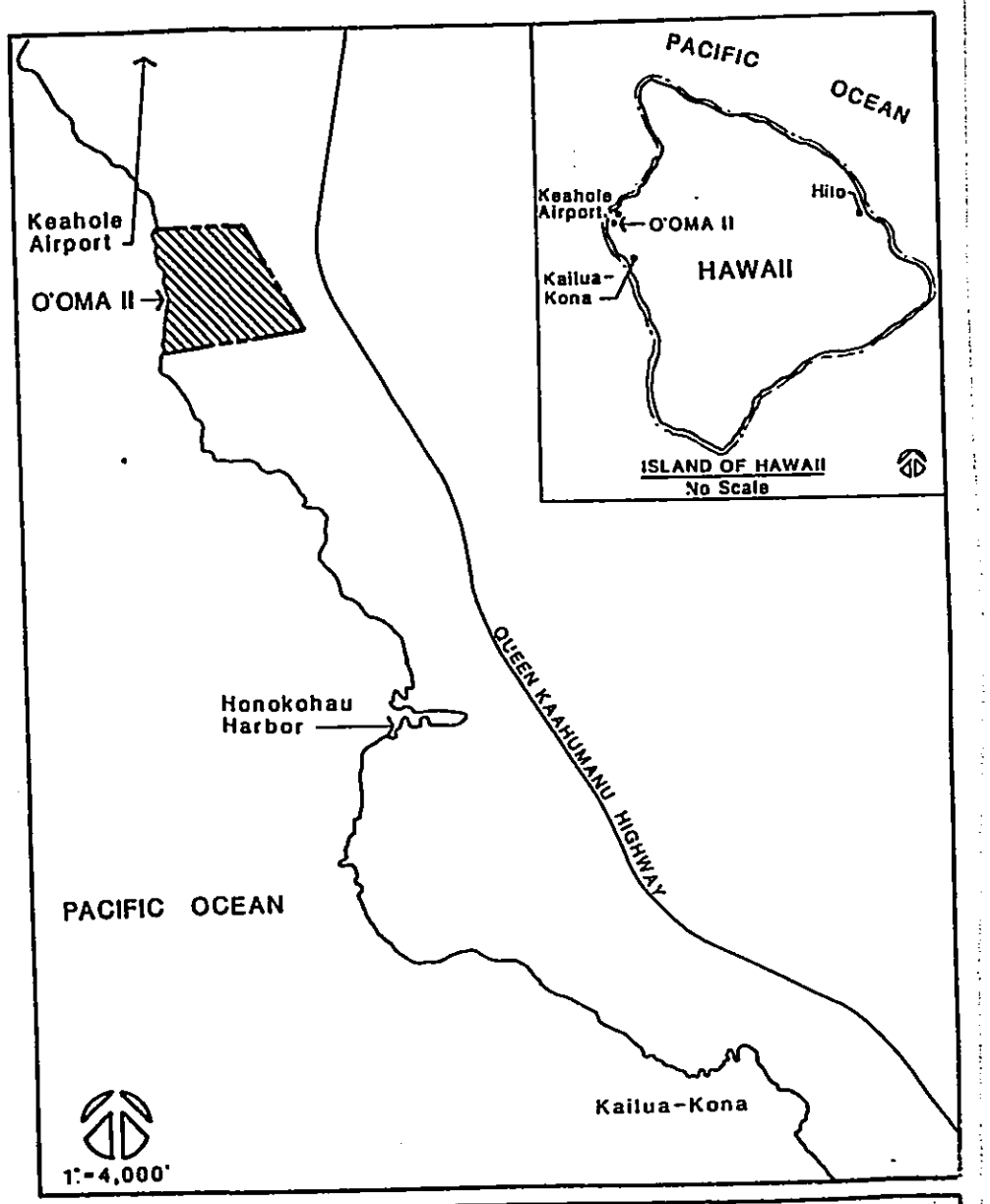
CHAPTER I
INTRODUCTION

PURPOSE

This report has been prepared as a support document on utilities infrastructure for an environmental impact statement, a land use district boundary amendment petition, and any other required permit for the preposed O'oma II Development. The information presented herein is based on public and private documents related to the project as well as the North Kona region of Hawaii.

PROJECT SITE

The proposed project is sited on the leeward coast of the island of Hawaii, between Keahole Airport and the town of Kailua-Kona (see Figure 1). The project site is currently in its natural state, consisting largely of near-barren lava fields with poorly vegetated areas.



Location Map — Figure: 1
O'OMA II
Kahala Capital Corporation — M & E PACIFIC, INC.

CHAPTER II
STORM DRAINAGE

O'OMA II WATERSHED

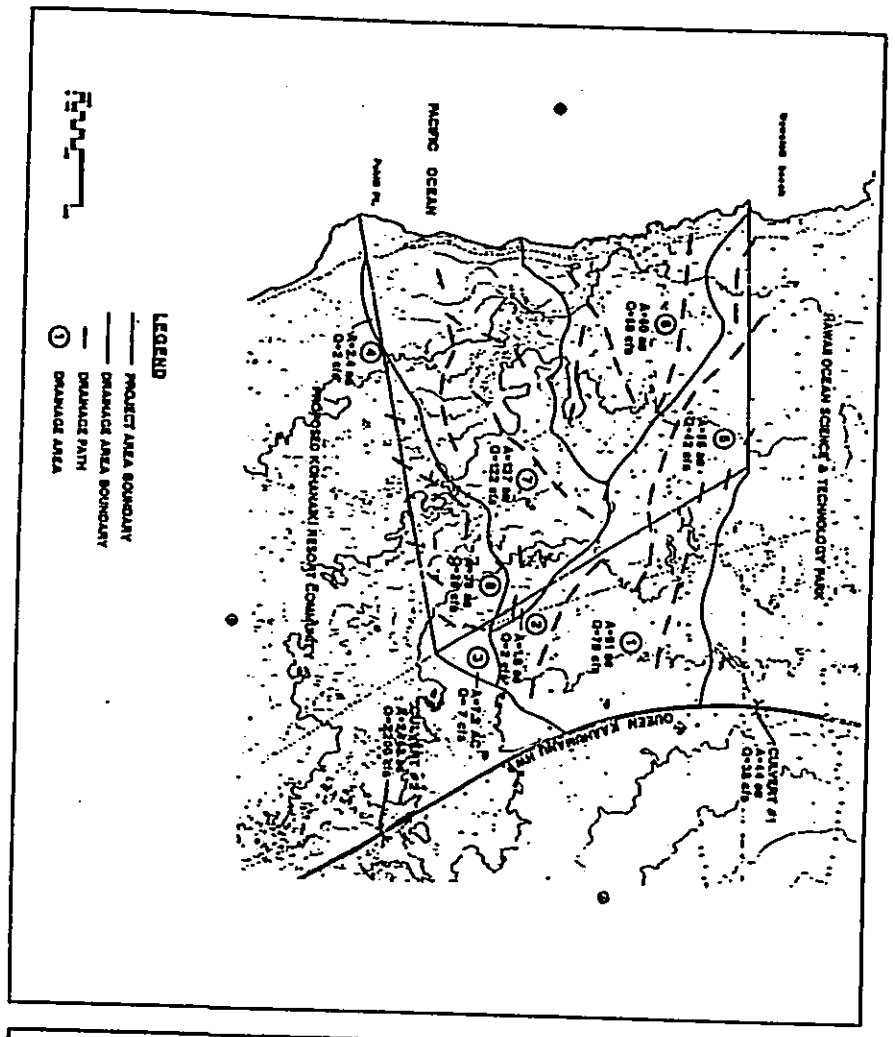
The existing O'oma II watershed contains an area of approximately 482 acres and extends from the western slopes of Hualalai volcano to the coast (see Figure 2). Elevations in the watershed range from 280 feet to mean sea level and ground slope varies from 5 percent in the upper elevations to 1 percent near the coast. Average ground slope in the watershed is approximately 3 percent.

Soil cover within the watershed consists of lava originating from eruptions at Hualalai. The lava is very porous and highly permeable, as evident by the numerous cracks, fissures, and tubes embedded in the surface layer. Dry grasses and shrubs grow sparsely throughout the lava flows and natural soil erosion is minimal.

The project site, located on the semi-arid leeward side of the island, is sheltered from the rain-producing northeast tradewinds by Mauna Loa, Mauna Kea, and Hualalai. The mean annual rainfall within the coastal project site is less than 20 inches. The wettest period of the year extending from May to September receives more than half of the total annual rainfall.

METHODOLOGY

The estimated storm runoff quantities herein have been based on the Storm Drainage Standards, Department of Public Works, County of Hawaii. Peak flows from drainage areas greater than 100 acres were determined from design curve Zone D on Plate 6, which is based upon maximum recorded flood peaks in the region. For drainage areas less than 100 acres, runoff quantities were determined according to the rational method, based upon a recurrence interval of 10 years.



Existing Drainage

O'OMA II

Kahala Capital Corporation

M & E PACIFIC, INC.

Figure: **2**

EXISTING DRAINAGE

Offsite Drainage to Queen Kaahumanu Highway

There are no perennial streams of well-defined water courses in the watershed due to a combination of meager rainfall and the lava landscape. Storm water primarily sheet flows downward from the upper parts of the watershed to Queen Kaahumanu Highway. A drainage ditch along the mauka side of the highway intercepts this runoff and conveys it to a culvert south of the O'oma II drainage basin. Another culvert, located just north of O'oma II, discharges runoff away from the project district.

Onsite Drainage

The O'oma II watershed, shown on Figure 2, extends west to east from the coastline to Queen Kaahumanu Highway. To the north and south, the watershed is bound by the project district boundary. The basin is divided into eight principal drainage areas (DA), with their respective areas, peak storm runoff, and flow patterns illustrated on Figure 2.

DA 1 occupies a 91-acre area between the eastern boundary of the O'oma II project district and Queen Kaahumanu Highway. The 79 cfs of storm runoff enters the project district across the eastern boundary and combines with the 42 cfs runoff from DA 5. Runoff from DA 1 and the 56-acre DA 5 drains across the northern project boundary.

On the southern side of the project, runoff from offsite DA 3 and onsite DA 8 drains away from the project site through the southern boundary. The 7.2-acre DA 3 discharges 7 cfs of runoff across the eastern project boundary into DA 8, which generates 26 cfs of runoff from its 38-acre area.

The coastline, forming the western project boundary, receives a total of 194 cfs of runoff from onsite and offsite areas. The onsite areas include the 80-acre DA 6 and the 137-acre DA 7, which contribute 68 and 122 cfs respectively. The 2 cfs of runoff produced by the 1.8-acre offsite DA 2

flows across the eastern boundary and into onsite DA 7. Offsite area DA 4 also drains into DA 7, contributing 2 cfs from its 2.4 acres.

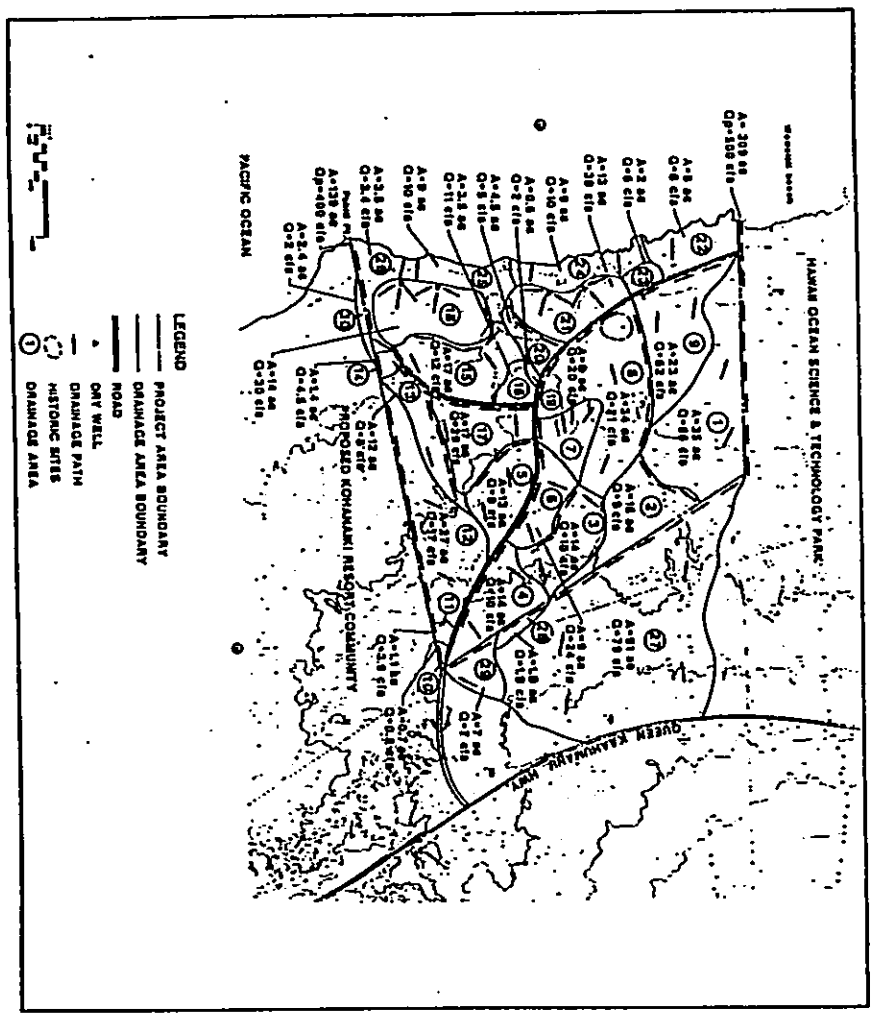
In summary, a total runoff of 90 cfs enters the project site from the eastern and southern boundaries and 268 cfs of runoff is generated within the 313-acre project area. The O'oma II coastline receives 190 cfs of runoff from onsite areas and 4 cfs from offsite areas. The remaining 164 cfs of onsite and offsite runoff flow across the northern and southern project district boundaries and into the adjacent HOST Park and Kohanaiki properties.

MODIFIED DRAINAGE

The modified O'oma II drainage pattern consists of 26 onsite and 4 offsite drainage areas as shown on Figure 3. The runoff quantities and flow pattern are dictated by changes in land use, the prevailing slope of the land, and locations of the discharge points.

The overall drainage scheme would protect developed areas by intercepting storm runoff from open and offsite areas by means of a network of cut-off ditches, inlets, and drain pipes. The drain pipes, located within the roads, form the major artery for collecting and transporting onsite runoff to ultimate disposal points. Offsite runoff would be intercepted by cut-off ditches along the project district boundary. Within the project area, swales and ditches would prevent runoff from the golf course and open areas from entering the condominium, hotel, and other developed sites. The use of unlined channels wherever possible would allow infiltration of runoff into the porous lava rock and thus minimize flows at the discharge points.

All of the offsite and 75 percent of the onsite runoff would be transported to the two drainage outlets, located at the north and south ends of the O'oma II coast, and discharged into the ocean. Because these two outlets each drain an area in excess of 100 acres, their respective discharge flow rates, shown on Figure 3, were determined by reference to the County Storm Drainage Standards (County of Hawaii, 1970). Thus, the north



Modified Drainage
O'OMA II
Kahala Capital Corporation
M & E PACIFIC, INC.
Figure: 3

outlet would carry a peak discharge of 500 cfs from 209 acres and the south outlet 400 cfs from 139 acres.

The remaining 25 percent of onsite runoff would either be disposed of into dry wells or allowed to drain naturally. Runoff from the hotel (DA 18) and the Marine Park and Visitor Center (DA 21) would be disposed of into dry wells located on their respective properties. The marine park receives an additional 5 cfs of runoff from the undeveloped parcel (DA 20) along its mauka border. Given a 4 cfs capacity per dry well, eleven dry wells would be required for the 43 cfs peak runoff from DA 20 and 21. Similarly, DA 18 would require eight dry wells for disposal of 30 cfs of runoff.

Based on the existing topography, the dry wells would be concentrated in the locations indicated on Figure 3. The 37 cfs runoff generated by the coastal and beach front areas (DA 22 to 26) would drain naturally by sheet flow into the ocean and by percolation into the soil.

IMPACTS OF MODIFIED DRAINAGE

The change in land use created by the proposed O'oma II development is expected to increase storm runoff within the 313-acre project site from 260 cfs to 450 cfs. However, land use and runoff potential from offsite DA 27 to 30 are not expected to change from their existing states.

Under existing drainage conditions (Figure 2), 190 cfs of runoff flows to the O'oma II coastline. The proposed drainage modifications would reduce sheet flow into the coastal area to only 37 cfs. This would be a result of concentrating the runoff to two points located at the northern and southern ends of the shoreline where impacts of the runoff to the prime beach front area would be minimized.

Potential impacts to the HOST Park warm water intake pipes near the north drainage outlet are expected to be minimal and infrequent. A 147-acre area of the O'oma II basin naturally drains into the shoreline near the HOST Park warm water intake pipes. By comparison, the area draining

into the north outlet under modified drainage conditions totals 209 acres, or an increase of 42 percent. Referring to the County Storm Drainage Standards (County of Hawaii, 1970), a 147-acre area would generate 400 cfs and a 209-acre area 500 cfs, an increase of only 25 percent. Additionally, storm runoff of the design magnitude should not be a factor in the normal operations of the HOST Park warm water intake pipes due to the design rain storm statistically occurring once every one hundred years.

CHAPTER III
EROSION

GENERAL SITE CHARACTERISTICS

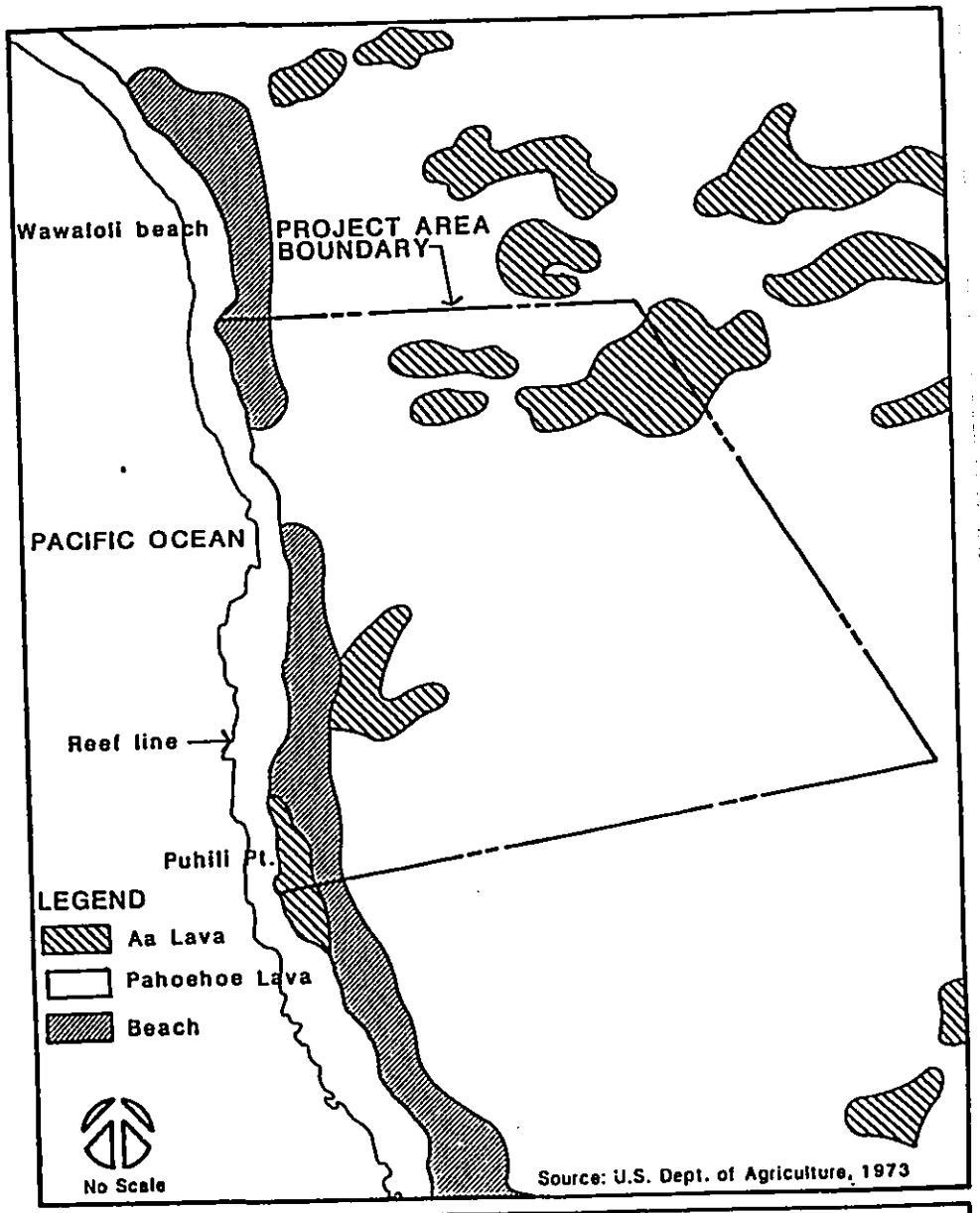
A concomitant, though potentially more environmentally significant, effect of storm runoff is soil erosion. Potential movement of soil due to rainfall and surface runoff generated by land disturbing construction operations at the project site are evaluated in this section. Measures for controlling soil erosion and sedimentation are also discussed to mitigate any erosion problems. The guidelines of the Hawaii Environmental Simulation Laboratory were used in the analysis of soil erosion and sedimentation hazard to coastal waters and property downstream of the project.

The project site, being located on the dry leeward side of the island, is sheltered from the rain-producing northeast tradewinds by Mauna Loa, Mauna Kea, and Hualalai. Mean annual rainfall within the project site is less than 20 inches. Much of the rainfall infiltrates directly into the porous lava surface layer, eliminating any chance for erosion to develop.

The topography of the project site gently slopes from the mauka boundary near Queen Kaahumanu Highway to the coast. Ground slope varies between 0 and 5 percent. There are no well-defined water courses in the project site that would serve to concentrate and transport soil sediments.

EXISTING SOIL EROSION POTENTIAL

The general soil map from the Soil Survey of Hawaii, Soil Conservation Service (1973) classifies the soil in the project site into two types: Pahoehoe lava and Aa lava (see Figure 4). The predominant soil type covering approximately 80 percent of the project site is Pahoehoe lava. Pahochoe has a billowy, glassy, and ropy surface that is relatively smooth. The erodibility factor for this soil is zero, indicating no soil erosion or sedimentation is produced. Pockets of the second type of lava, Aa, are also scattered throughout the project site. This lava has a rough, spiny, or rubbly surface. Again, the erodibility factor for this soil is zero.



North Kona Region — Figure: 4

O'OMA II

Kahala Capital Corporation — M & E PACIFIC, INC.

Thus, the soil characteristics of the project site show that no erosion or sedimentation is presently being produced.

POTENTIAL LONG-TERM ADVERSE EFFECTS

Development of the project site would require the placement of graded granular material overlain by a soil layer sufficient for the establishment of sod and other landscape vegetation. Lava fields left in a natural state, paved areas, and buildings would not contribute to the total erodible area. Potential long-term soil erosion (SL) can be estimated from the Universal Soil Loss equation:

$$SL = EA = (RKLSCP)\ A$$

where
- E = rate of soil loss per unit area
- A = area
- R = rainfall factor, 125
- K = soil erodibility factor, 0.05
- LS = slope-length factor
- CP = cover and control practice factor, 0.15

Using the above equation, potential long-term soil erosion of 8 tons per year is predicted for the ultimate development encompassing 313 acres.

POTENTIAL SHORT-TERM ADVERSE EFFECTS

Soil erosion during the construction period will mainly occur when the soil layer is being placed over the lava rock. The worst possible condition that could occur would be the clearing or grading of 20 acres at any one time (maximum allowable by County codes). Universal Soil Loss equation factors are as follows:

- R = 125
- K = 0.05
- C = 1.00 (bare soil)
- P = 1.00 (construction site)
- LS = 0.40

The resulting erosion rate is:

erosion (E) = 2.50 T/ac-yr x 20 ac
= 50 T/yr, in addition to existing potential erosion.

The sedimentation hazard posed to coastal area waters is also considered to be small according to Hawaii Environmental Simulation Laboratory (HESL) criteria (HESL, 1975). The HESL severity rating number (H) was calculated as follows:

$$H = (2\ FT + 3D)\ AE$$

where
- F = unit factor for potential damage to areas downslope and downstream from the site
- T = time duration of project from clearing to completion of all construction (yr)
- D = unit factor for potential sediment damage to coastal waters
- A = area of disturbance (ac)

The parameters in the severity rating number equation were evaluated to be:

- F = 2.0 downslope - downstream detriment - moderate
- D = 4.0 coastal water rating factor - Class AA
- A = 20 ac
- E = 2.50 ton/ac-yr from previous calculation
- T = 1 yr for each grading increment

So,

$$H = [2(2)(1) + 3(4)]\ (20)(2.50)$$
$$H = 800$$

The standard allowable severity rating number is 50,000. Thus, sedimentation hazard to coastal waters and downstream property is small according

to the computed severity rating number. Additional control measures for mitigation, however, could be taken to lessen construction impacts even further. These are--

1. Minimize time of construction.

2. Retain existing ground cover until latest date before construction.

3. Early construction of drainage control features.

4. Use of temporary area sprinklers in nonactive construction areas when ground cover is removed.

5. Station water truck on site during construction period to provide for immediate sprinkling, as needed, in active construction zones (weekends and holidays included).

6. Use temporary berms and cut-off ditches, where needed, for control of erosion.

7. Thoroughly water graded areas after construction activity has ceased for the day and on weekends.

8. Sod or plant all cut and fill slopes immediately after grading work has been completed.

CHAPTER IV
WATER

WATER RESOURCES

Water resources in the Kona region are primarily basal groundwater. Due to the low levels of rainfall, the relatively high hydraulic conductivity of lava rock, and the proximity to the coastline, water in the coastal region is expected to be brackish. Suitable potable water sources are expected to be found further inland at elevations of 1,200 feet or higher (Hydrophysics Corp., 1970). Groundwater resources in the Kona area have been estimated at 100 MGD (Kahala Capital Corp., 1986).

EXISTING INFRASTRUCTURE

The existing capacity of the North Kona water system is as follows:

	Total Capacity (MGD)	Safe Capacity (based on breakdown of one pump) (MGD)
Kahaluu Well A	1.0	---
Kahaluu Well B	2.0	1.0
Kahaluu Well C	3.0	2.0
Kahaluu Well D	4.4	3.0
Kahaluu Shaft	10.4	8.4

Source: County of Hawaii, 1980.

Pumpage projections have indicated that the "safe capacity" (i.e., including standby pump capacity) would be reached by approximately 1990. Water availability is primarily a problem of infrastructure, not source availability.

PROJECTED WATER DEMAND

Based on accepted per capita water usage factors (County of Kauai et al., 1985), projected water demand for the O'oma II development is shown in Table 1.

TABLE 1
ESTIMATED WATER DEMAND

	GPD
Hotel	383,000
Golf Course	361,000
Clubhouse	18,000
Beach Parking	1,000
Condominiums	190,000
Office Park	72,000
Marine Park	69,000
Hi-Tech Aquaculture	228,000
Open Space	18,000
Total Average Demand	1.34 MGD

Based on: 600 gal/room or condo unit
13 gal/capita/day for staff, 120 gal/capita/day for Hi-Tech staff
4,000 gal/acre/day for irrigation
3,000 gal/acre/day for clubhouse, office park

Reclamation of treated sewage effluent could provide an estimated 0.30 MGD at the ultimate phase of development. Water system infrastructure, however, should be designed to meet water needs exclusive of sewage reclamation.

WATER DEVELOPMENT ALTERNATIVES

Potable Water

Potential water development alternatives include the following:

1. Unilateral municipal expansion;
2. Buy into an existing water agreement;
3. Develop a new water agreement; or
4. Develop and maintain a new private water source.

While municipalities have been the primary developer/operator of water systems in Hawaii, agreements that dedicate systems funded by one or more private developers to the County have also been used when water availability due to infrastructure limitations has been an obstacle to development.

Unilateral municipal source development is unlikely and cannot be presumed for the projected development (M&E Pacific, Inc., 1986a).

Buying into an existing water agreement could be advantageous because of the lack of uncertainties regarding cost. The Red Hill Joint Venture Kealakekua Water Source Agreement currently has 1,200 water units available, each water unit equalling 600 gallons per day. However, the available water units are insufficient to meet the O'oma II demand upon ultimate development.

Development of a new water agreement is the most probable alternative for O'oma II. The County would be responsible for easement acquisition as

well as design and development; funding would be provided by the developers. Joint funding by developers with adjacent properties would be advantageous. Potable water wells would have to be drilled above the 1,200-foot elevation. Well(s), pump house, reservoir, and transmission lines would require offsite land acquisition and easements. Desalting brackish water developed from offsite wells is a second infrastructure alternative, but is unlikely due to the high operational and capital cost. A water agreement involving the County would save the developer operation and maintenance costs.

A private water system would be liable for all operation and maintenance expenses. A privately developed system would also lack the County's right of eminent domain, thus easement acquisitions could prove more difficult. In the short-term, higher capital costs could be incurred for the County accepted system versus a privately maintained system due to additional design features required by the County. A privately maintained system would be free to sell any excess water to other major consumers nearby.

Sea Water

Development of a new source would be expensive. A more economical alternative is buying into an existing system. The Hawaii Ocean Science and Technology (HOST) Park and Natural Energy Laboratory of Hawaii (NELH) facilities, located north of O'oma II, operate both warm and cold sea water intake lines. An estimated 2.90 MGD of cold water and 11.58 MGD of warm water would be required for the O'oma II aquaculture activities, based on HOST park projections. The quantity of water is approximately 10 percent of the expected HOST park cold and warm sea water requirements.

POTENTIAL IMPACTS

Water Availability

The impact of purchasing an existing water agreement would be neutral in regard to water availability. The development of a new water agreement

or a new private water source would expand the net amount of water available in the region; should there be excess capacity, additional water could be made available to others in the area.

Physical Environment

Since water limitations in the region are a problem of development and transmission rather than source availability, negative impacts on the physical environment from a properly designed and operated water system should be negligible. Overpumping of a vertical well or vertical wells too closely spaced in an area where the basal groundwater lens is thin could result in upconing and salt water intrusion. Operation of a well within the capacity of the basal lens, adequate spacing of wells within a well field, and the use of inclined or horizontal shafts where the basal lens is very thin could prevent any of the aforementioned potential adverse effects.

B-1

CHAPTER V
WASTEWATER

Collection, treatment, and disposal of wastewater generated within the O'oma II development would be necessary during initial and ultimate development phases. The purpose of this chapter is to present and evaluate wastewater treatment and disposal alternatives and to discuss the expected environmental impact of each action.

Table 2 summarizes the estimated wastewater flows for each land use.

ALTERNATIVE ACTIONS

Several alternative actions are considered for wastewater treatment and disposal and sea water disposal.

Treatment Alternatives

1. Single Centralized Treatment Facility. A centralized treatment facility with capacity of 0.30 MGD would be located in the southeast corner of the project, south of the main entrance road. Wastewater would flow by gravity sewers to pump stations located at the north beach parking area and north of the south beach parking area. A single force main would transport the wastewater along the southern development boundary to the treatment facility. Figure 5 illustrates the wastewater collection scheme for this alternative. The capital cost of this alternative would be high due to construction of the large-scale treatment facility. However, the system could be deeded to the County, who would assume operation and maintenance costs.

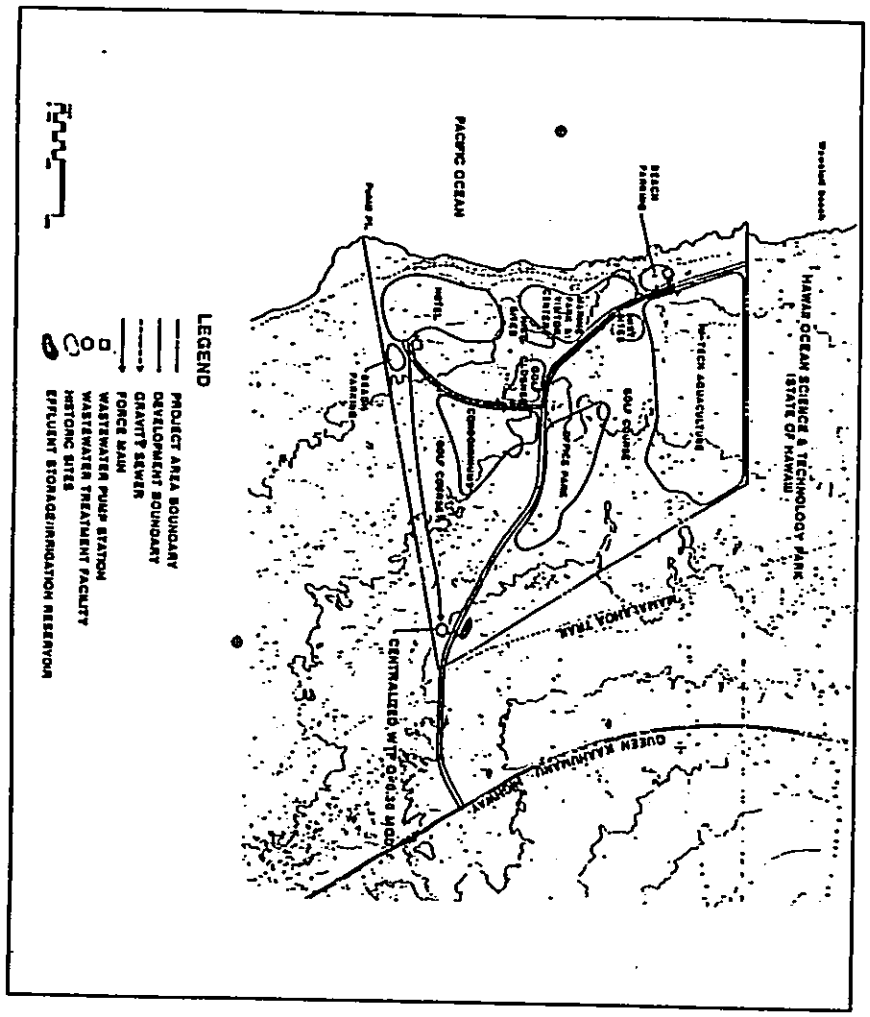
2. Onsite Treatment Facilities. Onsite treatment would require installation of individual units for each land use area as development occurred. Ultimately, a total of six facilities would be installed. The cost of this alternative would be low initially;

TABLE 2

ESTIMATED WASTEWATER FLOWS

Land Use	Acreage	Wastewater Flow (gpd)
600-Room Hotel	20	120,704
Golf Course	150	528
Clubhouse	5	16,198
Beach Parking Restroom	3	1,000
300-Unit Condominiums	15	65,592
Office Park	20	8,800
Marine Park	15	57,375
Hi-Tech Aquaculture	55	29,260
Open Space	30	0
	313	299,457

Based on: 80 gal/capita/day, 11 gal/capita/day for staff
1,250 gal/acre/day infiltration/inflow below 15-foot elevation
1.9 capita per unit for hotel
2.7 capita per unit for condominiums
40 capita per acre for clubhouse, office park, marine park
460 gal/acre/day for Hi-Tech



Wastewater Collection System

O'OMA II

Kahala Capital Corporation

M & E PACIFIC, INC.

Figure: 5

however, significant costs would be incurred throughout each construction phase. The operation and maintenance costs of six treatment facilities would also be high.

Effluent Disposal Alternatives

1. Golf Course Pond Storage and Irrigation. Due to the close proximity of golf course fairways to all resort areas, use of golf course ponds for effluent storage would be convenient. Ponds would provide additional treatment due to disinfection by ultra-violet radiation from the sun. Pond water would be easily accessible and available for irrigating golf course fairways. Expected nitrogen removal by Bermuda grass would be 40 pounds per acre per month (Handley and Ekern, 1981). Pond storage and irrigation would be an appropriate effluent disposal method for both treatment alternatives.

2. Subsurface Injection. Direct injection of effluent into deep wells is a second disposal alternative. Wells would be located near the treatment facility to minimize transmission requirements. Wells would be cased on the upper portion and uncased below. One well would be of sufficient capacity to dispose of effluent from the entire development. However, a second backup well would be required should this alternative be implemented.

Sea Water Treatment

Treatment of sea water prior to disposal would decrease maintenance requirements for the selected disposal system. Filtration beds and lined settling ponds were recommended for NELH and HOST Park (Traverse Group, Inc., 1985) to remove solids and entrained air prior to disposal.

Sea Water Disposal

Sea water used by the Hi-Tech aquaculture development would require daily disposal separate from the sanitary wastewater disposal system.

Approximately 5 MGD of sea water would be discharged from O'oma II Hi-Tech, based on the HOST Park generation rate of 2.2 gpd per square foot. Alternatives for disposal of spent sea water are described below.

1. HOST Park Joint Venture. The neighboring Hawaii Ocean and Science Technology Park would have a considerable quantity of sea water disposal capacity for its own needs. A joint venture where O'oma II's spent sea water would be pumped to the adjacent HOST Park disposal facility could be financially practicable. The Hi-Tech aquaculture development would be able to expand its capacity into the area that would otherwise be required for a sea water disposal facility. The HOST Park would also benefit from the joint venture by revenues generated from the shared cost. The estimated quantity of sea water wastes generated by O'oma II hi-tech is approximately 3 percent of the ultimate HOST Park generation rate.

2. Shallow Surface Trench. Shallow surface trench disposal was considered for the HOST Park facility (Dames & Moore, 1985). A trench 10 feet wide, 10 feet deep, and 100 feet long would be adequate for disposal of 20 MGD sea water, with allowance for silting and clogging. The trench required for O'oma II Hi-Tech would be considerably smaller considering an estimated flow of 5 MGD. The trench would be excavated with near vertical walls by a large bulldozer with a pneumatic ram attachment. The area should be fenced for safety reasons. Covering the trench would be optional. Occasional regrading of the trench bottom would be necessary to remedy clogging and biological fouling.

3. Large Diameter Deep Gravity-Injection Wells. Deep well disposal was also considered for the HOST Park facility (Dames & Moore, 1985). Based on HOST Park, two slotted cased wells 2 feet in diameter, 100 feet deep, and a minimum of 100 feet apart would provide sufficient capacity for sea water disposal and backup.

4. Injection Wells. Existing sea water disposal by Hawaiian Abalone Farms (HAF) includes two 12-inch diameter uncased injection wells 20 feet deep (Dames & Moore, 1985). Based on HAF information, O'oma II Hi-Tech would require ten wells, including two for backup purposes.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Wastewater Treatment

All wastewater pumping stations and treatment facilities would be located as far from the shoreline as practical. Pumping and treatment facilities would also be located above the 15-foot elevation to reduce the potential for groundwater contact.

Effluent Disposal

Infiltration of effluent into the groundwater by irrigation or injection could have a negative effect if not properly managed. The estimated quantity of effluent disposed is 0.30 MGD. This quantity is 6 percent of the estimated sea water disposal, and a fraction of a percent of the NELH and HOST park sea water disposal flows. Therefore, disposal of effluent by subsurface injection should not affect the underlying groundwater lens to a significant degree, assuming secondary treatment standards are met. Irrigation of golf course fairways should have even less of an effect on the groundwater lens due to contaminant removals during percolation through the soil and lava.

Should golf course pond storage and irrigation be implemented, the following mitigation measures would be appropriate.

Nutrient concentrations would be decreased below secondary standards with the addition of water hyacinths or other wetland plants to the effluent holding ponds. Removal of total nitrogen as high as 45 kg/ha/d is reported (Tchobanoglous and Schroeder, 1985). The principal nitrogen removal mechanism is bacterial nitrification/denitrification rather than plant

uptake. The harvesting of hyacinths every five weeks is suggested for effective nutrient removal (Metcalf & Eddy, Inc., 1979) since the removed nutrients are converted to cellular mass in the form of hyacinth growth.

Maintenance of aerobic conditions within the storage ponds would be an effective odor control measure. Aerobic conditions would be achieved by minimizing the pond depth and biochemical oxygen demand (BOD) loading. Aerobic conditions would also favor the growth of mosquito fish, which would feed on mosquito larvae in the pond.

Human contact with aerosols from effluent irrigation would be minimized by buffer zones or planting trees and shrubs around the irrigated areas; use of low trajectory sprinklers or downward spray nozzles; and avoiding irrigation during windy periods.

Irrigation of golf course fairways at night would reduce the chance of human contact by aerosols. Night irrigation would also aid infiltration of effluent into the ground, preventing accumulation of salts on grass blades due to rapid evaporation during daylight conditions.

Sea Water Disposal

Based on evaluation of the proposed HOST Park and NELH facilities (Traverse Group, Inc., 1985), sea water disposal at O'oma II Hi-Tech by injection wells or shallow trenches would impact the existing underlying brackish water lens. Although the lens is not suitable for groundwater development, it is expected to be displaced with a more saline water plume, affecting nearby anchialine ponds and deep-rooted vegetation such as kiawe trees. Temperature and density of the disposed sea water would also affect stratification once flow reaches the ocean. Sea water return flow temperatures below 19°C would be detrimental to coral communities. Corals could be killed if return flows consist of 10°C cold water.

The volume of sea water disposed from O'oma II Hi-Tech is relatively small in comparison to the quantities expected from NELH and HOST Park. At ultimate development, sea water discharges of 144 MGD and 39 MGD are

expected from HOST Park and NELH respectively. The 5 MGD sea water discharge expected from O'oma II is less than 3 percent of the ultimate HOST Park and NELH flows.

Mitigation of underlying groundwater lens replacement by the saline plume would be achieved only by off-shore discharges as opposed to on-land disposal. However, off-shore discharges would be expensive and economically unfeasible for the small quantity of sea water discharge expected at O'oma II Hi-Tech.

Mitigation of cold water discharge could be achieved by holding ponds allowing temperature equalization with the atmosphere. Similarly, use of open channels rather than pipelines for sea water transport to the disposal site would allow for warming of cold water.

NEGATIVE EFFECTS THAT CANNOT BE MITIGATED

Eventual effluent mixing with either groundwater or near coastal waters is impossible to avoid. Effluent and spent sea water will eventually reach either or both water sources. Therefore, the treatment and disposal alternative selected must provide high quality effluent to minimize adverse effects.

CHAPTER VI
POWER AND TELECOMMUNICATIONS

Acquisition of power and telecommunications for the proposed O'oma II development would be necessary. This chapter summarizes the existing conditions, proposed development of services, and alternatives for connection to O'oma II (HELCO, 1986; HTCO, 1986; and M&E Pacific, Inc., 1986b, 1986c, 1986d).

EXISTING CONDITIONS

Existing electrical service in the surrounding area is provided by Hawaiian Electric Light Company (HELCO) by a 69 KV transmission line located mauka of the Queen Kaahumanu Highway. Present electrical generation capacity is 127 MW, with 102 MW peak demand.

Existing telephone service to the surrounding area is provided by Hawaiian Telephone Company (HTCO). The closest existing facilities are located approximately 100 feet mauka of Queen Kaahumanu Highway. Available telephone trunk capacity out of Kailua-Kona would be sufficient for the needs of O'oma II.

Sun Cablevisinn is licensed to provide cable television service in the Kona-Kohala region. There are presently no cable lines immediate to the project area. The closest cabled areas are Kailua-Kona to the south and the Pacific Palisades subdivision approximately five miles to the north.

PROPOSED DEVELOPMENT

An estimated requirement of 7 MVA would be expected for the ultimate development. A substation consisting of transformer and switching gear would be required to handle the ultimate demand, plans of which would be developed by HELCO. The substation would be located mauka of Queen Kaahumanu Highway and two 12.47 KV distribution lines would run under the highway to O'oma II. These lines would cost $45 per foot per circuit, and two circuits would be required. The substation would require land acquisition. A phasing plan would also be needed to determine the sequence of power demands. Estimated cost of the substation would be $500,000, and PUC approval would be required.

A substation site would also be required for telephone service for the development. An underground cable under Queen Kaahumanu Highway would carry the system to an onsite HTCO substation.

The projected population of the initial development phase would be insufficient to require expansion of cable television service to the O'oma II area by State Department of Commerce and Consumer Affairs regulations. Should cable television service be desired, the developer would be required to fund any initial capital construction costs. The most practical alternative is the placement of an overhead line from the Pacific Palisades subdivision, the closest cabled area. A less feasible alternative is the construction of a microwave relay transmitter and receiver, the form of infrastructure used by more remote resort developments in the region. The microwave receiver would be funded entirely by the developer. Funding of the microwave transmitter would be split between Sun Cablevision and the developer; the developer would be eligible for a refund on a pro rata basis should a given number of additional subscribers enter the system within a stipulated period.

IMPACTS

There should be little direct impact to existing utility customers in the area since excess electrical and telephone capacity is available. The implementation of this project could accelerate any existing schedules for infrastructure expansion since a portion of existing excess capacity would be utilized for this project. The electrical substation would require the acquisition of offsite land.

The implementation of cable television utilities would provide access to such services in an area where such service was previously unavailable, a benefit to other existing and future residents of the region.

CHAPTER VII
SOLID WASTE

DISPOSAL SITES

The Kailua Landfill, one of three municipal sanitary landfills within the County of Hawaii, presently serves the North and South Kona solid waste districts (see Figure 6). This landfill is expected to reach capacity in 1990. The Kailua Landfill would then be converted to a transfer station and a new landfill opened at Puu Anahulu (Hawaii, 1981). Refuse from the proposed O'oma II development would be accepted by the municipal landfill; however, collection and transfer would require the use of private collection companies.

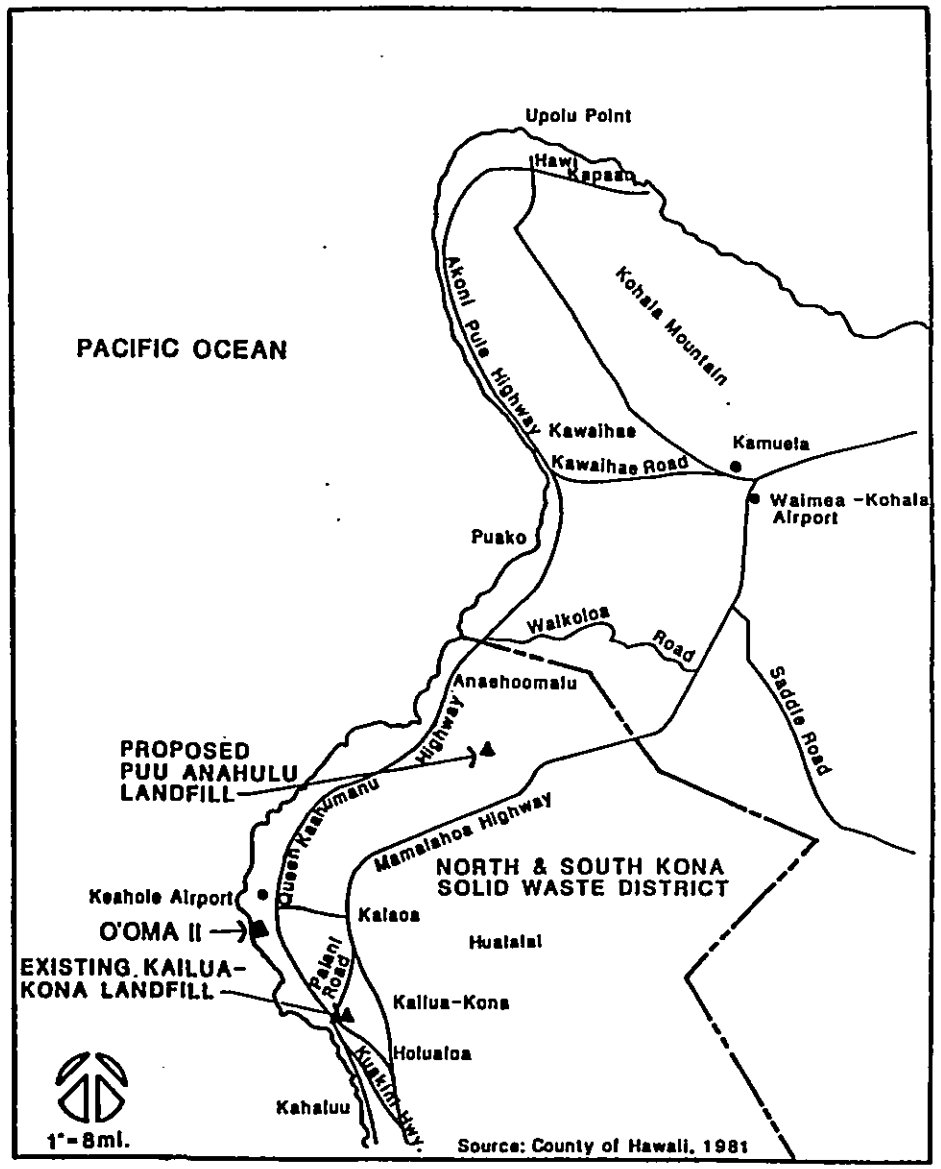
SOLID WASTE QUANTITIES

Management Plans

Waste generation quantities were projected according to the Solid Waste Management Plan for the County of Hawaii (Hawaii, 1981). Although no firm development schedule exists, nor can such a schedule be realistically made for the proposed development at this time, the projected quantities for 1990 and 2000 have been assumed to reflect the conditions of initial and ultimate development respectively.

Projected Waste Generation

The estimated populations for the proposed development, under average occupancy rates of 70 percent for the resort hotel and 50 percent for the resort condominiums, are as follows:



Solid Waste Facilities
O'OMA II
Kahala Capital Corporation M & E PACIFIC, INC.

Figure: 6

	Population
Initial Phase	
600-Room Hotel (1.9 occupancy factor)	
Hotel Staff	798
Golf Course Staff	864
Clubhouse Staff	48
	18
Initial Phase Total	1,728
Ultimate Phase	
600-Room Hotel (1.9 occupancy factor)	
Hotel Staff	798
Golf Course Staff	864
Clubhouse Staff	48
300-Unit Condominiums (2.7 occupancy factor)	18
Condominium Staff	405
Office Park	72
Hi-Tech Aquaculture Staff	800
Marine Park Staff	66
	20
Ultimate Phase Total	3,091

Source: Helber, Hastert, Van Horn & Kimura, 1985.

Applying the solid waste generation rates of the North and South Kona Solid Waste District in the county management plan, 7.41 pounds per capita per day (lbs/cd) for 1990 and 9.96 lbs/cd for 2000 results in 6.40 tons/day (T/d) and 15.39 T/d of solid waste for the initial and ultimate phases of development respectively. Projected solid waste generation rates for the refuse district are 726 tons/week (T/wk) in 1990 and 1,282 T/wk in the year 2000. The computed quantities of solid waste generated by the proposed project would equal approximately 6.2 and 8.4 percent of the quantities projected for the entire solid waste district for the interim phase and ultimate development respectively.

The solid wastes to be generated by the proposed project make up a very small fraction of the projected solid waste quantities of the refuse district. The proposed project should therefore not adversely impact the solid waste infrastructure (i.e., require the construction of a new landfill or significantly shorten projected landfill life).

Solid waste generated by the proposed project would also generate additional traffic. Assuming a typical 40 cubic yard container is used, an average of one and one-half trips per day would be required for the projected solid waste quantities during the initial phase, increasing to three and one-half trips per day after the ultimate phase of development. The additional traffic generated by the collection vehicles should therefore be of little consequence.

PROPOSED O'OMA II DEVELOPMENT

PRELIMINARY ENGINEERING UTILITIES COST ESTIMATE

Item	Description	Cost Estimate (million dollars)
1	SITE DEVELOPMENT Includes earthwork for 220 acres	12.0
2	ROADS Includes highway intersection improvements and onsite road construction	3.0
3	DRAINAGE Includes drainage channels, ditches, road crossings, and road drain lines	3.0
4	WATER SUPPLY Includes offsite source development and transmission and onsite transmission	11.5
5	WASTEWATER Includes centralized treatment facility and collection system	6.5
6	POWER AND TELECOMMUNICATIONS Includes offsite improvements and transmission and onsite transmission for electricity, telephone, and cable TV service	1.5
7	SOLID WASTE Includes annual cost of private hauler for years 1990 to 2000	0.05 - 0.15/yr

Note: Costs do not include offsite land acquisition and easements, and sea water intake/disposal for Hi-Tech aquaculture.

M&E Pacific, Inc.
Engineers & Architects

Suite 500, Pauahi Tower
1001 Bishop Street
Honolulu, Hawaii 96813
(808) 521-3051 Telex 7430065

Date: July 24, 1986

To:
Helber, Hastert, Van Horn & Kimura
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Attention: Ms. Nancy Nishikawa

Subject: Preliminary Engineering Utilities report for the Proposed O'oma II Development

We transmit:
- X herewith
- ____ under separate cover

the following:
- ____ calculations
- ____ filing fee
- ____ legal descriptions
- ____ letter (of authorization)
- ____ plans and specifications
- X prints
- X reports
- ____ shop drawings
- ____ tracings
- X cost estimate

for:
- ____ approval
- ____ information
- X use
- ____ review & comments
- ____ construction
- ____ files
- ____ payment
- ____ quotation
- ____ recordation
- ____ signature
- ____ _____

Remarks:

Enclosed are two (2) bound and one (1) unbound copies of the subject report and the Preliminary Engineering Utilities Cost Estimate. Please contact Dana Miyamoto, should you have any questions.

DM/pm By: Kenneth Ishizaki

cc:

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C. BASELINE ASSESSMENT OF THE MARINE ENVIRONMENT

BASELINE ASSESSMENT OF THE MARINE ENVIRONMENT IN THE VICINITY OF THE O'OMA II RESORT DEVELOPMENT

C-1

PREPARED FOR

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

JULY, 1986

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INTRODUCTION

Coral reefs and other marine environments are often some of the most valuable aesthetic and recreational features of coastal tropical and sub-tropical communities. Thus, addressing the potential for degradation of marine environments that might arise during construction, and the ensuing operation, of coastal developments is a matter of critical concern in early planning stages.

On the Big Island of Hawaii, Kahala Capital Corporation is proposing to develop an intermediate resort on 313 acres of open land situated just south of the Keahole Airport (see Figure 1). The development concept for the subject property, called "O'oma II", incorporates a variety of land uses comprising a resort community centered around one 600-room hotel, 600 resort condominiums and an 18-hole golf course. In addition, the development may provide space for high-technology users to complement the neighboring Hawaii Ocean Science and Technology (HOST) Park facility currently being developed on adjacent property by the State of Hawaii.

With such development scenarios there is inevitably the potential for undesirable habitat changes and possible irreversible destruction of marine ecosystems. In the case of O'oma II the need for caution in recognizing the potential for environmental degradation may be especially important owing to the proximity of the Natural Energy Laboratory of Hawaii (NELH), which relies on clean ocean water. Such degradational processes, if they exist, can 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. In the present study, alteration of the marine ecosystems from waves generated from a recent winter storm in the North Pacific presents a dramatic example of the forces that naturally affect marine community structure.

One objective of the proposed study is to establish quantitative baseline information to accurately depict the community structure of the indigenous marine populations inhabiting the areas offshore of O'oma II. 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. 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 a 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 offshore 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.

A quantitative data set can also serve as a baseline from which actual changes that may result from construction can be ascertained. If such changes are identified, remedial action can be applied to eliminate the stress factors causing environmental alteration after a minimum of change has occurred. With such management practices optimal utilization of marine resources may occur, while at the same time preserving a high level of environmental integrity.

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 54 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 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.

The most important, objective of this assessment is to evaluate the potential for impact to the marine environment resulting from the proposed development. In order to accomplish this objective it is first necessary to evaluate the adaptation of nearshore benthic communities to natural stress (sedimentation, wave scour, etc.). Because impacts caused by the development would be superimposed on natural effects, it is necessary to estimate cause and effect by comparing the existing community structure of stations subjected to varying degrees of natural disturbance to the conditions that would exist if the development proceeds.

METHODS

All field work was carried out on July 11-13, 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 location south of the development parcel at a site protected form north swells. The control sites serves 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 described by Dollar (1975) (see Figure 2).

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 (see Plate 1). 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

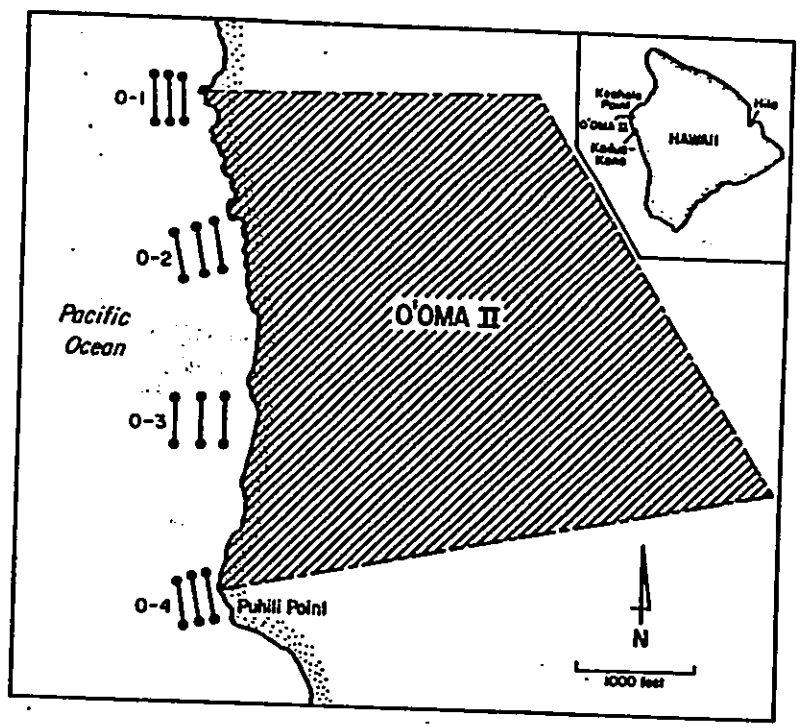

FIGURE 1. Map showing location of O'oma II development site, and locations of four transect sites, used to quantify marine community structure.

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 enumerated cryptic species dwelling within the reef framework.

Following the period of field work, quadrat photographs were projected onto a grid enabling units of bottom cover for each species and bottom type to be 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

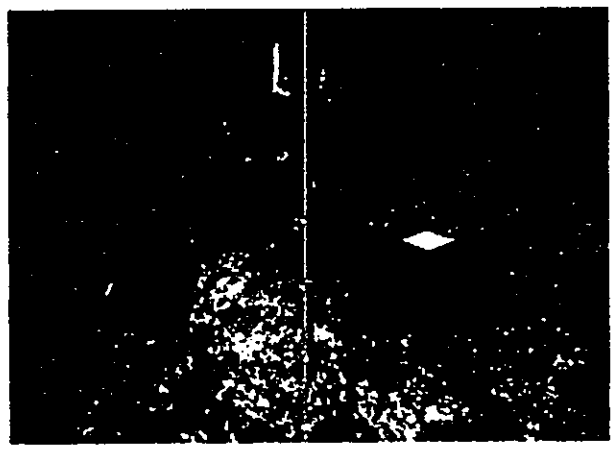

PLATE 1. Diver pounding transect stake into reef substrate at the origin of a 30 ft. transect station.

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 three meters 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.

RESULTS AND DISCUSSION

Shoreline Area

The main structural feature of approximate one mile of shoreline of the O'oma II development is a basaltic ledge of pahoehoe lava with interspersed pockets of white calcareous sand (see Plate 2). The intertidal platform, which is constantly subjected to the wash of waves, is flooded in places to form tide pools. However, none of these pools appeared to be separated from the ocean on a permanent basis so they do not constitute unique or rare habitats. Rimming many of pools formed in the basalt bench are dense bands of the intertidal seaweeds Ahnfeltia concinna and Ulva fasciata (see Plate 3). The submerged portions of the intertidal pools are lined with various forms of encrusting red algae, and contain numerous sea

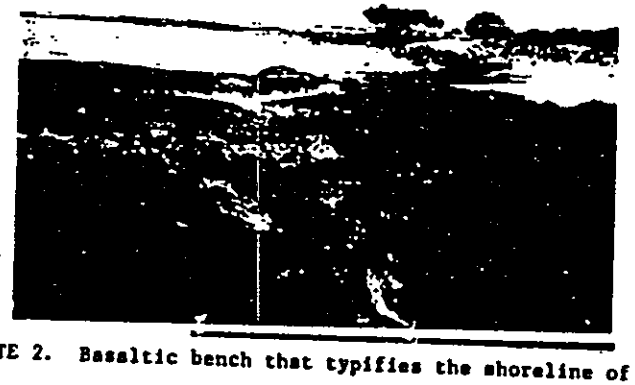

PLATE 2. Basaltic bench that typifies the shoreline of the O'oma II property. Small sand beach to the left of the trees at the northern border of the property constitutes the best shoreline access to the water for swimmers.

Plate 3. Typical tidepool in the basalt shoreline bench. Pool is connected to the ocean and is filled by wave action.

urchins Echinometra matheai, Echinostrephus aciculatus and Colobocentrotus atratus, as well as numerous juvenile reef fish. The seaward edge of the lava shoreline is composed either of basaltic boulder "beaches" or vertical shoreline sea-cliffs 2 to 5 feet in height. Access to the water from the basaltic bench is difficult, and potentially dangerous. The one exception is a small area at the northern border of the property where a small sandy beach reaches the waterline.

Offshore Marine Environments

Water Quality

A comprehensive water quality sampling program was not part of the present investigation. Such a sampling during the three days 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 near the NELH site located just to the north of the O'oma II property. This data set consists of weekly measurements spanning the last 4 years. In summary, surface waters near the O'oma II site contain relatively low concentrations of dissolved nutrients (nitrogen and phosphorus), but exhibit a natural cyclic variability that is apparently related to seasonal influences. This data set could serve as a excellent

preliminary baseline to monitor changes in water chemistry resulting from development activities.

Descriptively, the nearshore waters off the O'oma II property 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, and ground water seepage of fresh water appears to be relatively minimal. Present usage is restricted primarily to shoreline fishing.

Coral Community Structure

In general, the geologically young age of the Island of Hawaii results in very undeveloped true "coral reefs". Rather, the majority of the offshore environments can be called "coral communities". 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). The community structure of the O'oma II property corresponds well with the typical pattern. 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 2 shows

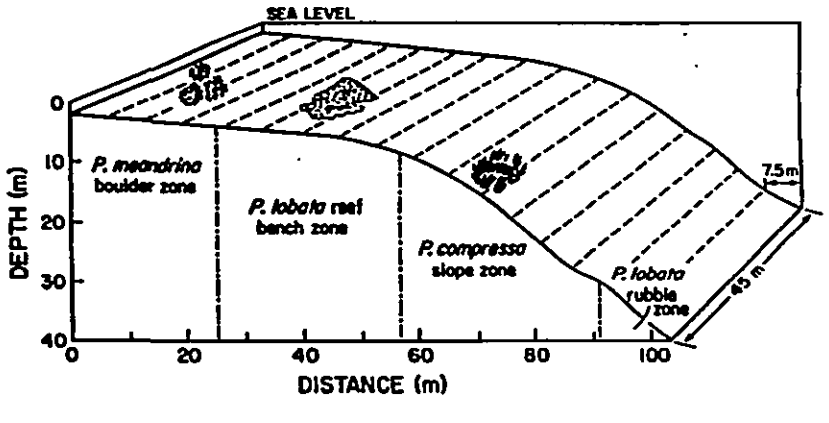

FIGURE 2. Schematic diagram of typical reef zonation pattern off West Hawaii. For the O'oma II survey, 20 ft. transects were conducted in the P. meandrina-boulder zone, 30 ft. transects in the P. lobata-reef bench zone, and the 60 ft. transects in the P. compressa-slope zone.

a diagramatic representation of the west Hawaii coral community structure, while Figure 3 and Tables 1 and 2 summarize quantitatively the results of the benthic community transects off O'oma II and the control station. The relative uniformity of the shoreline off the entire O'oma II property results in a fairly uniform marine environmental structure. Therefore, the zonation pattern described below represents the environment fronting the entire development.

The most shoreward zone is comprised of the seaward continuation of the basaltic shoreline bench and scattered basaltic boulders (see Plates 4 and 5). Seaward of the shoreline, the basaltic bench becomes a shallow submarine terrace, which receives most of the force of breaking waves. Pocillopora meandrina, a sturdy hemispherical branching species is the dominant coral colonizer of the near-shore areas. 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 off O'oma II all traversed the Pocillopora meandrina-boulder zone.

Seaward of the edge of the boulder field the reef bench is predominantly a flat basaltic pavement, interspersed with lava extrusions and sand channels (see Plate 6). Porites lobata is the dominant coral in this area, and

TABLE 1. Percentage of non-coral substrata on O'oma II benthic transects.

SUBSTRATA TYPE	TRANSECT DEPTH (ft)	TRANSECT STATION 0-1	0-2	0-3	0-4	CON
Sand	20	0	30.0	0	0	0
	30	0	0	0	0	9.5
	60	0	6.5	9.7	0	0
Limestone	20	21.0	24.9	10.8	4.3	14.3
	30	2.4	10.0	5.7	2.3	23.2
	60	0	8.3	11.2	0	0
Coral rubble	20	6.9	0	10.0	23.9	1.0
	30	50.9	27.5	70.2	10.8	13.6
	60	59.5	47.5	57.4	54.5	30.0
Basalt	20	52.3	23.5	77.2	63.4	58.6
	30	35.4	28.7	13.3	64.2	18.1
	60	59.5	0	1.1	38.6	0

TABLE 2. Percent cover of individual coral species, total coral cover, number of coral species, and coral species diversity on benthic transects at O'ama II.

CORAL SPECIES	TRANSECT DEPTH (ft)	TRANSECT STATION 0-1	0-2	0-3	0-4	COM
Porites lobata	20	19.3	20.2	14.9	9.7	23.0
	30	11.2	13.7	3.8	8.7	34.5
	60	4.4	24.8	14.5	4.2	0
Porites compressa	20	0	0.6	0	0	0
	30	0	1.6	1.5	0	0
	60	31.2	10.0	4.3	1.1	63.5
Pocillopora meandrina	20	0.1	0.6	7.6	1.7	3.0
	30	0.4	1.5	1.2	15.3	1.8
	60	0.6	1.8	0.7	1.4	0
Montipora patula	20	0.2	0	0	0	0.1
	30	0	0.2	0	0	0
	60	0	0	0	0	0.1
Montipora verrucosa	20	0.2	0.1	0.2	0.6	0
	30	0	0.1	0	0.1	0.1
	60	0	0	0	0.1	0
Leptastrea purpurea	20	0	0	0.1	0.7	0
	30	2.1	0	0	0	0
	60	0.2	0	0	0.1	0
Cyphastrella ocellina	20	0	0	0	0	0
	30	2.1	0	0	0	0
	60	4.1	1.6	1.1	0.1	3.5
Pavona varians	20	0	0.1	0	0	0.1
	30	0	0	0	0	0
	60	0	0	0	0	0
TOTAL CORAL COVER	20	19.8	21.6	22.8	12.7	26.1
	30	13.7	17.1	5.7	25.0	33.6
	60	40.5	37.6	20.6	6.9	70.0
NUMBER OF CORAL SPECIES	20	5	5	3	4	4
	30	4	5	3	3	3
	60	5	4	4	6	3
CORAL SPECIES DIVERSITY	20	0.144	0.311	0.779	0.779	0.693
	30	0.842	0.695	1.017	0.639	0.147
	60	0.762	0.906	0.845	1.102	0.221

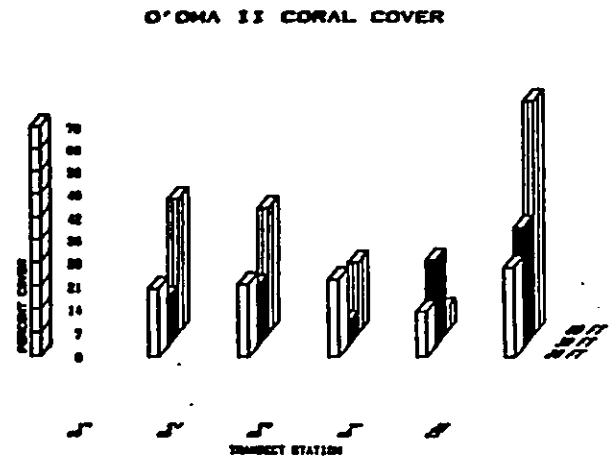

FIGURE 3. Bar graphs showing total coral cover and coral cover diversity on O'ama II transects.

occurs in a variety of growth forms, but predominantly takes the shape of short, thick lobed colonies (see Plate 7). Because of increased water depth and distance offshore, reduced wave scour results is greater proportions of coral cover on the reef bench. It is in this zone that the most number of corals occur, and where "reef formation" is occurring. The 30 ft O'oma II transects bisect the Porites lobata-reef bench zone.

At the seaward edge of the basaltic bench, the slope of the bottom increases sharply to approximately 40°, and the substratum consists primarily of unconsolidated rubble and sand (see Plate 8). Porites compressa, commonly called "finger coral" typically covers the reef slope in the form of dense interconnected thickets that extend to a depth of approximately 90 ft. (see Plates 8 and 9). The 60 ft. transects off O'oma II traversed the Porites compressa-slope zone.

The most significant result of the transects data, as well as the qualitative appearance of the reef communities, is that coral cover on all of the O'oma II transects is reduced compared to the control (see Figure 3, Table 2). The decrease is attributed to the physical destruction of coral colonies brought on by a severe winter storm that occurred in February of 1986. The direction of wave propagation (from the northwest) was such that breaking waves estimated at 15-20 ft in height impacted directly the O'oma II site, but not the control site.

Average coral cover for the four O'oma II transects was 6.8% less than the control at the 20 ft. deep transects, 20.2% less at the 30 ft. transects and 43.6% less at the 60 ft. transects. It is apparent from these differences that the greatest effects of the storm waves occur at the deepest reef zones, which normally exist under very calm conditions. As described above, the dominant coral to inhabit this zone, Porites compressa is extremely delicate and susceptible to breakage and re-distribution down the reef slope. In contrast, the shallow boulder zone, which routinely is subjected to water motion of sufficient velocity to prevent coral growth of all but Pocillopora meandrina exhibits relatively small changes at the O'oma sites compared to the control. In corresponding fashion, coral species diversity is greater at the O'oma sites compared to the control. The lower diversities at the control site 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 both th most abundant species or the species highest in competitive ability.

In contrast, infrequent storm events with forces capable of totally destroying all coral cover, effectively

PLATE 4. Nearshore boulder zone. Basaltic terrace in the background is the seaward extension of the shoreline reef bench.

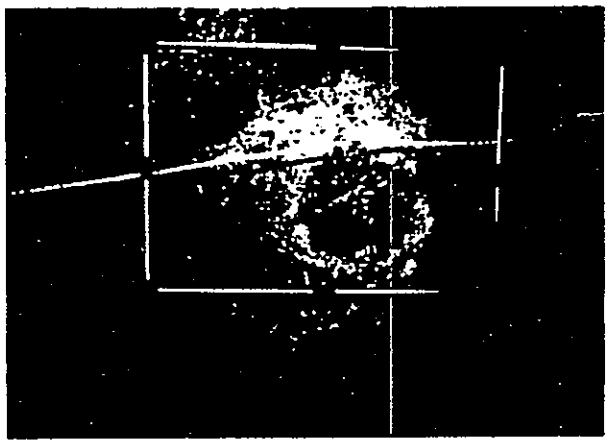

PLATE 5. Typical quadrat photograph on a 20 ft. transect. Round coral colonies growing on boulders are Pocillopora meandrina.

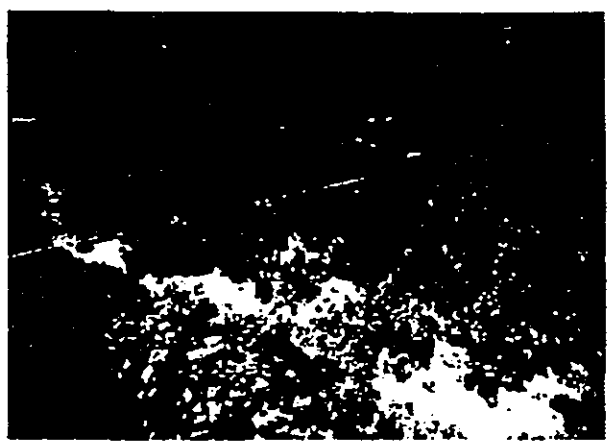

PLATE 6. View of diver laying transect line on reef bench zone.

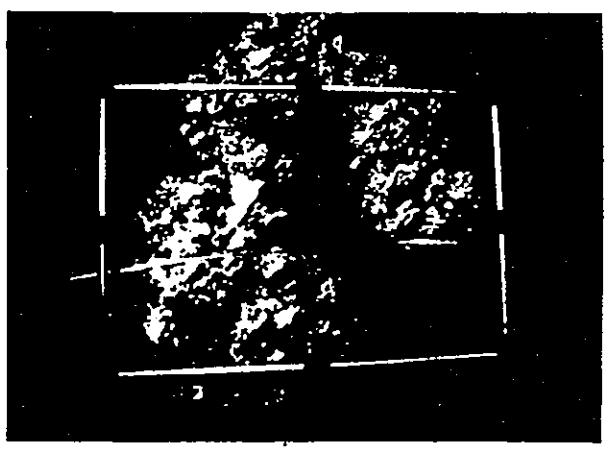

PLATE 7. Typical quadrat photograph on 30 ft. transect on reef building zone. Coral colonies in center of photograph are Porites lobata.

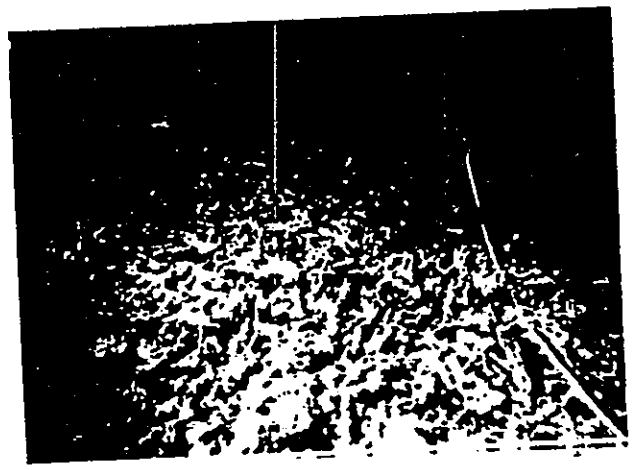

PLATE 8. Transect station in the reef slope zone.

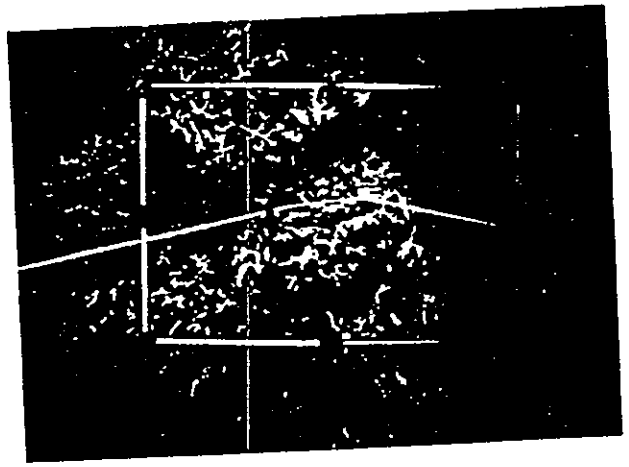

PLATE 9. Typical quadrat photograph at 60 ft. transect. Entire reef surface is composed of lattice of finger coral, Porites compressa.

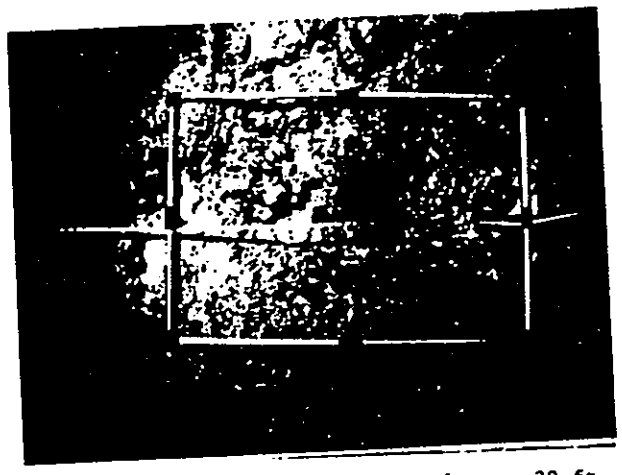

PLATE 10. Typical quadrat photograph at a 30 ft. transect in an area that received the full destructive force of winter storm waves. When compared to Plate 6 the extent of damage to coral cover is evident.

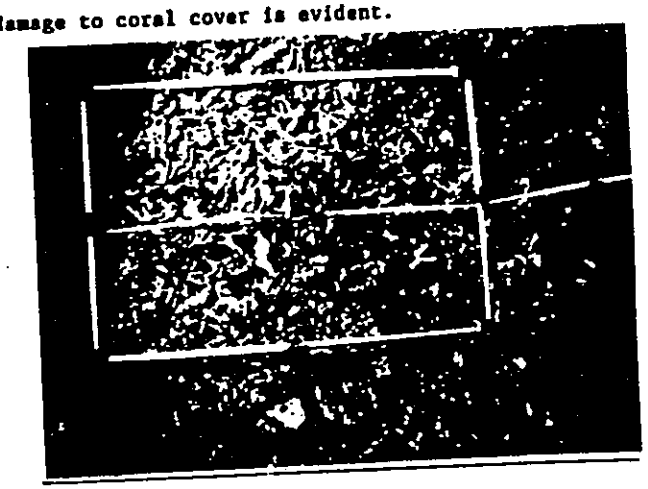

PLATE 11. Typical quadrat photograph at 60 ft. transect that received the full force of wave stress in February, 1986. Extent of coral damage is evident when compared to Plate 9

wipe out the entire zonation pattern and return the ent reef to an essentially pioneering stage. A more complete account of the effects of storm waves on coral community structure is described by Dollar (1982).

Other Benthic Invertebrates

The major taxa of benthic organisms occurring on the O'oma II reefs, other than corals, are sea urchins (Echinoides) and sea cucumbers (Holothuroides). 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 Tripneustes gratilla and Heterocentrotus mammillatus. Most common of the sea cucumbers are the species Holothuria atra and H. mauritiana, which occurred mainly in the P. lobata-reef building zone. None of the assemblages of these organisms constituted any unusual or rare community.

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 crustacea, 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.

Frondose benthic algae are conspicuously rare on the reefs of West Hawaii. Several plants were observed, however, off the O'oma II development. These included the brown algae Turbinaria ornata, and Padina spp.. The encrusting red coralline algae, predominantly Porolithon spp. and Peysonellia rubra were commonly observed on the deeper reef slope on the Porites compressa reef framework. None of the red algae communities associated with early successional stages of recolonization following denudation of substrate by wave action were observed.

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 3 and Figure 4.

The reef fish community bordering the proposed O'oma II development can be grouped into six general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwelling fishes, swarming tetrodonts, and surge-zone fishes.

Juvenile fishes were especially abundant at the deepest transect site in areas of finger coral (Porites compressa). It is important to note that while storm damage to the deep slope zone substantially lowered the percentage of living finger coral, the coral framework was not completely

TABLE 3. Reef fish community structure at O'oma II.

	0-1 60'	0-1 30'	0-1 20'	0-2 60'	0-2 30'	0-2 20'	0-3 60'	0-3 30'	0-3 20'	0-4 60'	0-4 30'	0-4 20'	CONT 60'	CONT 30'	CONT 20'
MURAENIDAE															
Gymnothorax melagris	1	1	1				1		1						
AULOSTOMIDAE															
Aulostomus chinensis	1	1											1	1	1
HOLOCENTRIDAE															
H. borodi									15						4
CIRRHITIDAE															
Cirrhitus pinnulatus												2			
Paracirrhites arcatus	2		1	2	2	1	1		5		2	3	3	3	1
P. forsteri	2		1							2				1	
MULLIDAE															
Mulloidichthys flavolineatus		2											60		5
M. vanicolensis	3					3		1				2			
Parupeneus multifasciatus	2	7	1	11	12	13	3	15	3	7	6	4	5	1	1
P. bifasciatus			3						1	3	1	1			
P. cyclostomus				4											2
LETHRINIDAE															
Monotaxis grandoculis															1
SERRANIDAE															
Cephalopholis argus		1													
CARANGIDAE															
Caranx melampygus												1			
CHAETODONTIDAE															
Chaetodon humeralis										2					3
C. quadrimaculatus			2		1	1			2						
C. ornatissimus			1		2	1		2						2	
C. multicinctus	4	3	5	1	4	3	2	4	1	2	3		2	1	10
C. reticulatus				0		2	5		3	0	0				
C. auriga			1												
Forcipiger flavissimus	2	3	2	5		2	1	1	1	3	2	4	2	4	2
Hemitaurus diplostoma										6					
POMACANTHIDAE															
Centropyge potteri	7	34		8			6	2		7			3	3	4
Holacanthus arcuatus	1														
POMACENTRIDAE															
Abudefduf sordidus									12			1			
Plectro. johnsonianus			1	1		1								2	1
Stegastes fasciolatus	2					2			1				1		
Dascyllus albisella				3											
Chromis agilis	44	72		30	3		89		2	25			30	25	10
C. hanui	4	9		17			21			17			15	8	
C. vanderbilti	90	95	81		172	88		95	120	50	95	85		110	105
C. ovalis			7		13										
LABRIDAE															
Novaculichthys taeniourus	1							2			1				
Cheilinus unifasciatus	8													2	1
C. trimaculatus											1				
Pseudocheilinus octotaenia	6			3	2	3	1			5		1	2	3	
P. tetrataenia	4			4	4		2			7	2		2	5	
Oxycheilinus bimaculatus					5										
Coris gaimard		3	1	4	7		1	8	7	11	1	1		2	2
C. flavovittata		1										1			
Anampses chrysocephalus				2									1		
Thalassoma duperrey	3	11	8	8	13	15	8	8	16	15	6	12	9	7	13
Stephanolepis varius								1						3	
Labroides phthirophagus				2			2			1					
Macropharyngodon geoffroy	3	3				3		2		1				1	1
Pseudojuloides cerasinus	1			6			1			1	1		2	1	
Stethojulis bandanensis			3		2			3						10	9
Halichoeres ornatissimus	6	7	4	4	6	6	3	2	1	3	1		4	1	3
SCARIDAE															
Calotomus sp.								1	1						
Scarus psittacus	3	1					3				4	3	1	3	
S. perspicillatus						8						1		1	
S. pyrrhostictus		1							1				1		
S. rubroviolaceus												2			
Juvenile Scarus	2	9	3	7				12	7	9		3			
ACANTHURIDAE															
Zebrasoma flavescens	65	69	31	23	21	10	22	9	40	27	14	45	27	26	51
Acanthurus achilles		1	1			7						9	2		6
A. nigricauda									10			1			
A. leucopareius												27			11
A. thompsoni													90		
A. olivaceus			3	3				11	4	2	1	5			
A. nubilus											1				
A. nigrofuscus	13	21	15	14	9	14	20	4	14	12	13	8	12	10	12
A. olivaceus		5	3		4	3	2		3	1	2	2	1	2	2
Ctenochaetus striatus	21	44	21	44	2	10	11	6	13	12	12	12	25	21	30
C. hawaiiensis							2					3			
Naso literatus	5	11	3	3			5	2	3		3	11	4	3	7
N. unicornis												1		1	
ZANCLIDAE															
Zanclus cornutus	3	1	2	2		2			21			3	2	4	
MONACANTHIDAE															
Paraluter cotiosus	46	37	31	21	27	45	40	35	32	44	41	31	27	45	30
BALISTIDAE															
Balistapus undulatus	3	2	2		3	2	2			0	2	1	2		2
Melichthys vidua					3				2		2			1	
M. niger	1	2	5						1					2	
Xanthichthys auromarginatus		2								3	3			1	
TETRAODONTIDAE															
Arothron meleagris	3	3	1	3	1		1	5	3	1	1		1	1	
NUMBER SPECIES	31	31	30	30	23	26	26	25	31	30	27	32	26	35	29
NUMBER INDIVIDUALS	327	362	255	269	251	297	271	231	364	311	191	306	276	256	253
SPECIES DIVERSITY	2.527	2.600	2.683	2.616	2.145	2.484	2.254	2.296	2.525	2.111	2.411	2.544	2.409	2.500	2.490

flattened. The complex habitat created by the interstitial spaces of the finger coral framework, was partially maintained in the aftermath of the storm event. Juveniles belonged mostly to the family Acanthuridae (surgeon fishes), with representatives from the families Labridae (wrasses), Mullidae (goat fishes) and Chaetodontidae (butterfly fishes). Planktivorous damselfishes, principally of the genus Chromis were extremely abundant in all areas surveyed. Members of this genus often comprised more than a third of the total number of individuals encountered along a transect. The species C. agilis and C. hanui predominated at the outer edge of the shelf and in deeper water, whereas C. vanderbilti was the primary shallow water species.

Herbivores, primarily the acanthurids Zebrasoma flavescens and Ctenochaetus strigosus were also abundant. At the shallower sites, adult Acanthurus olivaceus and scarids (parrot fishes) were also common. In areas where coral rubble were abundant, common fishes included the angelfish Centropyge potteri, and several species of wrasse, notably Pseudochilinus tetrataenia and P. octotaenia. Large numbers of the fantail filefish Pervagor spilosoma were observed swarming in the water column. Many of these individuals looked unhealthy in having faded colors and a gaunt appearance. Such aggregations of filefish appears to be a cyclic phenomenon that occurs with at irregular frequencies.

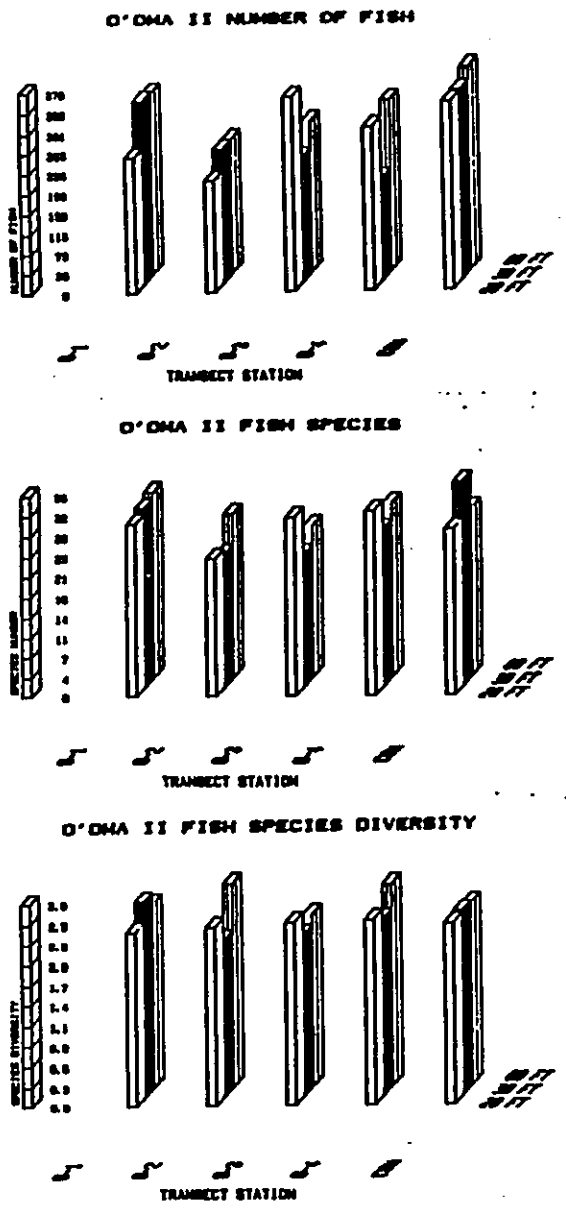

FIGURE 4. Bar graphs showing reef fish abundance, species number and diversity at O'oma II transects.

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 Thalassoma trilobatum and T. purpureum were also abundant in the surge zone. Few juvenile fishes were seen inhabiting the boulder zone environment, although inshore tidepools are generally inhabited by young individuals.

Several species of "food fishes" were observed during the survey. These included parrotfishes (Scarus spp.), goatfishes (Parupaneus spp.), introduced snappers (Lutjanus kasmira), jacks (Caranx melamphygus), grand-eyed porgys (Honotaxis grandoculis), and groupers (Cephalopholus argus). None of these fishes were particularly abundant, and all tended to avoid divers. Squirrelfishes (Myripristes berndti) and orange-eye surgeonfishes (Ctenochaetus strigosus) were abundant, but tended to be small in size.

One important characteristic of the reef fish community off O'oma II is the relative scarcity of butterfly fishes. With the exception of Chaetodon multicinctus, most individuals encountered were very small juveniles that appeared to have only recently ended their planktonic larval phase, and joined the reef community. One explanation for the scarcity of butterfly fishes is that

this family is the principle group harvested by aquarium fish collectors.

Overall, the fish community at the O'oma II site is fairly typical of the assemblages found in Hawaiian reef environments. The reduced size of some food fishes, their tendency to avoid divers, and their general scarcity indicated that this area is subjected to a substantial, but not overwhelming, degree of fishing pressure. The scarcity of commercially valuable reef fishes also suggests that the community is somewhat affected by aquarium fish collectors.

As discussed above, the control site differed from the O'oma II sites by having a greater percentage of living coral cover. The fish communities at the control site, however, did not follow the same trend, and all three fish community parameters (number of individuals, number of species, and species diversity) showed only slight differences (Figure 4). The 30 and 60 foot deep transects at the control site showed somewhat higher numbers of individuals than the comparable O'oma II sites, primarily owing to the presence of large schools of Mulloidichthys flavolineatus and Acanthurus thompsoni. Overall, however, it is apparent that fish community structure is not nearly as influenced by the storm-related damage to reef corals off the O'oma II property as might be expected. This is in contrast to changes in reef fish community structure off Oahu following Hurricane Iwa in 1982. Wave forces from Iwa

caused total decimation of many reef areas, reducing the coral habitat to a flattened rubble pavement without interstitial spaces suitable for shelter. As a result, reef fish populations were drastically reduced, and recolonization was slow (Pfeffer and Tribble 1985). In contrast, the storm damage at O'oma II decreased living coral cover, but did not result in total destruction of the physical habitat necessary for normal fish population.

Threatened or Endangered Species

Two 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. No turtles were observed along the O'oma II property during the course of the present survey, but several individuals were sighted to the south of the property near the entrance to Honokahau boat harbor.

Populations of endangered humpback whale (Megaptera novaeangliae) are known to winter in the Hawaiian Islands, and have been sighted in the offshore waters in the vicinity of the development property 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.

CONCLUSIONS

The ultimate purpose of the data collected during the baseline survey is to provide estimates on the degree of environmental impact that might occur as a result of construction of the O'oma II 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 alteration of the shoreline for such purposes as marina construction or beach improvement.

Based on the descriptive and quantitative data characterizing these environments contained in the baseline survey it is possible to predict what impacts, if any, might occur as a result of proposed development. With regard to the aquatic resources, the major potential impact parameters would be: 1) increased sedimentation from wind or runoff as a consequence of grading; 2) changes in groundwater discharge, especially with respect to nutrient loads from sewage-laden irrigation and golf course fertilization; 3) shoreline modification including changing coastline access; and 4) changes in runoff.

Below, each of these factors is treated in turn followed by a summary section which addresses the potential for impacts to the O'oma II environment as a whole.

Increased Sedimentation

In most cases in Hawaii the greatest potential cause for impact to the marine environment as a result of nearshore development practices is increased sediment loading. The offshore environment at O'oma II does 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. With regard to the offshore communities, increased sedimentation is generally regarded as one of the most important water quality characteristics, especially in connection with the ecology of corals. Increased sedimentation does not appear, however, to be a likely source of environmental alteration for the development scenario at O'oma II. The main reason for this is that the ground cover of a majority of the land to be graded is raw lava that has not been weathered to any appreciable extent and has little or no soil cover. When moved and crushed by bulldozers a smooth surface of cobbles 1 to 4 inches in size generally results. In addition, only a fraction of the wind-blown material would be carried in a westerly direction toward the ocean. 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. The climate of the O'oma II 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 fields 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. Therefore, it appears that 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.

Several other scenarios around the Hawaiian Islands can also be drawn upon to estimate the potential for impact from sedimentation at O'oma II. 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 hence similar developments such as O'oma II 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 O'oma II resort calls for irrigation and fertilization of the golf course with treated sewage effluent, the potential for impacts to the aquatic ecosystem exists owing to high rates of nutrient loading. 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, generally at the expense of normal community intergrity. 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 O'oma II, it is not anticipated that such impacts will occur for several reasons. Most importantly, the unrestricted circulation of the offshore 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 buildup of any nutrient materials is unlikely.

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. Other chemical processes including cation exchange, fixation and adsorption on the soil, and leaching will also lessen the nutrient load that could potentially reach 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.

The negative effects of sewage impact on open ocean reefs that have been reported in Hawaii all have been due to point source discharge of raw sewage over a time span of years. Since there appears to be no provisions which would allow raw sewage to enter the marine environment under any of the O'oma II development plans for even the shortest length of time, it can be concluded that there does not appear to be any potential for impact to the marine

environment.

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. 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.

Storm Runoff

Changes in storm runoff patterns have the potential to affect the quality of coastal waters and the marine biota that live within them. 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 O'oma II 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.

Shoreline Modification

There are currently no plans for direct alterations of the shoreline area. As such, any environmental changes resulting from development would come about via the indirect mechanisms discussed in the previous sections. Future plans may, however, call for structural changes to the shoreline, probably in the form of beach modification. As described above, the majority of the existing shoreline along the property is composed of rugged basaltic structures, that do not present a suitable environment for access to the water for swimmers. Modification of one of the small existing beaches to improve access would probably entail removal of a section of the basaltic substratum, followed by deposition of sand to create an "artificial" beach. Observation of this type of constructional process at a site to the north of the O'oma II site (Hauna Lani Resort) revealed that the initial grading and rock removal, accomplished by heavy equipment, resulted in temporary high turbidity plumes near the beach site. These plumes dissipated in less than 24 hours, and surveys of reef biota indicated that the increased sediment loading had no adverse effects on community structure.

Effects to NELH

Of special concern to the planning scenarios of the O'oma II resort is the possibility of effects to water

quality parameters in the vicinity of Keahole Pt, the site of the Natural Energy Laboratory of Hawaii (NELH). The high-precision surface water nutrient monitoring program being conducted at NELH could potentially be influenced by material input at the O'oma II site. This concern is amplified by the occurrence of periodic strong northerly currents, which could transport water from the development site past Keahole Pt.

The perspective origin of any nutrients which could constitute a spurious signal to the NELH data is most likely runoff from the golf course (i.e. sewage effluent). As discussed above, it appears that such runoff is unlikely owing to the structural qualities of the basal lava rock, and the lack of sheet flow reaching the ocean. There has not been to date, however, a hydrologic study to determine the actual magnitudes of nutrient materials that reach the ocean via golf course irrigation/fertilization. Therefore it is recommended that in the event of golf course construction, a comprehensive time-course monitoring program should be instituted in the vicinity of O'oma II to identify any potential alterations to natural water quality parameters.

The principal facility of the NELH program is a cold-water intake pipe located at a water depth of about 600 meters (1900 ft.) off Keahole Pt. It does not appear that any modification to the marine environment brought about by the implementation of the O'oma II development could alter

the chemical characteristics of the intake water.

Summary

With regard to the O'oma II resort, the potential for direct impact as a result of development to the offshore communities appears to be very small. None of the developmental activities appear to have the potential to induce large changes in physio-chemical water quality parameters. In addition, as described in the RESULTS section, the offshore reef areas adjacent to the development property are constantly exposed to natural stresses, especially in the form of storm waves, that are the primary factor determining the make-up of the reef communities. The most relevant point of illustrating the effects of such natural phenomena is to show that 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. If some unexpected event related to development activities does occur, the resulting alterations to marine community structure would probably be negligible, 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. Observations of the response of marine ecosystems to such shoreline development as Princeville, on Kauai, Kaanapali

on Maui, Kailua-Kona on Hawaii and even Waikiki on Oahu substantiate the overall conclusion that the marine environment is capable of withstanding shoreline development activities without suffering any loss in quality.

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 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 O'ahu II 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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D. BIOLOGICAL SURVEY

BIOLOGICAL SURVEY

PROPOSED 'O'OMA II PROJECT

NORTH KONA, ISLAND OF HAWAI'I

by

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D-1

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BIOLOGICAL SURVEY
PROPOSED 'O'OMA II PROJECT
NORTH KONA, ISLAND OF HAWAI'I

INTRODUCTION

The proposed 'O'oma II development project consists of approximately 313 acres, located in the North Kona Judicial District, County of Hawai'i. It is bound on the north and east by the State of Hawai'i's proposed Hawai'i Ocean Science and Technology (HOST) Park and a small portion of the Hamalohoa Trail, on the west by the Pacific Ocean, and on the south by the makai portion of the Kohana-iki ahupua'a (TMK 7-3-09:03 & 16).

The substrate consists primarily of pahoehoe lava although a few 'a'a flows are occasionally encountered near Puhili Point and in the northern portion of the project area. Along the project's coastal area the substrate may vary from unconsolidated coralline sand to coral rubble to weather-worn pahoehoe.

Vegetation on the lava flows is composed of a grass-scrub community and, along the coastal area, a strand community. The mean annual rainfall is less than 20 inches per year.

Biological surveys have been conducted of areas near the 'O'oma II project site. Walker (1975, 1976) conducted a survey of the flora and fauna on the Natural Energy Laboratory of Hawaii (NELH) site as well as the adjoining Wawaioli Beach and the planned access road and utility corridor. Portions of the area surveyed by Walker are now included in the HOST Park. Krauss (1977) did a walk-through survey of the Ka'ahole Agricultural Park which lies to the east of the Ke'ahole Airport. Char and Associates (1985) briefly described the principal vegetation types and vertebrate animal species found on the NELH and HOST Park sites.

No rare, threatened, or endangered plant species were found during these surveys.

Krauss (1977) reported seeing one Pueo or Hawaiian Owl (Asio flammeus sandwichensis) during the Ke'ahole Agricultural Park survey. Although the Pueo is not classified as an endangered species by the Federal Fish and Wildlife Service, it has recently been so classified by the State Division of Forestry and Wildlife. Two endangered species, the Hawaiian Stilt or Ae'o (Himantopus himantopus knudseni) and the Hawaiian Hoary Bat (Lasiurus cinereus semotus), may fly over the 'O'oma II site. The former is present in the pond areas to the north and south of the project site; the latter probably feeds on insects along the coastal area during the evenings and night.

TERRESTRIAL BOTANICAL SURVEY

A botanical survey to inventory the flora, describe the major vegetation types, search for endangered species, and identify areas of potential environmental problems or concerns was conducted on 10 and 11 May 1986. A team of three botanists was used to gather the technical data contained in this report.

Survey Methods

Prior to undertaking the survey, a search was made of the pertinent literature to familiarize the principal investigator with previous studies conducted in the general area.

Existing topographic maps and a recent black and white aerial photograph were examined to determine access, terrain characteristics, and potential logistical and technical problems. Access was by a four-wheel drive road from Queen Ka'ahumanu Highway—the road runs along the 'O'oma II and Kohanaiki parcels—and by the MELH road. Both roads link up to a coastal jeep trail which runs the length of the property from Wawaioli Beach to Puhili Point.

A walk-through survey method was used. Species identifications were made in the field. Plants which could not be positively identified were collected for later determination in the laboratory and herbarium. Notes were made of the species present in each vegetation type. The species recorded are indicative of the time and environmental conditions under which the survey was conducted. A survey taken at a different season would no doubt yield slight differences in the species list, especially of the annual species.

Description of Vegetation Types

Two broadly defined vegetation types are recognized on the 'O'oma II parcel. The scrub vegetation occupies almost 95% of the project area with the strand occupying a narrow belt along the coast. However, the largest number of native species is found in the later vegetation type.

1. Strand vegetation

A band of vegetation composed primarily of beach naupaka (Scaevola taccada), one to two meters tall, is found along the coastal portion of the project area. The substrate varies from unconsolidated coralline sand to coral rubble, and, occasionally, pahoehoe flows. The band varies in width from as much as 100 meters (about 300 feet) to as little as 16 meters

(about 50 feet). In places where the strand is very narrow, the pahoehoe flows come down very close to the beach; the beach naupaka occurs as scattered individuals in these areas and fountain grass (Pennisetum setaceum) is common, occupying even the sandy areas.

Where the strand vegetation is widest, beach naupaka forms almost solid stands. Clusters of tree heliotrope (Messerschmidia argentea), three to five meters tall, are scattered here and there among the naupaka shrubs. Among the herbaceous species found in the strand are nohu (Tribulus cistoides), pohuehue (Ipomoea brasiliensis), Bermuda grass (Cynodon dactylon), alena (Boerhavia diffusa), and the native poppy (Argemone glauca). Some of the native plant species found in the strand, such as the naupaka, pohuehue, and hinahina (Heliotropium anomalum var. argenteum) are used in landscaping. Such plants could be incorporated into the development's landscape plans.

2. Scrub vegetation

The scrub vegetation is composed of a mixture of various grass and shrub species on pahoehoe flows. Fountaingrass is usually the most abundant species, especially in those areas of the project site closer to the shore. Further inland, however, large areas may be dominated by the native piligrass (Heteropogon contortus) or by a Natal redtop (Rhynchelytrum repens)/ 'uhaloa (Waltheria indica var. americana) association. Shrubs of 'ilima (Sida fallax) and indigo (Indigofera suffruticosa) may be locally common, especially in depressions in the pahoehoe flows.

Widely scattered throughout the site are taller plants of kiawe (Prosopis pallida), Christmas berry (Schinus terebinthifolius), a'ali'i (Dodonaea sandwicensis), maiapilo (Capparis sandwichiana var. zoharyi), and noni (Morinda citrifolia).

In some of the collapsed lava tubes which are frequently encountered on the site, ferns such as kilau-o-pueo (Pteris vittata), 'iwa'iwa (Doryopteris decora), and swordfern or kupukupu (Nephrolepis multiflora) may be found, although their occurrence is rather rare.

The rough 'a'a flows on the 'O'oma II site support only a few plants, usually fountaingrass, coat buttons (Tridax procumbens), or 'uhaloa.

PLANT SPECIES LIST, 'O'OMA (PARCEL II), ISLAND OF HAWAI'I

In the plant species list, families are arranged alphabetically within each of three groups: Pteridophytes, Monocotyledons, and Dicotyledons. Taxonomy and nomenclature of ferns and fern allies (Pteridophytes) follow C. H. Lamoureux's unpublished checklist (1984); 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. Two major vegetation types are recognized on the project area and are discussed in detail in the text. They are:

   Strand = Strand vegetation

   Scrub = Scrub vegetation

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:

Scientific name	Common name	Status	Vegetation types: Strand	Vegetation types: Scrub
PTERIDOPHYTES (Ferns and Fern Allies)				
NEPHROLEPIDACEAE (Swordfern Family)				
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	swordfern, kupukupu	X	-	R
PSILOTACEAE (Psilotum Family)				
Psilotum nudum (L.) Beauv.	moa	I	-	R
PTERIDACEAE (Pteris Family)				
Pteris vittata L.	kilau-o-pueo	X	-	R
SINOPTERIDACEAE (Pellaea Family)				
Doryopteris decora Brack.	'iwa'iwa	E	-	R
MONOCOTYLEDONS (Flowering Plants)				
CYPERACEAE (Sedge Family)				
Fimbristylis af. hawaiiensis Hbd.		E	-	O
GRAMINEAE (Grass Family)				
Cenchrus echinatus L.	common sandbur, 'uma'alu	X	U	-
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	O	R
Dactyloctenium aegyptium (L.) Willd.	beach wiregrass	X	R	R
Eleusine indica (L.) Gaertn.	goosegrass, manienie-ali'i	X	U	-
Eragrostis tenella (L.) Beauv ex R. & S.	lovegrass	X	O	U
Heteropogon contortus (L.) Beauv. ex R. & S.	pili, piligrass	I	-	A/C
Pennisetum setaceum (Forsk.) Chiov.	fountaingrass	X	C	A
Rhynchelytrum repens (Willd.) C. E. Hubb.	Natal redtop	X	-	Lc/O
DICOTYLEDONS (Flowering Plants)				
AMARANTHACEAE (Amaranth Family)				
Amaranthus viridis L.	slender amaranth, pakai	X	U	-

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	Vegetation types Strand	Scrub
LEGUMINOSAE (Pea Family)				
Acacia farnesiana (L.) Willd.	klu, kolu	X	-	U
Cassia lechenaultiana DC.	partridge pea, lauki	X	-	O
Desmodium triflorum (L.) DC.	three-flowered beggarweed	X	-	O
Indigofera suffruticosa Mill.	indigo, 'iniko	X	-	Lc/O
Leucaena leucocephala (Lam.) de Wit	koa-haole, ekoa	X	O	-
Prosopis pallida (Humb. & Bonpl. ex Willd.) HBK.	algaroba, kiawe	X	-	O
Tephrosia purpurea (L.) Pers.	'ahuhu, 'auhuhu	P	-	U
MALVACEAE (Mallow Family)				
Sida fallax Walp.	'ilima	I	O	A/C
MYOPORACEAE (Naio Family)				
Myoporum sandwicense Gray	bastard sandalwood, naio	E	-	U
NYCTAGINACEAE (Four O'Clock Family)				
Boerhavia diffusa L.	alena	I	C	U
PAPAVERACEAE (Poppy Family)				
Argemone glauca Pope	pua-kala	E	-	U
PASSIFLORACEAE (Passion Flower Family)				
Passiflora foetida L.	scarlet-fruited passion-flower, pohapoha	X	-	O
PORTULACACEAE (Purslane Family)				
Portulaca cyanosperma Egler	'ihi	E	O	O
Portulaca oleracea L.	common purslane, 'ihi	X	O	R
RUBIACEAE (Coffee Family)				
Morinda citrifolia L.	noni	P	-	O
SAPINDACEAE (Soapberry Family)				
Dodonaea sandvicensis Sherff	a'ali'i	E	-	U
SOLANACEAE (Tomato Family)				
Lycopersicon pimpinellifolium Mill.	currant tomato, 'ohi'a-ma-kanahele	X	-	R

Scientific name	Common name	Status	Vegetation types Strand	Scrub
ANACARDIACEAE (Mango Family)				
Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X	Lc/O	R
APOCYNACEAE (Periwinkle Family)				
Catharanthus roseus (L.) G. Don	red periwinkle	X	R	U
BORAGINACEAE (Heliotrope Family)				
Heliotropium anomalum var. argenteum Gray	hinahina-ku-kahakai	I	O	-
Messerschmidia argentea (L. f.) Johnston	tree heliotrope	X	O	-
CAPPARACEAE (Caper Family)				
Capparis sandwichiana var. zoharyi Deg. & Deg.	maiapilo, pua-pilo	E	U	O
CHENOPODIACEAE (Goosefoot Family)				
Chenopodium murale L.	nettle-leaved goosefoot	X	O	-
COMPOSITAE (Daisy Family)				
Ageratum conyzoides L.	ageratum, maile-hohono	X	-	R
Emilia fosbergii Nicolson	red pua-lala	X	-	U
Pluchea odorata (L.) Cass.	pluchea, shrubby fleabane	X	O	R
Sonchus asper (L.) Hill	spiny sow thistle	X	O	-
Tridax procumbens L.	coat buttons	X	-	O
CONVOLVULACEAE (Morning-glory Family)				
Ipomoea brasiliensis (L.) Sweet	beach morning glory, pohuehue	I	O	-
Jacquemontia sandvicensis Gray	pa'u-o-Hi'i-'aka	E	O	-
EUPHORBIACEAE (Spurge Family)				
Euphorbia hirta L.	garden spurge, koko-kahiki	X	U	U
GOODENIACEAE (Naupaka Family)				
Scaevola taccada (Gaertn.) Roxb.	naupaka-kahakai	I	A	-
LABIATAE (Mint Family)				
Plectranthus parviflorus Willd.	spurflower	I	-	R

Scientific name	Common name	Status	Vegetation types Strand	Scrub
STERCULIACEAE (Cocoa Family)				
Waltheria indica var. americana (L.) R. Brown ex Hosaka	hi'aloa, 'uhaloa	I	O	A
VERBENACEAE (Verbena Family)				
Lantana camara L.	lantana, lakana	X	-	C
Stachytarpheta jamaicensis (L.) Vahl	Jamaica vervain, owi	X	-	C
ZYGOPHYLLACEAE (Tribulus Family)				
Tribulus cistoides L.	nohu	I	-	U

TERRESTRIAL FAUNAL SURVEY

The following survey was undertaken to provide detailed information on bird and mammal populations within a proposed resort area at 'O'oma II, North Kona, Hawai'i.

Survey Methods

Bird survey

The faunal survey was conducted on May 10, 14, and 24, 1986. Approximately 16 hours were spent at the study site and the adjacent Kohana-iki area. Most of the field work was performed between the hours of 0830 and 1530, although work on May 24 was done between 1600 and 1945 to include both a late afternoon peak in avian activity and the beginning of the nighttime activity period of the endangered Hawaiian Hoary Bat.

Birds were censused by two methods during the survey. The first of these, transect counts, was used to provide distributional information and data useful for determining relative abundances within different habitat types. During transect counts, birds were detected both by sight and by their vocalizations by an observer travelling at a constant rate to prevent counting individuals more than once.

In addition, presence of bird species was determined by indirect means such as by presence of tracks, droppings, and observations of nests. These data were particularly important for species with sparse population densities, secretive habits, or nocturnal activity cycles.

The major limitation of the survey is that it was performed at a time of year when migratory bird species were absent from the Hawaiian Islands.

Mammal survey

Mammalian presence and distributional data were primarily collected by means of distributional data or by indirect means. The latter (particularly skeletal material) was very important in indicating historical occurrence in the study area for species that were no longer present.

Results

Faunal habitats

Two major faunal habitats were present in the study area. These approximately correspond to the vegetation types in the region but are less finely divided. More complete descriptions of the area's vegetation types may be found in the botanical report prepared concurrently with that of this survey.

The predominant habitat in the study area consists of an arid plain of closed to scattered Fountain Grass on pahoehoe substrate with occasional native and alien shrub species. Common shrub species include Capparis, 'Ilima, Noni, and Klu. Bird densities in this habitat type were very low, and most birds seen in these areas were passing through on their way to more preferred habitats that provided more food, water, and cover. One species (the Grey Francolin) was found in this habitat on a more regular basis and presumably is able to utilize the available food sources more effectively than most of the birds found here. This habitat usually extends to within 30 meters or so of the shoreline, where it is replaced by the coastal strand vegetation. However, in certain parts of 'O'oma this habitat type comes down close to the shoreline area.

The coastal strand habitat occurs immediately inland from the high water level and varies in width; as mentioned above, it is present only in part of the 'O'oma II parcel. The primary component of this habitat is Messerschmidia shrubs to about three meters in height. Also present are a number of native coastal strand plants (e.g., Capparis, 'Ilima, Pohuehue, Hinahina, etc.), as well as some alien weedy species. Birds were much more abundant in this habitat than in the one mentioned above, although it appeared that much of the activity here was of a transient nature, as many species that fed here in daytime hours roosted elsewhere at night.

Beaches and sections of rocky coastline on the seaward edge of the strand vegetation comprise an important habitat for migratory shorebirds. As the survey was conducted during a time of year when shorebird species are generally absent from the Hawaiian Islands, only one species was found here (See the annotated species list below.), although at least two and possibly three others would be expected here on a regular basis (The three species absent were the Bristle-thighed Curlew, the Ruddy Turnstone, and the Sanderling.). The Pacific Golden-plover was seen in the adjacent Kohana-iki parcel.

Annotated species list

The following list includes those species found on the 'O'oma II parcel. Following the common and scientific names for each species is its status in the Hawaiian Islands (following Pyle 1983). A summary of this information is provided in Table 1.

Table 1. Summary of bird species on the 'O'oma II study area.

Species	Status*	Number
Great Frigatebird *Fregata minor palmerstoni*	Bi	1
Gray Francolin *Francolinus pondicerianus*	Fn	2
Wandering Tattler *Heteroscelus incanus*	Vr	3
Zebra Dove *Geopelia striata*	Fl	4
Japanese White-eye *Zosterops japonicus*	Fl	10
House Sparrow *Passer domesticus*	Fl	13
Yellow-billed Cardinal *Paroaria capitata*	Fl	5
Northern Cardinal *Cardinalis cardinalis*	Fl	1
House Finch *Carpodacus mexicanus*	Fl	10

* Bi = Indigenous breeding species, leaves when not breeding
Fn = Foreign, introduced since World War II
Fl = Foreign, introduced before World War II
Vr = Visitor, regular migrant to Hawaii

Status abbreviations after Pyle (1977), Preliminary list of the birds of Hawaii, 'Elepaio 37:110-121.

I. Birds

1. Great Frigatebird, 'Iwa (*Fregata minor palmerstoni*) Bi

One individual was seen flying along the coastline near Puhili Point. This seabird frequents waters around the main Hawaiian Islands, although its breeding colonies are in the Northwest Chain. 'Iwa are known to take fresh water where it is available (pers. obs., Kawainui Marsh, O'ahu) and may utilize some of the larger anchialine ponds in the adjacent Kohana-iki area for this purpose.

2. Gray Francolin (*Francolinus pondicerianus*) Fn

Gray Francolin or evidence of their activity were present in low numbers in much of the study area: birds were seen in Fountain Grass habitat in 'O'oma, and feathers and tracks were found in the strand vegetation. This species is well-adpated to dry open grasslands and scrub habitats such as those found in the study area.

3. Wandering Tattler, 'Ulili (*Heteroscelus incanus*) Vr

The Wandering Tattler is another regular winter resident of the Hawaiian Islands. Its habitat preferences are less catholic than those of the Pacific Golden-plover; it is found along rocky shorelines, in mud-flats, and in streambeds. Much of the coastline in the study area is suitable Tattler habitat, and this species, like the Plover, is undoubtably more common in the winter months.

Three Tattler were found along the coastline in the 'O'oma II parcel, feeding amongst the rocks in the surge zone. None appeared to be in breeding condition; few nonbreeding individuals of this species remain in the islands over the summer months.

4. Zebra Dove (Geopelia striata) F1

This species was present in the strand habitat. Individuals were observed foraging on the ground on herb and grass seeds.

5. Japanese White-eye (Zosterops japonicus) F1

The White-eye was the second commonest bird species in the study area. It was most common in the strand vegetation where Messerschmidia was present. Although occasionally found in the grassland habitat throughout much of the study area, birds seen in this habitat were invariably flying overhead in the process of moving from one patch of trees to another.

6. House Sparrow (Passer domesticus) F1

A flock of about 13 individuals was seen in a patch of Christmas Berry in the southern part of the project area. This species readily associates with man and may become a nuisance in developed areas due to its frequent habit of constructing nests in and around buildings.

7. 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 early 1970's. It is very abundant in the Honokohau area.

Yellow-billed Cardinals were common in the study area, especially in strand habitats. They were much more common in the adjacent Kohana-iki parcel than in the 'O'oma II parcel, presumably because of greater habitat availability in the former area.

8. Northern Cardinal (Cardinalis cardinalis) F1

The Cardinal was common in the adjacent Kohana-iki parcel, particularly in the Mangrove patch and in Kiawe scrub. Only one individual was

observed in the 'O'oma II parcel, on the inland part of the strand vegetation. Males were very vocal, suggesting breeding activity on both areas, although no nests were found.

9. House Finch (Carpodacus mexicanus) F1

The House Finch was the most abundant bird in the study area: they were found in the strand habitat as well as over grassland habitat as they flew from one part of the study area to another.

II. Mammals

1. Mongoose (Herpestes auropunctatus) F1

The mongoose was the only mammal seen during the survey, although skeletal material of other species was present in abundance throughout the study area (See below.). Mongoose droppings were found throughout the strand vegetation and on the seaward edges of the arid grassland that makes up the bulk of the study site.

2. Other mammal species

Mammalian skeletal material was abundant in the study site. Much of it was found on the pahoehoe substrate that covers most of the inland part of the area, and some was discovered in lava tubes and caves that dot the pahoehoe flows. The majority of the bones were not recent but were useful in providing a historical perspective on the presence of mammals in the study area. The following species were represented:

1. Feral Cat, Felis catus.
2. Feral Goat, Capra hircus.
3. Donkey, Equus asinus.

Additional Material

A pahoehoe cave discovered in 'O'oma II by the botanical team during the course of their survey contained large numbers of shells and animal bones. I was unable to examine this skeletal material, but the botanists thought that some of the bones might have been those of small bird species. An extinct fauna of previously unknown bird species has been discovered in similar circumstances in the course of the last decade (Olson and James 1982), and the large number of lava tubes in the area may contain additional specimens of great scientific interest.

DISCUSSION AND RECOMMENDATIONS

The terrestrial biological communities found on the 'O'oma II parcel occur in similar habitats throughout the North and South Kona Districts. A scrub vegetation type composed of a mixture of various grass—predominantly fountaingrass—and shrub species covers the major portion of the study area. A band of coastal strand vegetation runs along the seaward edge of the property. No anchialine ponds or other areas with standing water were found during this survey.

A total of 51 vascular plant species were inventoried. Of these, 31 (61%) are exotic (or introduced), 18 (35%) are native, and 2 (4%) are of Polynesian introduction. Among the 18 native species, 10 are indigenous (i.e., occur in the Hawaiian Islands and elsewhere) and 8 are endemic (i.e., occur only in the Hawaiian Islands). None of these native species is listed as Endangered or Threatened by the U. S. Fish and Wildlife Service (1980).

The vertebrate fauna is largely composed of introduced species. Nine bird species were observed on the project area. Of these, seven are

listed as foreign species, one is an indigenous species which leaves the islands when not breeding, and one species is a migratory winter visitor. The mongoose was the only mammalian species observed, although skeletal material of cat, goat, and donkey was found. The later two have probably been extirpated from the project area. No endangered faunal species were observed on the project area. The Hawaiian Hoary Bat may utilize the coastal area for feeding during the evening and night. It is known from the ponds and coastal areas in Kona (Kramer 1971).

While the proposed development project will result in the loss of vegetation, primarily the scrub community, and some faunal habitat, it is expected to have only a minimal impact on the total island populations of the species involved.

D-1

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E. AIRCRAFT NOISE EXPOSURE ANALYSIS

P A C I F I C O C E A N

KEAHOLE POINT

U.S. COAST GUARD

60

65

70

75

'O'OMA II

WAWAHAI POINT

WIND ROSE

SCALE: 1"=20 MPH

H A W A I I

LOCATION MAP

NOT TO SCALE

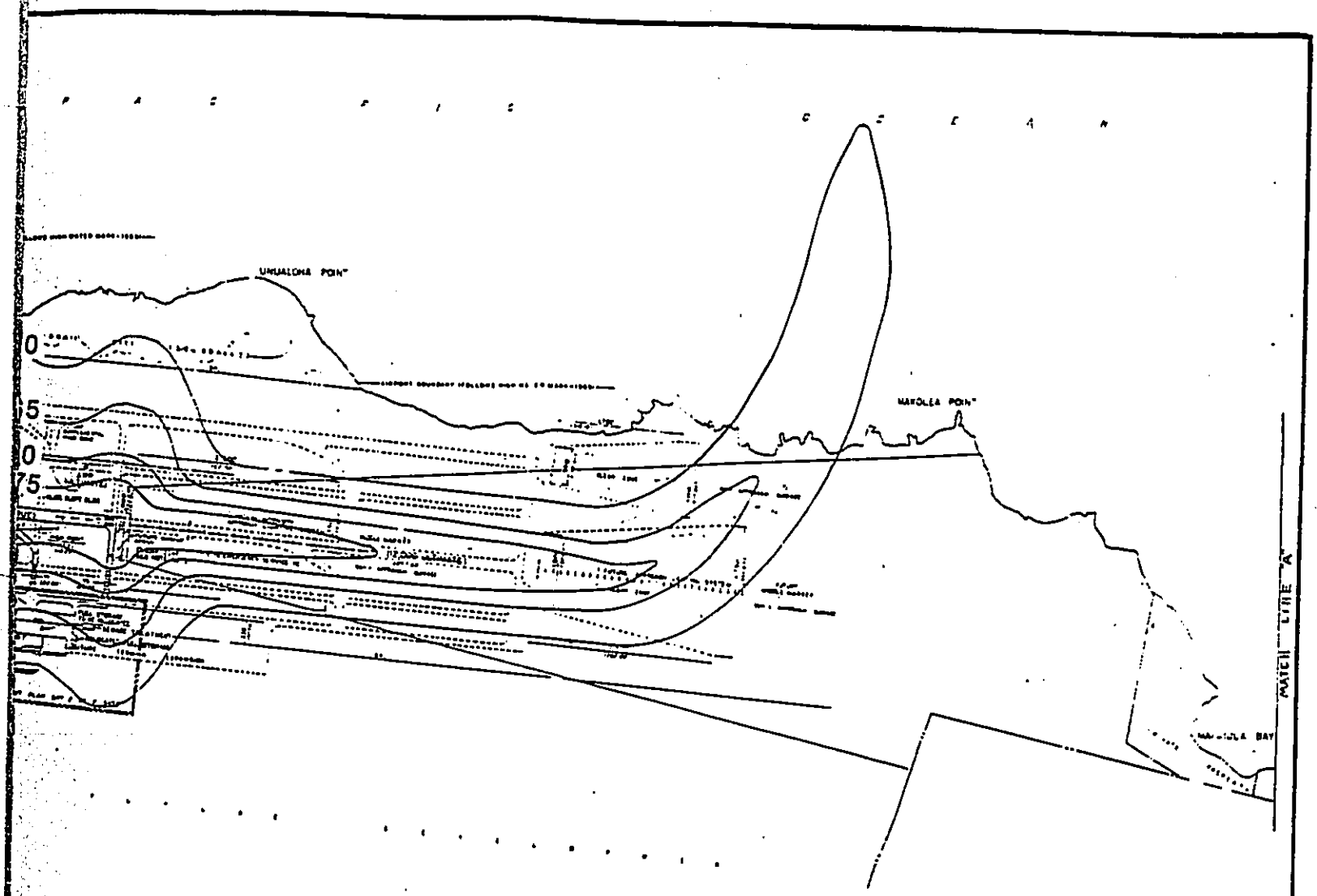
RUNWAY DATA

AIRPORT DATA

NOTE

LEGEND

1985 LDN CONTOURS
FOR 100% TURNING OPERATIONS



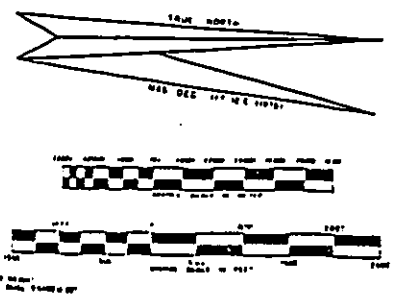
CONTOUR CONDITIONS

*Annual operations...51,500 (1)
*Runway usage.....80% RW17;20%RW35 (2)
*Day/Night.....100%Day;0%Night(2)
*Local/Itinerant.....Itinerant.100%of aircarrier and air taxi;60% general aviation
Local.40% of general aviation
*1 engine/2 engine...57% 1 engine;43% 2 engine of (general aviation) general aviation operations
*Aircraft operations.DC-9/737=12,768(turbojet)
Y-11=14694(turboprop)
General Aviation=15,697(reciprocating)
Military=8,341(3)

(1)Source:FAA
(2)Source:Airport Staff
(3)Not included due to lack of pattern data

PREPARED BY GORDON BRICKEN & ASSOCIATES

1621 EAST 17th ST. SANTA ANA.CALIF.92701 JULY.1985



REVISIONS	DATE
PLAN UPDATED	
PLAN UPDATED	
PLAN UPDATED	
PLAN UPDATED	
PLAN UPDATED	

APPROVED:

DIRECTOR, DEPT OF TRANS, STATE OF HAWAII — DATE

CHIEF, AIRPORTS DIVISION, STATE OF HAWAII — 2/18/70 DATE

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII
AIR TRANSPORTATION FACILITIES DIVISION

KE-AHOLE AIRPORT
NORTH KONA - ISLAND OF HAWAII

AIRPORT LAYOUT PLAN

SCALE AS SHOWN

SHEET 1 OF 2 SHEETS
DATE FEBRUARY, 1988

3581.4R

P A C I F I C O C E A N

KEAHOLE POINT

U.S. COAST GUARD

60

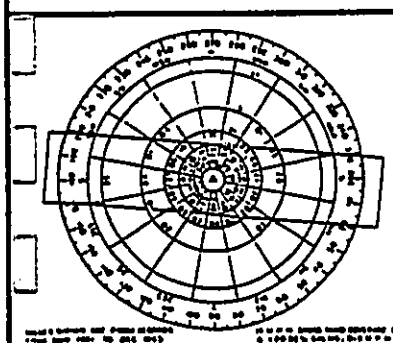
65

70

75

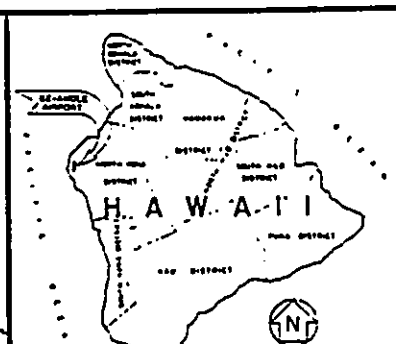
'O'OMA II

WAWAHIWA POINT



WIND ROSE

SCALE: 1" = 20 MPH



LOCATION MAP

NOT TO SCALE

RUNWAY DATA	
EFFECTIVE GRADIENT	
% WIND COVERAGE	
INSTRUMENT APPROACH	
NAVIGATIONAL AID	
APPROACH SURFACE	
RUNWAY LIGHTING	
RUNWAY MARKING	
PAVEMENT STRENGTH	
SAFETY AREA WIDTH	
EXTENDED RUNWAY SAFETY AREA	
APPROACH LIGHTING AID	

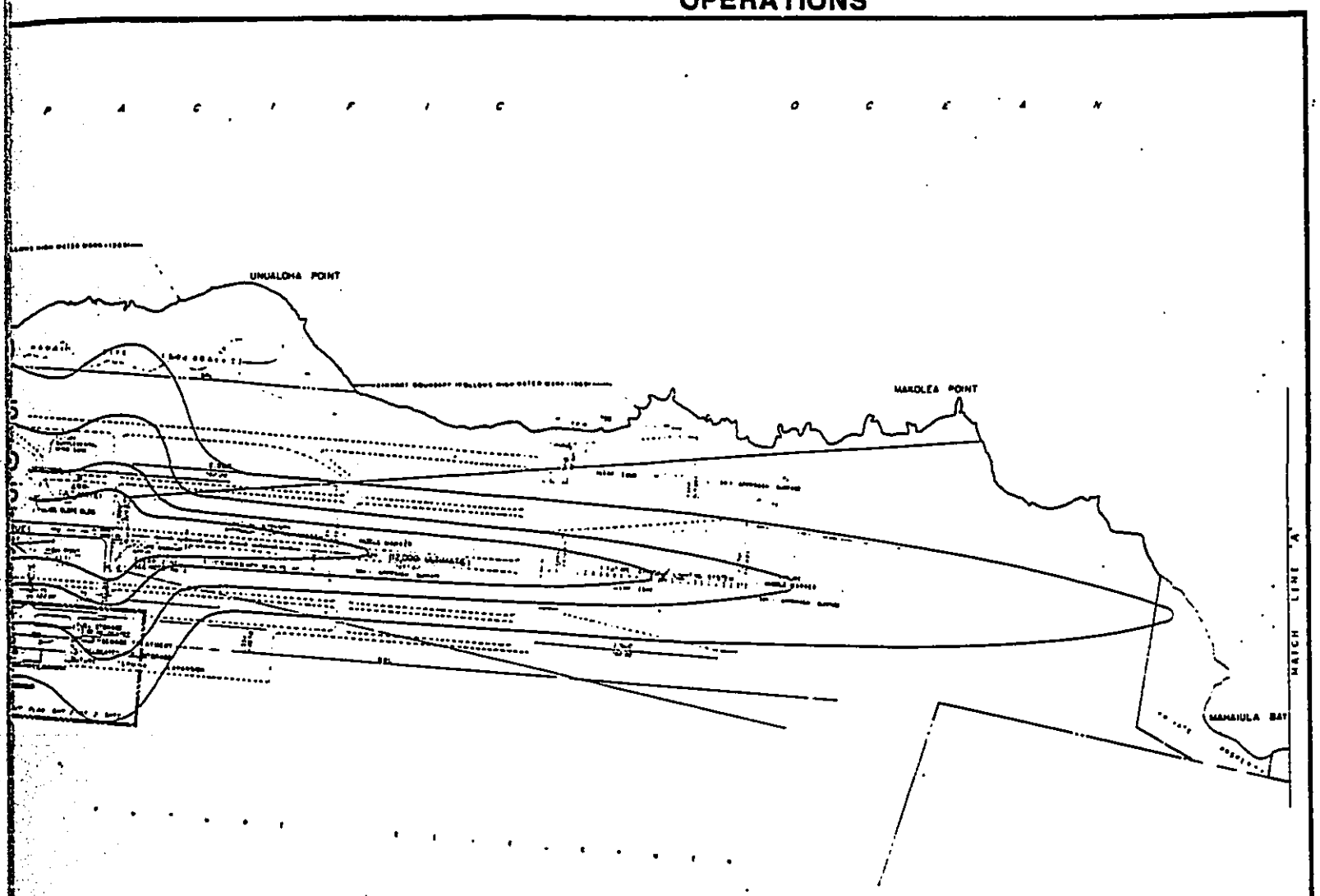
NOTE

1. ALL RUNWAYS ARE LIGHTED IN PART
2. ALL RUNWAY ENDING ON RUNWAY
3. AIRPORT ZONES - APRIL, 1972
4. ALL ELEVATIONS REFERRED TO MEAN SEA LEVEL

AIRPORT DATA	
AIRPORT REFERENCE POINT	
RADIO COORDINATES	
NORMAL MAX TEMP HOTTEST MONTH	
AIRPORT ELEVATION	

LEGEND	
AIRPORT BOUNDARY	
BUILDING RESTRICTION LINE (BRL)	
B.R.L. FAA	
FACILITIES	
FENCE	
GROUND CONTOURS	
BUILDING	

1985 LDN CONTOURS FOR 100% STRAIGHT IN-OUT OPERATIONS



CONTOUR CONDITIONS

*Annual operations...51,500 (1)
*Runway usage.....80% RW17;20%RW35 (2)
*Day/Night.....100%Day;0%Night(2)
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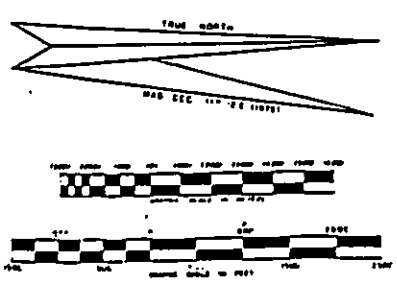
Local,40% of general aviation
*1 engine/2 engine...57% 1 engine;43% 2 engine of general aviation operations
*Aircraft operations.DC-9/737=12,768(turbojet)
Y-11=14694(turboprop)
General Aviation=15,697(reciprocating)
Military=8,341(3)

(1)Source:FAA
(2)Source:Airport Staff
(3)Not included due to lack of pattern data

PREPARED BY GORDON BRICKEN & ASSOCIATES
1821 EAST 17th ST. SANTA ANA,CALIF.92701 JULY,1983



REVISIONS	DATE
PLAN UPDATED	JULY 9, 1971
PLAN UPDATED	JUNE 10, 1975
PLAN UPDATED	NOV 20,1980
AS BUILT & TERMINAL	FEB 17, 1984
PLAN UPDATED	JUNE 10, 1985
FAA APPROVED TO LETTER DATED	
TDA APPROVED WITH TO LETTER DATED	

APPROVED:
DIRECTOR, DEPT OF TRANS., STATE OF HAWAII — DATE 4/24/70
CHIEF, AIRPORTS DIVISION, STATE OF HAWAII — DATE 3/10/70

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII
AIR TRANSPORTATION FACILITIES DIVISION

KE-AHOLE AIRPORT
NORTH KONA - ISLAND OF HAWAII

AIRPORT LAYOUT PLAN

SCALE AS SHOWN
SHEET 1 OF 2 SHEETS
DATE FEBRUARY, 1988

3881,4R

F. PUBLIC ECONOMIC BENEFIT STUDY

July 16, 1986

Mr. Mark H. Hastert
Helber, Hastert, Van Horn & Kimura
Grosvenor Center
PRI Tower, Suite 2590
Honolulu, Hawaii 96813

Public Economic Benefit Study
for Proposed Ooma Resort

Dear Mr. Hastert:

At your request, we have completed a summary analysis of the potential public costs and benefits that may inure as a result of the development of the proposed Ooma resort and high-tech community to be located near Keahole Point, North Kona, Hawaii. The project is preliminary planned to contain a total of 600 hotel rooms, 300 condominium units, up to 80 acres within a low-density high-tech business and industrial park, and a variety of recreational, historic, and scenic amenities which will contribute to the quality resort industry being developed along the Kona-Kohala shoreline.

The subject site contains a total of 313.66 acres, and is identified on State of Hawaii Tax Maps as Third Division 7-3-09, Parcel 4. It is situated approximately 7 miles north of Kailua-Kona Village, circa one mile south of the Keahole Airport facility. Over the past year, The Hallstrom Appraisal Group,

Inc. has prepared a variety of objective, comprehensive studies analyzing the potential market demand for subject development and a Highest and Best Use analysis addressing favorable land use types and densities. It is our assumption that the reader of this letter has access to and is familiar with these previous reports.

Purpose and Function of the Letter. The purpose of this letter is to delineate the areas in which the proposed subject resort development will potentially impact the sphere of public agency resources and quantify (where possible) the costs of providing enhanced services versus the economic benefits that accrue to the community through increased tax payments and other capital infusion.

In order to complete this assignment we have interviewed spokepersons for various governmental agencies regarding the need and costs for additional public services (or impact on existing facilities), and projected the increase in tax levies which would flow to the County and State coffers as a result of the subject's improvement. Ideally, the direct and indirect tax and community economic benefits would more than offset the need for increased outlays for public services. Within this letter we also address other indirect and non-economic issues such as increase in employment opportunities and achievement of stated public goals.

The function of this letter is to provide a summary of direct costs/benefits to the Big Island community as-a-whole resulting from the construction of the Ooma resort and high-tech project. It is our understanding that all or portions of this letter may be incorporated into governmental land

use change applications currently being prepared by yourselves and other developer representatives.

We have made a variety of assumptions regarding the level of commitment anticipated by the developer in enhancing public services to the subject community through contributions, improvements or otherwise. These assumptions are based on the historic actions of other West Hawaii and statewide resort projects, and are not necessarily indicative of specific commitments made in regard to the proposed subject development. Should the Ooma developer be willing to incur additional service enhancements beyond those addressed herein, or fail to provide them, the conclusions of our study would require adjustment.

The research, analysis and opinions comprising this assignment are subject to the standard limiting conditions and assumptions of The Hallstrom Appraisal Group, Inc., in addition to any others which may be contained herein or within previous documents prepared regarding the proposed Ooma resort. All work undertaken has been completed according to the Standard Practices of the American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers.

Introduction. The body of our study is divided into three sections. The first discusses the potential impacts of the proposed resort project on various integral public services, such as fire and police protection, water service, access and other minor concerns. Costs of providing/altering services and ways the developer may mitigate such costs are also addressed.

The second section estimates the increased direct tax payments to the County and State arising from subject development in the form of Real Property Tax roll increases and additional excise tax revenues. Indirect economic benefits, including enhanced regional employment opportunities (through construction and operation of the resort), subsequent income and other tax revenue increases, and other community benefits are summarized.

A cursory review of intangible impacts of the resort project on stated community goals comprises the third section of our study. Such issues as desirability of development of pristine space versus increased public shoreline access, and the "fit" of the proposed subject development within County land use plans are the primary concerns. Secondary issues include whether the project fills any unmet community needs, and its impact on creating the "critical mass" of tourism development needed to enhance the standing of West Hawaii in the visitor industry.

SECTION I: POTENTIAL PUBLIC COSTS

There are six areas of public concern that could potentially be impacted by the proposed subject resort development by requiring enhanced services or infrastructure facilities which may result in a cost to the community. The items are: police protection, fire protection, water service, access from existing roadways, availability of parks, and public education needs.

Each of these items is addressed in the enusing paragraphs, with concern given to parameters of service enhancement,

costs of such enhancement, developer funded alternatives, and overall level of impact on the Kona community.

Indirect costs to the community, such as public services required by the employees of the resort, are not considered in this analysis.

Police Protection

According to Inspector Glory of the County of Hawaii Police Department, the department is required by law to answer all calls which may arise within the proposed subject community whether or not there are personnel increases made to the already taxed police force in the Kona District. However, due to the extent of the increasing demand for services in the Kailua to Keauhou urban corridor, any additional needs resulting from the Ooma development would result in a "stacking of calls" were additional personnel not made available.

Although the inspector noted that funds for five additional positions (four patrolmen, one inspector) have been allocated by the County, he stated that this would still be insufficient to effectively meet the anticipated increase in the number of calls, resulting from both the general growth sector and any subject development, in a timely manner. Currently, the department does have regular beats covering the Keahole Airport during congested periods.

It is doubtful, particularly during the first (resort) phases of development, that the proposed subject project would require a full-time patrolman on the premises, or

result in sufficient numbers of call to justify such an allocation. Also, the security staff of the project would be anticipated to help mitigate the problems created by minor disturbances which would likely comprise the bulk of the Police services need. Yet, the inspector is of the opinion that a full-time position would be required were the corridor stretching from Keahole Point to Kailua-Kona developed as currently envisioned, with several resorts (including the subject), an increase in industrial areas at the subject, at Kaloko and the Kona Industrial Parks, the expansion of Honokohau Harbor, and the development of the proposed National Historic Park.

According to Glory, the current cost of providing one individual patrolman on service is approximately $42,000 per year; this includes wages, benefits, overhead and equipment. One full-time position consists of five individual patrolmen working in three daily shifts throughout the week. Thus, the cost of one full-time position is circa $210,000 annually.

For the purpose of our study, and acknowledging the difficulties associated with estimating service demands in less than one-full individual, we have assumed that calls for service equivalent to one-quarter full-time patrolman position will be required upon the completion of the first hotel within the subject development, increasing to and stabilizing at the need for one-half of a full time position upon the completion of the second hotel facility. During the first phase, this would equate to $52,500 annually (in constant, current dollars), increasing to the stabilized level of $105,000 per year expenditures by the County for

Police protection for the subject. In all likelihood, this estimate is very liberal, as there is little probability that patrolman efforts for the proposed subject resort would be required for six or twelve hours daily, respectively.

Fire Protection

As with police services, the fire protection facilities in the North Kona region are already taxed to the limit according to County of Hawaii Deputy Chief Don Coloma. The existing station at the junction of Palani Road and Queen Kaahumanu Highway, approximately 7 miles south of the subject, is insufficient to meet the projected demand resulting from increased development throughout the region encompassing the subject.

Because of the existing need for service enhancement, the impact of the subject development would be more extensive than merely acquiring additional personnel or equipment, a new station house would be recommended. Also, as stressed by the deputy chief, fire insurance costs for improvements (particular for capital intensive projects such as hotels and condominiums) increase dramatically the further the structure is from a fire station, especially if outside a five mile radius.

In light of the insurance savings, tax breaks associated with improvement, and confidence instilled by the proximity of service, the Mauna Lani Resort formed a co-op of the South Kohala resort developers to fund construction of a fire station on a donated parcel near the Mauna Lani resort. The cost of development (not including the donated land) was

$1.1 million dollars, according to Coloma, for a three bay station, furnishings and fixtures other than fire-fighting equipment. The co-op also purchased a $70,000 medical unit. Beyond the facility, the County will spend $416,751, Coloma said, for the necessary engines and other equipment as a start-up cost.

A minimum of four persons per shift (one officer and three drivers/firemen) are required to man such a facility, but due to the scheduling efficiencies of fire service, a total of only 12 persons are needed to man the station on a full-time basis. As with police personnel, the cost of maintaining one fireman in-service is circa $42,000 annually. Or a total of approximately $504,000 per year for a station as is being cooperatively developed by the South Kohala resorts.

It is doubtful if the planned subject resort could justify the expense of constructing an on-site fire station on an individual basis as part of the first phase of development. However, it is likely that a similar co-operative as found in South Kohala would be formed in the Keahole Point region among the subject and other resort or other developments should they be approved. Such a station would benefit the County by providing service to the subject, other coastal developments, and the Kalaoa residential subdivisions which are currently on the fringe of effective fire protection services.

For the purpose of our projections, we have assumed that fire protection services for the Ooma community will be improved in a similar fashion as was followed at Mauna Lani

and its co-operative partners, i.e. with in-house services (as much as possible) until the planning/construction of the second hotel/resort expansion phase commences, and then subsidizing a facility on-site or in the near vicinity. Thus, immediate cost to the County upon the beginning of subject development will not be substantial, but will place additional burdens on the existing facilities; upon construction of the fire station (prior to second hotel development) the County would be liable for start-up equipment purchases of approximately $420,000 and personnel costs of $504,000, in current dollars.

As the co-operatively improved facility would also service nearby developments, not all of the start-up and operational costs would be attributable to the subject development. We have therefore assumed that one-half of the costs will be ascribed to the proposed destination resort, or roughly $210,000 prior to the construction of the second hotel in start-up cost, and $252,000 in personnel expenses on an annual basis thereafter.

Water Service

As discussed in our previous study on the subject, prepared by ourselves and others, the resort would be able to receive public water supply were there sufficient water resources available. Although the problems affecting current supply are being resolved in a timely manner, the difficulty lies in transmission. There is a 16" line along Queen Kaahumanu Highway which would be substantial enough for subject use, however, the line terminates at Honokohau Small Boat Harbor, and continues on thereafter (to the airport) as a 12" line,

which has insufficient capacity for the proposed Ooma development.

According to Mr. Quirino Antonio, Jr., Staff Engineer with the County of Hawaii Water Supply Department, should the subject seek County supply (if available) the developer would have to fund the cost of any transmission line enhancement necessary to transport the water to the site. The line would become the County property, and the developer unable to recoup capital investment from any subsequent developments which would share the expanded line.

Therefore, there would be no additional costs to the County in regards to supplying water to the subject. It is assumed that the individual unit hook-up costs currently estimated at circa $4,000 per unit would more than offset any source (well) development costs. In this regard, the County may, in fact, profit slightly from supplying water service to the subject both by having the developer pay for any line expansion (which could serve later developments), and through the hook-up costs, which also include a allocations for transmission and storage that may not be required for the subject.

Access

Queen Kaahumanu Highway is designed to be a limited-access, high-speed, high-volume roadway, as described at-length in foregoing analyses of the proposed Ooma development. Although a substantial amount of long-term development in the Keahole Point area may provide an impetus for expansion

of the existing roadbed from two to four lanes, this is not foreseen for many years by the State.

According to developer representations, the subject site has the right to access onto the highway via an existing jeep trail easement which extends from the subject parcel across State of Hawaii land to the highway. For the purpose of this report, we have assumed that this "easement" would permit sufficient access area necessary for subject development, or be readily expanded. The financial responsibility of improving the access, complete with turnpockets and accel-decel lanes, lies entirely upon the developer, and not with any governmental agencies.

According to Mr. Bruce McClure, District Design Engineer for the State of Hawaii Transportation Department Division Right-of-Way, Hawaii County Division, who was interviewed during our original study, the cost of developing such a "fully-channelized" intersection is currently circa $200,000 to $500,000. He noted the State is stringent regarding improvement of the intersections, and will not move the designated access easement from the points delineated on the existing maps except under rare circumstance. In this respect, the state property buffering the subject from the highway may be indirectly affected, as the development of the subject access may impact future development planning decisions.

In our projection process, we have therefore not included any costs to the State of County for access development, as the existing roadway is sufficient for the proposed

subject's resort use, and the cost of constructing access ways is entirely borne by the developer.

Parks and Recreation

Preliminary subject plans call for a public oceanfront park as part of the Ooma resort and research community, thus enabling ease of access to the shoreline, which is currently difficult for the average Big Island citizen to reach. As discussed following this is in keeping with the goals of the County to increase public oceanfront access.

Both the Mauna Lani and Waikoloa Beach Resorts have self-developed public parks and shoreline trail systems to enhance oceanfront access. According to Pat Engeljard, a supervisor with the Hawaii County Parks and Recreation Department, these facilities are maintained by the respective resort developers at no cost to the County. She stated the County would pursue the establishing of a public access area in any major proposed shoreline development, but would likely request that the developer maintain the park as do the two resorts cited.

We have therefore concluded that the County will absorb no additional expenses as a result of the development of a public access park area within the planned subject project, that all costs will be borne by the developer.

Education

In our opinion, it is highly unlikely that the proposed subject resort and high-tech community will be the residence

for a significant number of school-age children, as evidenced in resort projects throughout the state. As such, we do not foresee the need to expand any existing facilities as a result of its construction, and it is doubtful that any overcrowding of classrooms (beyond current levels) would ensue.

Should public education services be required, transportation to the schools, not facility or faculty enhancement, is the only conceivable cost factor. We note that school buses already extend their routes into the Kona Palisades subdivision, less than four miles from the subject site, and it is probable that re-routing of one bus would be more than sufficient to handle any demands created by the Ooma development at minimal cost.

Thus, our cost projections do not contain any allowance for public costs resulting from the need for public education services. Conversely, the high-tech component of the subject project could provide positive educational effects in the community education process by serving as an educational tool, and by offering skilled employment opportunities.

Summary

Based on our analysis, we foresee only two areas of significant public expenditures associated with the proposed subject development, for police and fire protection.

In regard to police protection, we have estimated the cost (in current dollars) at circa $52,500 per year during the

first phase of development, increasing to a stabilized level of $105,000 annually upon the completion of the second phase of development (after the second hotel is open for occupancy and the high-tech business and industrial construction commences).

For fire protection services, we do not forecast any appreciable expenditures by the County during the first phase of development. However, assuming a co-operative auxiliary fire station is constructed in the area by the subject and other developers, prior to completion of the second phase of subject development, the County would incur start-up costs at that time of approximately $210,000 which would be ascribed to the subject, and a proportionate subject share of $252,000 in annual operating expenses.

It is assumed that the subject developer would pay any and all costs associated with extending needed infrastructure (roads, piping, etc...) from the State-run Hawaii Ocean Science and Technology park into any related subject improvement area.

We note, that these assumptions are quite liberal, in that service arising from subject development of a fire station facility and enhanced police protection would benefit an increasing number of residents and developers in the Keahole Point area other than the subject, which is being ascribed a large portion of these service increases.

SECTION II: POTENTIAL PUBLIC FINANCIAL BENEFITS

There are four areas in which the state and County purses will benefit from the proposed subject development: through increased property tax revenues, excise tax on the various operations of the resort, state income taxes paid by the employees, and the other tax collections arising from the expenditure of employee wages and purchased goods which trickle through the local economy. Income and other taxes arising from wages paid to construction workers was not included in this study, because it is unknown the number of workers which will be required for the various development phases, and the length of their time of employ at the site. However the tax revenues generated by the efforts of these workers could be substantial.

We have constructed a 13-year cash flow model to depict the levels of public tax income generated by the first three levies listed above. The model is displayed on Table 1. Due to the lack of data regarding probable gross sales revenue levels for the high-tech business and industrial components of the proposed Ooma development, we have omitted these totals from our study. As such, the excise tax totals are definitely below likely levels.

All revenues and expenses shown ARE IN CURRENT DOLLARS, being based upon the tax rates, estimated expenses, property values and income levels existing at the time of our study. As such, THE REVENUES ARE LIKELY TO BE UNDERSTATED over time, as typically, tax rates, property value appreciation, vacation costs, and workers wages increase more rapidly than the general rate of inflation.

For the purpose of forecasting revenues we have made the following assumptions:

Property Tax

We have assumed that County zoning will be approved for the entire resort at one time, and the construction will begin on the first phase as soon as zoning approvals are granted. We have also assumed zoned hotel acreage will be assessed at circa $750,000 per acre, multi-family acreage at $500,000 per acre, and the high-tech business and industrial area at $175,000 per acre. All remaining acreage (for the golf course and other recreational areas, which will remain designated as open spaces) and any support housing acreage that maybe included was assumed to be assessed at a minimal rate of $12,000 per acre.

The assessed values selected are slightly below the market values for the acreage (based on cursory analysis of our firm's files) were the subject community in-place at the time of our study. In this regard, our conclusions may be understated were the County to adopt an aggressive assessment posture toward the subject.

Improvement values for hotels were conservatively estimated according to anticipated construction costs at approximately $175,000 per room (compares with the $200,000 per room cost of the Mauna Lani Bay Hotel). Luxury water oriented condominium unit improvement values were estimated at the projected average market sales price of $350,000 per unit. For the circa 80-acres comprising the proposed high-tech development acreage improvement costs (a basis of

assessment) were estimated for: the business/office, administrative, research and warehouse, or commercial area of the park, at $50 per square foot; with the industrial and production construction costs at $30 per square foot. These estimates are conservative relative to development costs incurred at other North Kona light industrial parks.

Based on State surveys prepared for the HOST project abutting the subject and our experience with other west Hawaii developments, it is probable the Floor Area Ratio (FAR) for the "commercial" area of the high-tech component would be approximately .50, and the "industrial" area about .20. This would result in up to 21,800 square feet of improvement space per acre of "commercial" area, and 8,750 square feet of space per "industrial" acre. The total square footage of commercial development would be 490,000, assuming 75 percent (or 22.5 acres) of the 30 acre area is saleable after infrastructure development. Industrial improvement space would total 327,000 square feet on the 50 acres so designated, under similar assumptions.

For ease in the projection process, we have assumed that assessment for the improvements will be incurred in the year the property is constructed, and that the condominium units will be constructed only as successfully marketed (i.e. with no market overhang). This latter assumption, while being the only realistic way to forecast property tax revenues in a summary study such as this, again contributes to the slight understatement of revenues, in that typically an entire condominium project is built at once, and the developer must pay applicable property taxes for each unit until it is successfully marketed. Condominium units are

assumed to be absorbed at the rate of 50 units per year over a six year period.

In the course of this limited study, and review of HOST park reports, we do not claim expertise regarding the demand for the high-tech component of the Ooma community. However, an absorption period of ten years would appear appropriately conservative based on the available data. It is our assumption that this light industrial development will commence with the second phase of resort construction, in year four of operation.

The applicable tax rates for 1985-86, as shown below, were employed in our study.

	Tax Rate per $1,000 Assessed Value	
Use	Land	Building
Hotel/Resort	$10.00	$8.50
Light Industrial	10.00	8.50
Conservation	10.00	8.50

State Excise Tax

A four percent state tax is applicable to all gross sales revenues generated by the resort and its components. In the subject, this would include rentals of hotel rooms and use of a hotel facilities (restaurants, shops, concessionaire and other income); rental of condominium units on a transient basis; golf course revenues (green fees, pro shop, etc.); and any revenues generated by business/production activity in the high-tech park.

The following paragraphs summarize our preliminary assumptions regarding the proposed subject development. We note that these assumptions are based on prevailing market levels and our perception of the quality of the proposed development. Should more specific plans become available, we reserve the right to adapt our projections.

We have estimated potential excise tax revenues only for the hotel, condominium and golf course components of the subject community, as our firm has obtained significant market operational data for these uses through our experience. Again, we cannot be as specific regarding the high-tech component as specific use studies are outside our expertise, and were not included in the assignment scope.

Therefore, any excise tax revenues which would result from activity in the 80-acre high-tech area is omitted from the tax revenue totals. As such, our projections of State excise tax receipts at Ooma are identifiably understated, perhaps significantly so. This factor should be considered when analyzing the figures on the table.

It is also noted, that we have not calculated excise tax revenues for other resort sales income such as long-term condominium unit rental and similar minor items. These tax receipts were considered insignificant.

Hotel Revenue. Beyond room rental receipts, there are other income generating departments within a hotel facility. On an industry-wide basis, income from these items are projected as a function of (or percentage ratio to) room revenue forecasts. The following table depicts our

assumption for the subject hotels based on prevailing West Hawaii market trends and a daily room rate of $150 per night after all discounts.

		Gross Income Levels		
Department	Ratio to Room Revenues	Daily per Occupied Room	Per Room Annually (at 80% Occupancy)	Stabilized Annual Income Based on 80% Occupancy(1)
Room Revenues		$150.00	$43,800	$26,280,000
Food Sales	50.00%	75.00	21,900	13,140,000
Beverage Sales	18.00	27.00	7,884	4,730,400
Other Income(2)	10.00	15.00	4,380	2,628,000
		$267.60	$77,964	$46,778,400
Total State Excise Tax Per Hotel Room per year (4% of $77,964, rounded)			$3,119	
Total Annual State Excise Tax Based on 80% Stabilized Occupancy (4% of $46,778,400, rounded)				$1,871,136

(1) Stabilized income, in current dollars, for all 600 hotel rooms in subject resort.

(2) Includes minor operating departments, concessionaire income, space lease rental, and other income sources.

Condominium Rental. We have assumed that 70 percent of the finished condominium units will be made available for rental on a transient basis, a figure slightly below the prevailing average. We also assume that those units place in such a hotel pool will achieve stabilized occupancy rates of circa 70 percent annually, and room rates of $175 per night. Typically, there are no other revenue sources in a condominium rental pool.

Thus, the quantification of excise tax levels is as follows:

	Gross Income Levels	
	Daily Per Occupied Unit	Per Unit Annually (at 70% Occupancy)
Condominium Unit Rental	$175.00	$44,713
Total Excise Tax Per Rentable Condominium Unit per Year (4% of 44,713, rounded)		$ 1,789

Golf Course. As with hotels, golf course revenues for the various operating departments within a facility are projected as a function of the prevailing green fee. The table below displays the calculation for the proposed subject course and clubhouse according to current market standards, with the course operating at 70 percent of reasonable capacity (or 70,000 rounds per year, and a cost (after all discounts of $25 per round in green fees.

Department	Ratio Green Fees Revenues	Per Round	At 70,000 Rounds Annually
Green Fees		$25.00	$1,750,000
Golf Cart Rental	40.00%	10.00	700,000
Club Storage	1.00	0.00	17,500
Misc. Fees & Dues	1.00	0.25	17,500
Equip. Rental	10.00	2.50	175,000
Pro Shop Sales	30.00	7.50	525,000
Rest./Lounge Sales	35.00	8.75	612,000
Other(1)	2.00	0.50	35,000
Totals		$54.75	$3,832,500
Total Annual Excise Tax Generated by Golf Course Facility (4% of $3,832,500)			$ 153,300

(1)Includes driving range, lessons, etc.

State Income Tax

The third item within our public financial benefit projections is the state income tax which will be paid by resort employees. Of all the benefit items, this is the most difficult to project, as management philosophy and other as yet unknown variables have a significant impact on number and renumeration of employees.

For the resort component of the subject community, we have assumed that there will be 1.75 employees for each hotel room in operation, .75 employees for each condominium unit in rental pools, 50 employees involved in the golf course operation, and 100 employees involved in upkeep, security, and administration of the resort as-a-whole. All estimates are for full-time employees, with allowances for round-the-clock services as is typical of quality resorts.

In our resort income tax revenue forecasting, we have assumed the average annual renumeration on an overall basis is $15,000, acknowledging the great disparity between non-union retail employees and resort upper-management personnel. Furthermore, we have assumed that the effective income tax rate is 3 percent. Hotel and condominium positions would be filled as the units are placed in operation, all others (golf and resort administration) commence with the opening of the resort.

For the high-tech component, our employment statistics are taken from a study prepared for the state regarding the Hawaii Ocean Sciences and Technology (HOST) park which calculated the creation of ten jobs per acre for the

"commercial" area of that facility as developed, and one job per acre for the production/aquaculture (or industrial) area. As the subject could be viewed as an extension of the HOST park, or at least similarly developed, we have used the jobs/acre figures for the Ooma light industrial average, assuming the 80 acres (30 commercial, 50 industrial) are developed on a 75 percent of total acreage basis (making allowance for infrastructure).

Average salary for high-tech area employees (in 1986 dollars) was forecast at $22,000 per year per employee. We have assumed an effective state income tax rate of 35 percent; or each employee pays $770 per year in Hawaii income tax. Jobs are assumed to be created in the year that the acreage is absorbed and improved.

Other Tax Revenues

There are a variety of minor, indirect, or difficult to quantify tax revenues which will be generated as a result of the proposed Ooma resort project. Among them are: excise tax on materials and services purchased for construction and development, which would be anticipated to be an amount in excess of $9,400,000 (based on a total development cost of circa $235,000,000); income taxes paid by construction workers; state conveyance taxes for the recordation of the privately-held units and homes in the resort; and, other levies and fees not foreseen at this time.

Additionally, on a stabilized basis, the estimated 1,620 full-time employees which will work in the Ooma community upon its completion will take-home some $26,138,000 annually

in wages. Typically, it is assumed that each dollar in wages is multiplied by circa 1.5 to 2.25 as it flows through the local economy, and the effective tax rate on such expenditures (accounting for excise, income and other taxes) is circa 7.5 percent of the total monies involved. Using a multiplier of two-times, the wages from the proposed subject resort employees will grow to circa $52,276,000 annually as it moves through the Big Island economy, creating extra taxes of approximately $3,921,000 per year.

Summary

There is no doubt, that the proposed Ooma multi-use project would prove to be beneficial to the tax coffers of the state and county. As shown on Table 1, property and excise taxes will constitute the majority of revenues, with employee income taxes and other taxes providing, substantial but secondary revenues.

On a stabilized basis the subject development will contribute some $5,790,700 per year to State and County purses in direct net tax benefits upon its completion. This amount can be divided between $2,577,310 to the County of Hawaii, and $3,213,390 to the State. This does not include the nearly $4 million annually in other tax revenues generated through economic multipliers in the community, or other overall island-wide economic benefits resulting from increased employment levels.

TABLE 1

ESTIMATE OF POTENTIAL TAX REVENUES GENERATED
BY THE PROPOSED OCEAN RESORT/HIGH TECH COMMUNITY
Oahu, North Kona, Hawaii

All Amounts Based on Current Dollars and Tax Levels

YEAR	CURRENT	ANNUALLY UPON REZONING	YEAR ONE OF OPERATION	2	3	4	5	6	7	8	9	10	11	12	13	STABILIZED
PROPERTY TAXES (1)																
Assessed Values																
Land:																
Hotel/Resort (2)	$0	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000	$37,500,000
Light Industrial	$0	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000	$16,500,000
Conservation/Open	$3,763,920	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000	$2,076,000
Total Land Assessment	$3,763,920	$53,576,000	$53,576,000	$53,576,000	$53,576,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000	$56,076,000
Buildings:																
Hotel	$0	$0	$52,500,000	$52,500,000	$52,500,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000
Condominium	$0	$0	$0	$17,500,000	$35,000,000	$52,500,000	$70,000,000	$87,500,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000	$105,000,000
Commercial (3)	$0	$0	$0	$0	$0	$2,450,000	$4,900,000	$7,350,000	$9,800,000	$12,250,000	$14,700,000	$17,150,000	$19,600,000	$22,050,000	$24,500,000	$24,500,000
Industrial (3)	$0	$0	$0	$0	$0	$980,000	$1,960,000	$2,940,000	$3,920,000	$4,900,000	$5,880,000	$6,860,000	$7,840,000	$8,820,000	$9,800,000	$9,800,000
Total Bldg. Assessment	$0	$0	$52,500,000	$70,000,000	$87,500,000	$160,930,000	$181,860,000	$202,790,000	$223,720,000	$227,150,000	$230,580,000	$234,010,000	$237,440,000	$240,870,000	$244,300,000	$244,300,000
Property Tax Lines																
Land:																
Hotel/Resort (2)	$0	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000	$375,000
Light Industrial	$0	$160,000	$160,000	$160,000	$160,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000	$165,000
Conservation/Open	$37,639	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760	$20,760
Total Land Taxes	$37,639	$535,760	$535,760	$535,760	$535,760	$560,760	$560,760	$560,760	$560,760	$560,760	$560,760	$560,760	$560,760	$560,760	$560,760	$560,760
Buildings:																
Hotel	$0	$0	$446,250	$446,250	$446,250	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500
Condominium	$0	$0	$0	$148,750	$297,500	$446,250	$595,000	$743,750	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500	$892,500
Commercial (3)	$0	$0	$0	$0	$0	$20,825	$41,650	$62,475	$83,300	$104,125	$124,950	$145,775	$166,600	$187,425	$208,250	$208,250
Industrial (3)	$0	$0	$0	$0	$0	$8,330	$16,660	$24,990	$33,320	$41,650	$49,980	$58,310	$66,640	$74,970	$83,300	$83,300
Total Bldg. Taxes	$0	$0	$446,250	$595,000	$743,750	$1,367,905	$1,545,810	$1,723,715	$1,901,620	$1,930,775	$1,959,930	$1,989,085	$2,018,240	$2,047,395	$2,076,550	$2,076,550
TOTAL PROPERTY TAX REVENUES	$37,639	$535,760	$982,010	$1,130,760	$1,279,510	$1,868,665	$2,046,570	$2,224,475	$2,402,380	$2,431,535	$2,460,690	$2,489,845	$2,519,000	$2,568,155	$2,577,310	$2,577,310
EXCISE TAX REVENUES (4) (5)																
Generated by:																
Hotels	$0	$0	$535,700	$535,700	$535,700	$1,871,400	$1,871,400	$1,871,400	$1,871,400	$1,871,400	$1,871,400	$1,871,400	$1,871,400	$1,871,400	$1,871,400	$1,871,400
Condominium Rentals	$0	$0	$0	$62,615	$125,230	$187,845	$250,460	$313,075	$375,690	$375,690	$375,690	$375,690	$375,690	$375,690	$375,690	$375,690
Golf Course	$0	$0	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300	$153,300
TOTAL EXCISE TAX REVENUES	$0	$0	$1,089,000	$1,151,615	$1,214,230	$2,212,545	$2,275,160	$2,337,775	$2,400,390	$2,400,390	$2,400,390	$2,400,390	$2,400,390	$2,400,390	$2,400,390	$2,400,390

Table Continued on Next Page.

TABLE 1
CONTINUED

YEAR	CURRENT	ANNUALLY UPON REZONING	YEAR ONE OF OPERATION	2	3	4	5	6	7	8	9	10	11	12	13	STABILIZED
INCOME TAX REVENUES (4) (6)																
Through Employment By:																
Hotels	$0	$0	$236,250	$236,250	$236,250	$472,500	$472,500	$472,500	$472,500	$472,500	$472,500	$472,500	$472,500	$472,500	$472,500	$472,500
Condominium Rentals	$0	$0	$0	$111,813	$223,625	$335,438	$447,250	$559,063	$670,875	$670,875	$670,875	$670,875	$670,875	$670,875	$670,875	$670,875
Golf Course	$0	$0	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500	$22,500
Commercial (3) (7)	$0	$0	$0	$0	$0	$17,325	$34,650	$51,975	$69,300	$86,625	$103,950	$121,275	$138,600	$155,925	$173,250	$173,250
Industrial (3) (7)	$0	$0	$0	$0	$0	$2,888	$5,775	$8,663	$11,550	$14,438	$17,325	$20,213	$23,100	$25,988	$28,875	$28,875
Resort Administration	$0	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000
TOTAL INCOME TAX REVENUES	$0	$45,000	$303,750	$415,563	$527,375	$895,650	$827,675	$959,700	$691,725	$711,938	$732,150	$752,363	$772,575	$792,788	$813,000	$813,000
TOTAL TAX REVENUES																
To County of Hawaii	$37,639	$535,760	$982,010	$1,130,760	$1,279,510	$1,868,665	$2,046,570	$2,224,475	$2,402,380	$2,431,535	$2,460,690	$2,489,845	$2,519,000	$2,568,155	$2,577,310	$2,577,310
To State	$0	$45,000	$1,392,750	$1,467,178	$1,541,605	$2,668,155	$2,902,835	$2,997,475	$3,092,115	$3,112,328	$3,132,540	$3,152,753	$3,172,965	$3,193,178	$3,213,390	$3,213,390
TOTALS	$37,639	$580,760	$2,374,760	$2,597,938	$2,821,115	$4,536,820	$4,949,405	$5,221,950	$5,494,495	$5,543,863	$5,593,230	$5,642,598	$5,691,965	$5,761,333	$5,790,700	$5,790,700
COSTS TO PROVIDE SERVICES																
To County of Hawaii																
Police Protection	$0	$0	$52,500	$52,500	$52,500	$105,000	$105,000	$105,000	$105,000	$105,000	$105,000	$105,000	$105,000	$105,000	$105,000	$105,000
Fire Protection	$0	$0	$0	$0	$210,000	$252,000	$252,000	$252,000	$252,000	$252,000	$252,000	$252,000	$252,000	$252,000	$252,000	$252,000
Sub-total	$0	$0	$52,500	$52,500	$262,500	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000
To State	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS	$0	$0	$52,500	$52,500	$262,500	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000	$357,000
NET REVENUE PROVIDED																
To County of Hawaii	$37,639	$535,760	$982,010	$1,130,760	$1,279,510	$1,868,665	$2,046,570	$2,224,475	$2,402,380	$2,431,535	$2,460,690	$2,489,845	$2,519,000	$2,568,155	$2,577,310	$2,577,310
To State	$0	$45,000	$1,392,750	$1,467,178	$1,541,605	$2,668,155	$2,902,835	$2,997,475	$3,092,115	$3,112,328	$3,132,540	$3,152,753	$3,172,965	$3,193,178	$3,213,390	$3,213,390
TOTALS	$37,639	$580,760	$2,374,760	$2,597,938	$2,821,115	$4,536,820	$4,949,405	$5,221,950	$5,494,495	$5,543,863	$5,593,230	$5,642,598	$5,691,965	$5,761,333	$5,790,700	$5,790,700

(1) Paid to Hawaii County.
(2) Includes hotel and multifamily acreage.
(3) Within 80-acre ocean sciences oriented high-tech light industrial park.
(4) Paid to State.
(5) Does not include excise taxes paid in the conduct of business in the 80 acre high-tech light industrial park, which are indeterminable at this time.
(6) Assumes average salary of $15,000 annually per employee, with effective income tax rate of 3% or $450 is paid in income taxes per employee per year.
(7) Workers in high-tech light industrial area assumed to have average annual salaries of $22,000 with an effective tax rate of 3.506% or $770 is paid in income taxes per employee per year.

Source: The Hallstrom Appraisal Group Inc., July 1986.

SECTION III. POTENTIAL INTANGIBLE IMPACTS

In addition to the community-wide economic benefits discussed above, we foresee three other areas of potential concern in regard to public costs/benefits that may be associated with the proposed Ooma resort/high-tech development. They are: the dilemma of increased public shoreline access versus desirability of maintaining pristine open space; does the planned development concur with reasonable public planning goals; and, the diversified employment opportunities the project would provide.

In regard to the first issue, it is our opinion that the subject development would benefit the Kona community by providing easy access to a usable beachfront (which would be developed by the resort). Currently, there are only three significant beaches in the Keahole Point to Keahou Resort urbanized corridor: Kahaluu Beach Park, Disappearing Sands Beach Park, and the beach fronting the Honokohau Fishpond. Kahaluu Beach Park, and Disappearing (or Magic) Sands Park, which receives its name from the fact the sandy beach is often lost during high wave action are heavily used and often crowded. The beach at Honokohau is a quality strand, but requires a lengthy walk from available parking at the Honokohau small boat harbor, and has an established history as a nudist beach, which deters many area families from its use.

A public beach at the subject would mitigate the need to travel as far north as Anaehoomalu or Hapuna in order to enjoy a developed drive-up beach park facility, thereby filling a significant need in the Kona community. This is

particularly so as the residential areas of Kealakehe and Kalaoa are further developed. The lack of available, accessible white sand beaches is a well-known problem in North Kona, and has proven to be a detriment to the visitor industry in the region, and is a common complaint among residents. In this respect, the subject would be helping achieve a long-standing County goal of increasing public access to the Kona shoreline, as well as providing needed additional recreational facilities that are open to the public, proximate to the residential areas.

As to the argument that the development would be destroying pristine or historically significant areas, we note that the Keahole Point to Kailua-Kona corridor does not meet the definition of pristine, with a large airport facility, boat harbor, high-speed highway and new industrial development all within a short distance from the site. Additionally, there are rock quarries, the regional dump, and an ever increasing number of developments taking place on the lower Hualalai slopes (including the Keahole Agricultural Park) that are turning the corridor into the urban expansion area of the Kailua community. There are no significant archaeological sites directly on the subject property, and the near offshore waters are constantly traversed by boats heading from the harbor to "The Grounds" off of Keahole Point. In light of the trend of development, and the demand for accessible ocean frontage near the Kailua urban area, it would seem prudent to establish pristine/conservation zones in areas where development can be more fully controlled, and not disturbed by existing negative influences as exist near the subject, such as in the more northerly areas of the North Kona District, or in South Kohala.

As to meeting reasonable planning goals, in addition to those addressed above, the subject is in a prime location to take advantage of the existing infrastructure, which was developed for the purpose of enhancing the economic development of the region. The Keahole Airport, the Hawaii Natural Energy Laboratory, Honokohau Small Boat Harbor, Old Airport Park, and the services available in Kailua-Kona all enhance the reasonableness of placing a multi-use community at Ooma. The outlying resorts in South Kohala do not stimulate the income of Kailua-Kona to a significant degree, and are, in fact, somewhat of a drain on available resources due to the long drive to them from the airport, harbor or town; and the prolonged commute for the majority of their workforce, which is located within five miles of the subject.

The final primary intangible impact of the subject development would be its ability to create numerous skilled and technical employment opportunities within its high-tech component. Higher paying and potentially the creator of additional jobs, high-tech employment is a diversive opportunity currently limited in the County. Such quality jobs can have a ripple effect throughout the community stimulating educational goals and entrepreneurial interest.

In this respect, by providing a uniquely wide variety of employment types, the proposed subject project could be more beneficial to the County over time than are other planned resort-only developments.

In addition to these community attributes, others have been discussed in previous studies prepared by ourselves and

others. The most notable is that the 600-plus acres on the shoreline commencing 1/2 mile south to the subject (stretching to Honokohau Harbor) is to be developed as a National Historic Park. A quality resort near the park would be an excellent addition to the Kona tourism plant, and help revive the Kailua-Kona visitor industry which is now hampered by the competition from the South Kohala projects.

SUMMARY

Based on our investigation and research, as summarized in this letter of opinion, it is our conclusion that the proposed subject resort/high-tech development would prove advantageous to Hawaii County, and the North Kona community by increasing diversified employment opportunities, tax revenues, and shoreline access, at relatively small cost to the County budget or the quality of the Keahole Point-Kailua corridor.

The income generated by the increased tax structure would more than offset any required public expenditures, and would prove to be a strong utilization of existing infrastructure facilities.

We appreciate the opportunity to continue being of service to you in this quality resort project. Please contact us if

further clarification of our assumptions or calculations are desired.

Respectfully submitted,

THE HALLSTROM APPRAISAL GROUP, INC.

James E. Hallstrom, Jr., MAI, SRPA

Tom W. Holliday

JEH:rc 1401a

The research, analysis, conclusions, and certification for valuation or market studies performed by The Hallstrom Appraisal Group, Inc. are subject to and influenced by the following:

LIMITING CONDITIONS AND ASSUMPTIONS

1. The report expresses the opinion of the signers as of the date stated in the letter of transmittal; and in no way has been contingent upon the reporting of specified values or findings. It is based upon the then present condition of the national and local economy and the then purchasing power of the dollar.

2. Legal descriptions used within the report are taken from official documents recorded with the State of Hawaii, Bureau of Conveyances, or have been furnished by the client, and are assumed to be correct. No survey is made for purposes of the report.

3. Any sketches, maps, plot plans, and photographs included in the report are intended only to show spatial relationships and/or assist the reader in visualizing the property. They are not measured surveys or maps and we are not responsible for their accuracy or interpretive quality.

4. It is assumed that the subject property is free and clear of any and all encumbrances other than those referred to herein, and no responsibility is assumed for matters of a legal nature. The report is not to be construed as rendering any opinion of title, which is assumed to be good and marketable. No title information or data regarding easements which might adversely affect the use, access, or development of the property, other than that referenced in the report, was found or provided. The property is analyzed as though under responsible ownership and competent management.

5. Any architectural plans and/or specifications examined assume completion of the improvements in general conformance with those documents in a timely and workmanlike manner.

6. Preparation for, attendance, or testimony at any court or administrative hearing in connection with this report shall not be required unless prior arrangements have been made therefor.

7. If the report contains an allocation of value between land and improvements, such allocation applies only under the existing program of utilization. The separate valuations for land and building must not be used in conjunction with any other purpose and are invalid if so used.

8. If the report contains a valuation relating to a geographical portion or tract of real estate, the value reported for such geographical portion relates to such portion only and should not be construed as applying with equal validity to other portions of the larger parcel or tract; and the value reported for such geographical portion plus the value of all other geographical portions may or may not equal the value of the entire parcel or tract considered as an entity.

9. If the report contains a valuation relating to an estate in land that is less than the whole fee simple estate, the value reported for such estate relates to a fractional interest only in the real estate involved, and the value of this fractional interest plus the value of all other fractional interest may or may not equal to the value of the entire fee simple estate considered as a whole.

10. It is assumed that there are no hidden or inapparent conditions of the property, subsoil, or structures which would render it more or less valuable; we assume no responsibility for such conditions or for engineering which might be required to discover such factors.

11. Nothing in the report should be deemed a certification or guaranty as to the structural and/or mechanical (electrical, heating, air-conditioning, and plumbing) soundness of the building(s) and associated mechanical systems, unless otherwise noted.

12. Information, estimates, and opinions provided by third parties and contained in this report were obtained from sources considered reliable and believed to be true and correct. However, no responsibility is assumed for possible misinformation.

13. Possession of the report, or a copy thereof, does not carry with it the right of publication, and the report may not be used by any person or organization except the client without the previous written consent of the appraiser, and then only in its entirety. If the client releases or disseminates the reports to others without the consent of the appraiser, the client hereby agrees to hold the appraiser harmless, and to indemnify the analysts from any liability, damages, or losses which the analysts might suffer, for any reason whatsoever, by reason of dissemination of the report by the client. Further, if legal action is brought against the analyst by a party other than the client concerning the report or the opinions stated therein, the client agrees, in addition to indemnifying the analysts for any damages or losses, to defend said analysts in said action at client's expense. However, nothing herein shall prohibit the client or analysts from disclosing said report or opinions contained therein as may be required by applicable law.

14. Disclosure of the contents of this report is governed by the By-Laws and Regulations of the American Institute of Real Estate Appraisers of the National Association of Realtors. Neither all nor any part of the contents of this report (especially any conclusions as to value, the identity of the appraisers or the firm which they are connected, or any reference to the American Institute of Real Estate Appraisers or to the M.A.I. designation or to the Society of Real Estate Appraisers or the S.R.P.A. designation) shall be disseminated to the public through advertising media, public relations media, news media, sales media, or any public means of communication without the prior consent and approval of the appraisers.

CERTIFICATION

We hereby certify that, to the best of our knowledge and belief, the statements of fact contained herein are true and correct. It is further certified that the reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are our personal, unbiased professional analyses, opinions, and conclusions. We further certify that we have no present or prospective interest in the property that is the subject of this report, and have no personal interest or bias with respect to the parties involved. Our compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report. The appraisal analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and the Standards of Professional Practice of the American Institute of Real Estate Appraisers, and the Code of Ethics and Standards of Professional Practice and Conduct of the Society of Real Estate Appraisers. The use of this report is subject to the requirements of the American Institute of Real Estate Appraisers and Society of Real Estate Appraisers relating to review by duly authorized representatives. The undersigned certify that they have made personal inspections of the property that is the subject of this report, and that no other persons provided significant professional assistance.

The American Institute of Real Estate Appraisers and Society of Real Estate Appraisers conduct voluntary programs of continuing education for their designated members. MAI's, RM's, SREA's, SRPA's and SRA's who meet the minimum standards of this program are awarded periodic educational certification. The designated appraisers are currently certified under this program.

G. ARCHAEOLOGICAL RECONNAISSANCE

OOHA II, HAWAII: ARCHAEOLOGICAL RECONNAISSANCE

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MAY 1985

Table of Contents

Illustrations

I. INTRODUCTION

An archaeological reconnaissance of approximately 350 acres at Ooma II, North Kona, Hawaii (Figure 1) was conducted during the week of April 29, 1985. Because the purpose was to provide data useful in initial development planning, the work was not intended as an intensive survey. For our purposes it was sufficient to indicate the types and locations of the archaeological and historical sites and site concentrations present.

Previous work in the area includes surveys for Ke-ahole Airport (Ching, Cluff and Riley: n.d.), dissertation research by Cordy (1978), projects for the Natural Energy Laboratory (Rogers-Jourdane 1978, Rosendahl 1978, and Rosendahl and Kirch 1975, and a reconnaissance by Barrera (1985). These revealed the presence of small sites inland (stone mounds and crude shelters with little or no midden materials) and substantial structures (habitation enclosures, caves, etc.), often with considerable middens, at the coast.

Sweeps were conducted across the project area by two persons spaced approximately 100 feet apart, looking for any evidence of past that might be present. Brief notes were taken on each site, each was photographed, and its location plotted on an aerial photograph. During the first hours of fieldwork certain features (herein identified as "clearings") were individually recorded (Sites T-1 and T-2). However, we soon learned that this feature type is so common that to have stopped and individually recorded each one would have been too time consuming in light of the extensive nature of the project. It should therefore be understood that such clearings are found in small numbers throughout the project area.

The level of recording was also differentiated on a geographic basis: all features (excluding clearings) that were found inland of an imaginary line running from Site T-14 on the south through Sites T-29, T-31, T-17 and T-20 on the north (Figure 1) were recorded, whereas only the larger and more substantial features between this line and the beach road were recorded. This line, which is the point at which feature concentrations increase dramatically as one nears the ocean, closely coincides with the top of a low lava bluff. It should be assumed that small midden scatters, clearings, mounds, and so on, are scattered evenly throughout this seaward area. The area seaward of the beach road was not surveyed, as this is an unlikely area for development.

Permanent site numbers were not assigned. This will be done when the State Historic Preservation Office (Department of Land and Natural Resources) has reviewed the manuscript and provided a list of numbers to be used.

II. THE SITES

SITE T-1

This site consists of two features. The first is a stone mound measuring about 1 by 1 meter and standing to a height of about 50 centimeters. The second consists of three bedrock clearings from which rocks have been removed.

Figure 2. Site T-1, Mound, looking north.

Figure 3. Site T-1, Clearings, looking southeast.

SITE T-2

This site consists of a bedrock clearing measuring about 2 by 3 meters from which rocks have been removed.

Figure 4. Site T-2, Clearing, looking northeast.

SITE T-3

This site consists of two stone mounds.

Figure 5. Site T-3, Mounds, looking west.

SITE T-4

This site consists of two features. The first is a habitation cave measuring approximately 15 by 15 meters with a 1.2 meter high ceiling. Midden remains include sea shells, bird-bone and fishbone, and artifacts in the form of bone picks and awls are present. The second feature is a habitation shelter measuring about 3 by 4 meters, the wall of which stands to a height of about 30 centimeters.

Figure 6. Site T-4, Cave, looking east.

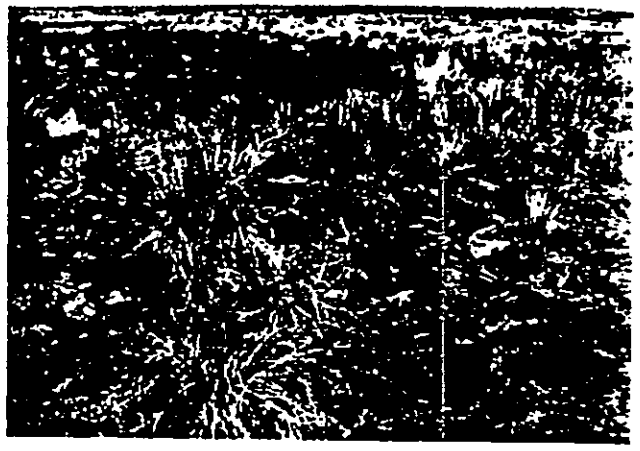

Figure 7. Site T-4, Shelter, looking west.

SITE T-5

This is a rock shelter measuring approximately 2 by 10 meters. Midden materials are scarce.

Figure 8. Site T-5, Rock Shelter, looking southeast.

SITE T-6

This is a habitation cave measuring approximately 15 by 25 meters, with a ceiling standing to a height of 2 to 3 meters. Shell midden is present in moderate amounts, but no artifacts were observed.

Figure 9. Site T-6, Cave, looking southeast.

SITE T-7

This is a habitation cave measuring approximately 15 meters in diameter. Shell midden and coral fragments are present in small amounts.

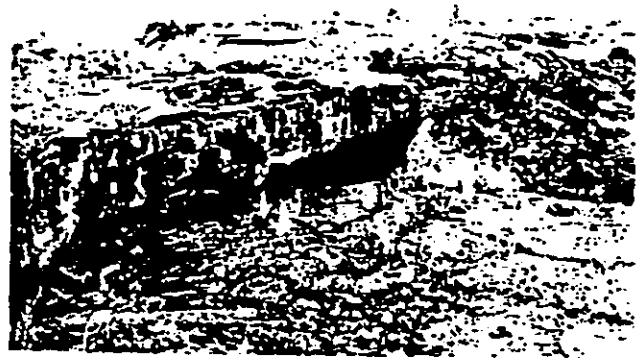

Figure 10. Site T-7, Cave, looking northwest.

SITE T-8

This site consists of four crude stone mounds. Neither midden nor artifacts were observed in association with the features.

Figure 11. Site T-8, Mounds.

SITE T-9

This site consists of two stone mounds. One is well-constructed, measures about 1 by 1 meter and stands to a height of approximately 80 centimeters; the other is crude, measures about 75 centimeters in diameter and stands to a height of 75 centimeters. Neither midden nor artifacts were observed in association with the features.

Figure 12. Site T-9, Mound.

SITE T-10

This site consists of three stone mounds. The first measures about 50 by 60 centimeters and stands to a height of approximately 50 centimeters; the second measures about 80 by 80 centimeters and stands to a height of about 80 centimeters, and the third measures about 75 centimeters in diameter and stands to a height of approximately 50 centimeters.

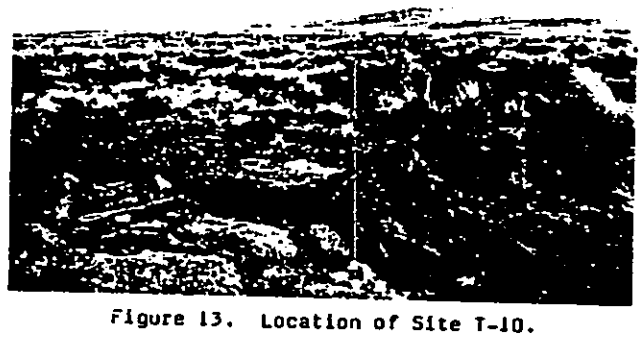

Figure 13. Location of Site T-10.

SITE T-11

This is a lava tube with two rooms that contain small amounts of midden and coral fragments. The first room measures approximately 10 by 20 meters and has a ceiling 1.5 meters high; the second room measures about 4 by 6 meters and has a ceiling 1 meter high.

Figure 14. Site T-11, Entrance to Lava Tube.

G-10

SITE T-12

This is a habitation cave measuring about 10 by 25 meters with a ceiling that stands to a height of 1.5 to 2.5 meters. Associated cultural materials include small amounts of shell midden, a deposit of grey ash, shells of the kukui [Aleurites moluccana] nut, a coral abrader and a waterworn pebble hammerstone.

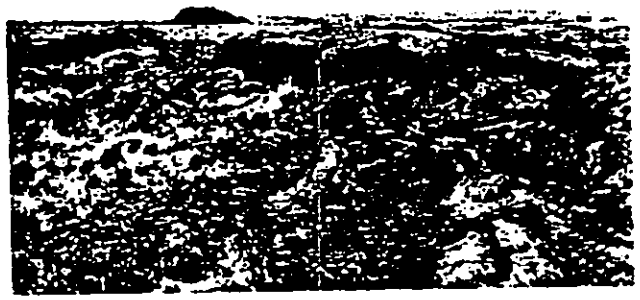

Figure 15. Site T-12, Cave.

SITE T-13

This is an oval stone mound, possibly a grave, measuring 2 by 3 meters and standing to a height of 75 centimeters.

Figure 16. Site T-13, Mound.

Figure 16. Site T-13, Mound.

SITE T-14

There are three features included in this site. The first is a crude enclosure measuring 4 by 4 meters and standing to a height of 30 centimeters, the interior of which is paved with branch coral fragments up to 8 centimeters in length. The second is located approximately 10 meters north of the enclosure and consists of a crude mound measuring about 2 by 2 meters and standing to a height of 50 centimeters. The last feature is a midden deposit measuring about 1 meter in diameter, situated between the mound and the enclosure. Artifacts present at the site include basalt hammerstones and fragments of glass bottles.

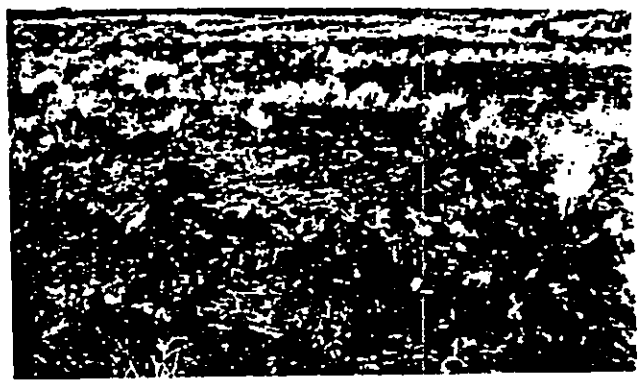

Figure 17. Site T-14, Enclosure, looking southwest.

SITE T-15

This is a possible water well consisting of a collapsed lava bubble measuring about 6 by 10 meters and up to 4 meters deep. A stone wall has been built on the edge of the bubble at the south end, and a 1.5-meter-high and 50-centimeter-wide stone wall has been built across the bottom approximately one-fourth of the way north of the south end. A series of waterworn stones serve as steps into the feature at the northwest corner. Moderate amounts of shell midden and coral fragments are scattered on the surface surrounding the feature. Artifacts consist of late 19th-century bottle fragments.

Figure 18. Site T-15, Possible well, looking north.

SITE T-16

This is a 25 meter long core-fill stone wall measuring 1 meter in width and standing to a height of 60 centimeters. The vicinity is covered with coralline high surf debris, and examination of a 1981 aerial photograph suggests a square outline extending north of this location, indicating that the debris may cover the remains of a structure in that area.

Figure 19. Site T-16, Wall, looking northeast.

SITE T-17

This is a complex of features covering an area of approximately 75 by 135 meters. It includes five stone mounds, a habitation platform, a habitation enclosure, a habitation cave, a walled lava bubble and two cave shelters. The dense midden remains include foodshells, fish, bird and mammal bone, pieces of wood and fragments of the shell of the kukui [Aleurites moluccana] nut. The site has been extensively vandalized by looters.

Figure 20. Site T-17, Walled Lava Bubble, looking northeast.

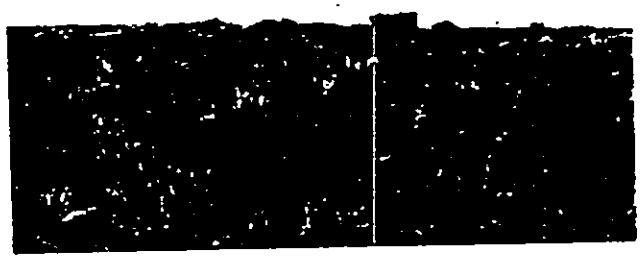

Figure 21. Site T-17, Shelter and Mound, looking south.

Figure 22. Site T-17, Platform, looking north.

SITE T-18

This is a complex of features covering an area of approximately 30 by 60 meters. It includes one stone mound (possibly a grave), 2 habitation terraces, a platform which may be either a habitation feature or a grave, two walled lava bubbles, an unwalled lava bubble and several open midden scatters. The dense midden deposits at various of the features have been extensively vandalized by looters.

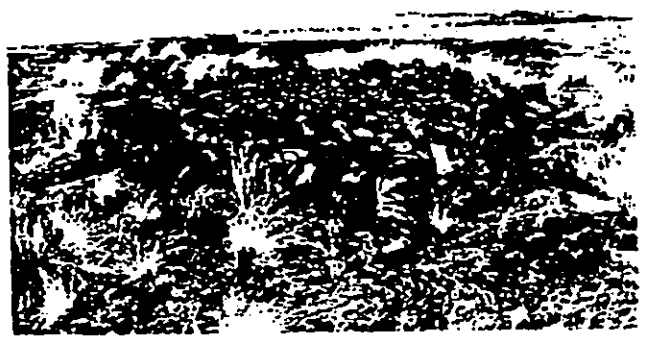

Figure 23. Site T-18, Platform, looking northwest.

Figure 24. Site T-18, Vandalized Cave, looking northn.

Figure 25. Site T-18, Terrace, looking northneast.

SITE T-19

This is a trail crossing a stretch of aa lava between two areas of pahoehoe lava. It consists of a trodden path about 1.5 meters wide and 25 meters in length. The north terminus of the feature is marked by two stone mounds, the south end is marked by one such mound.

Figure 26. Site T-19, Trail, looking northwest.

SITE T-20

This is a possible grave consisting of a stone platform measuring 5 by 5 meters and standing to a height of 2 meters.

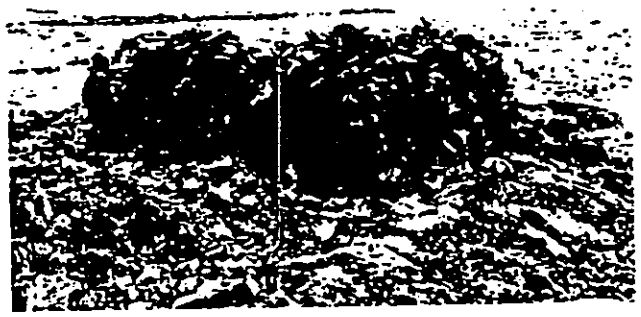

Figure 27. Site T-20, Possible Grave, looking southwest.

SITE T-21

This is a possible grave consisting of a stone mound measuring 2 by 2 meters and standing to a height of 1.2 meters.

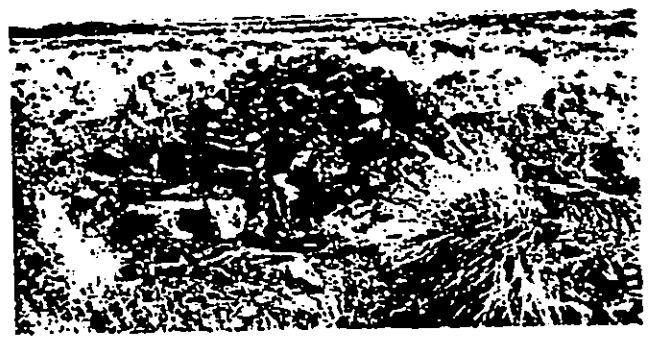

Figure 28. Site T-21, Possible Grave, looking northeast.

SITE T-22

This is a habitation cave measuring 5 by 10 meters with a ceiling 80 centimeters high. Shell midden is scarce, but an ash deposit and several waterworn basalt cobbles are present.

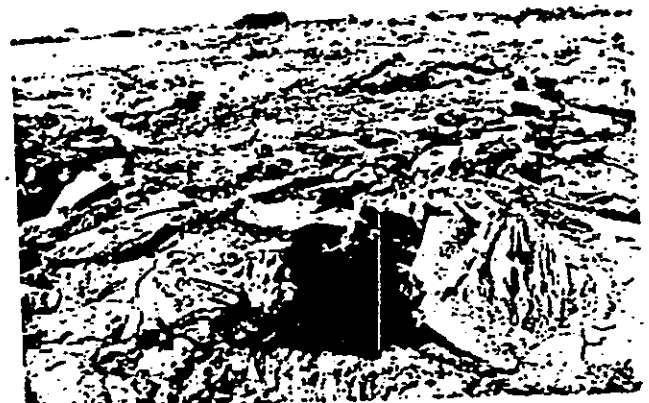

Figure 29. Site T-22, Cave, looking northwest.

SITE T-23

This is a habitation shelter measuring 3 by 4 meters and standing to a height of 30 centimeters. Neither shell midden nor artifacts were observed at the site.

Figure 30. Site T-23, Habitation Shelter, looking east.

SITE T-24

This is a habitation cave measuring 2 by 10 meters with a 1 to 2 meter high ceiling. Shell midden and coral fragments are scarce to moderate in quantity.

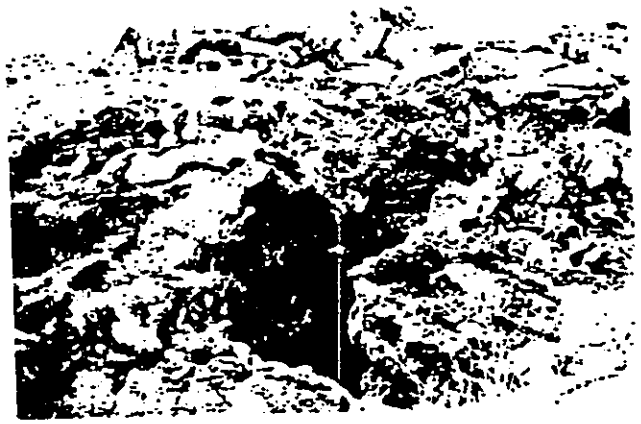

Figure 31. Site T-24, Cave, looking northwest.

SITE T-25

This is a C-shaped habitation shelter measuring 1.5 by 3 meters and standing to a height of about 40 centimeters. Shell midden is scarce and no artifacts were noted.

Figure 32. Site T-25, Shelter, looking east.

SITE T-26

This is a trail crossing a stretch of aa lava between two areas of pahoehoe lava. It consists of a trodden path about 1 meter wide and 10 meters in length.

Figure 33. Site T-26, Trail, looking north.

SITE T-27

This is a habitation cave measuring 2 by 5 meters, with a ceiling standing to a height of about 80 centimeters. Midden remains are scarce, although a thin ash deposit is present.

Figure 34. Site T-27, Cave, looking southeast.

SITE T-28

This is a stone mound measuring about 1.5 by 2.5 meters and standing to a height of about 60 centimeters.

Figure 35. Site T-28, Mound, looking southeast.

SITE T-29

This is a habitation shelter measuring about 3 by 5 meters and standing to a height of about 1.5 meters. The density of shell midden is impossible to determine because of the presence of large quantities of shells in the coral and beachrock paving that covers the site.

Figure 36. Site T-29, Shelter, looking southeast.

SITE T-30

This is a habitation shelter measuring about 8 by 8 meters and standing to a height of about 2 meters. A small room abuts the outside of the structure at the southeast corner. Two or three possible stone terraces are located in the interior. Shell midden is present in moderate amounts.

Figure 37. Site T-30, Shelter, looking southeast.

SITE T-31

This is a flat area, measuring about 8 by 11 meters, paved with large quantities of waterworn coral. Only the northwest corner appears to have been artificially terraced, to a height of about 60 centimeters. An upright basalt rock, modified by chipping, is located on the structure. The site has been vandalized.

Figure 38. Site T-31, Terraced Paving, looking east.

SITE T-32

This is an enclosure measuring about 15 by 25 meters and standing to a height of 3.5 meters. The floor of the structure is composed of beach sand, which may have been washed in by high surf. No midden or artifacts were observed.

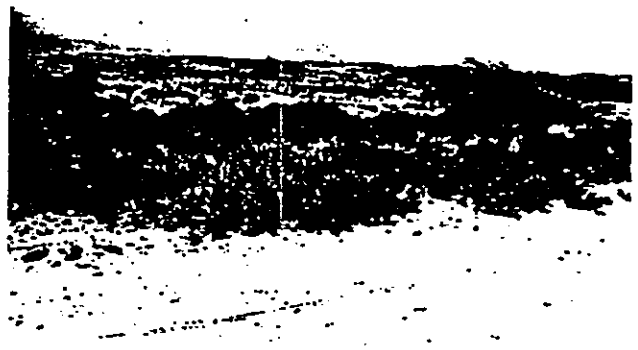

Figure 39. Site T-32, Enclosure, looking east.

SITE T-33

This is a stone mound, possibly a grave, measuring about 2 by 2 meters and standing to a height of 1.5 meters. Fragments of beachrock are incorporated in its construction.

Figure 40. Site T-33, Mound, looking northeast.

SITE T-34

This is a platform, much obscured by vegetation and high surf debris. It covers an area of about 7 by 20 meters and stands to a height of 1 meter.

Figure 41. Site T-34, Platform, looking northeast.

SITE T-35

This is a habitation platform measuring about 4.5 by 5 meters and standing to a height of 60 centimeters. A 25 centimeter deep possible slab-lined firepit measuring 40 by 60 centimeters is located on the surface of the structure. Midden shells are scarce, and the only artifacts noted were two abraders, one of lava and one of coral.

Figure 42. Site T-35, Platform, looking east.

SITE T-36

This is a terraced platform measuring about 11 by 17 meters and standing to a height of 1.8 meters. Evidence of either low terraces or different building phases in the form of low stone alignments are present on the surface, which is paved with waterworn basalt and coral pebbles. Two basalt uprights are located on the surface. The site has been excavated by vandals.

Figure 43. Site T-36, Terraced Platform, looking southeast.

SITE T-37

This is a C-shaped habitation shelter measuring about 3.5 by 5.5 meters and standing to a height of 60 centimeters. Shell midden is moderately dense. The site has been vandalized.

Figure 44. Site T-37, Shelter, looking south.

SITE T-38

This is a platform measuring about 3.5 by 7 meters and standing to a height of 60 centimeters. Shell midden is moderately dense. The site has been damaged by high surf.

Figure 45. Site T-38, Platform, looking southeast.

SITE T-39

This is a midden deposit situated in a 1 meter deep lava bubble measuring about 3 by 7 meters. In addition to the dense shell midden remains, three waterworn basalt boulders are present.

Figure 46. Site T-39, Midden Deposit, looking southeast.

SITE T-40

This is a complex consisting of four habitation terraces covering an area of about 12 by 30 meters. The terraces range in size from approximately 4 by 5 meters to 8 by 8 meters, and stand to heights of as much as 90 centimeters. Shell midden is scarce and no artifacts were noted. One of the terraces has four large waterworn basalt boulders standing upright on its surface, but as these are not embedded in the paving of the structure it seems most likely that they have been placed there only recently.

Figure 47. Site T-40, Terraces, looking north.

III . CONCLUSIONS AND RECOMMENDATIONS

This reconnaissance has confirmed the pattern uncovered in previous surveys in the vicinity, that is, there was a relatively light utilization of the inland area and a concentration of intensive utilization at the coast. Most of the inland features found fit into the categories of small scattered mounds, clearings and crude shelters with little or no midden deposits. The coastal area can be characterized as including these types as well, but with the addition of large well-built structures of a more permanent nature associated with considerably greater amounts of midden materials and artifacts.

From the archaeological perspective, none of the sites found are of such significance that preservation should be required. It is recommended that if construction is to take place at any of the site locations, detailed recording followed by archaeological salvage excavations should first be conducted to remove the scientific information contained in them. The necessity for such detailed recording is greatest in the area situated between the coastal road and an imaginary line running from Site T-14 on the south through Sites T-29, T-31, T-17 and T-20 on the north. It is in this area that the greatest concentration of cultural remains is found, and it is in this area that a large number of features was left undescribed.

Insofar as any possible negative impacts of development are concerned, the following position taken by Barrera in his 1985 study of the adjacent parcel is applicable at Ooma II as well:

> "The alarming extent of vandalism and looting which has occurred at certain of the coastal sites leads to the conclusion that construction at those locations will actually represent a positive impact, in that the valuable information in them could be saved by a data recovery program. If left in their present vulnerable state, the vandalism and looting will undoubtedly continue until there is nothing left." [Barrera 1985:49]

G-26

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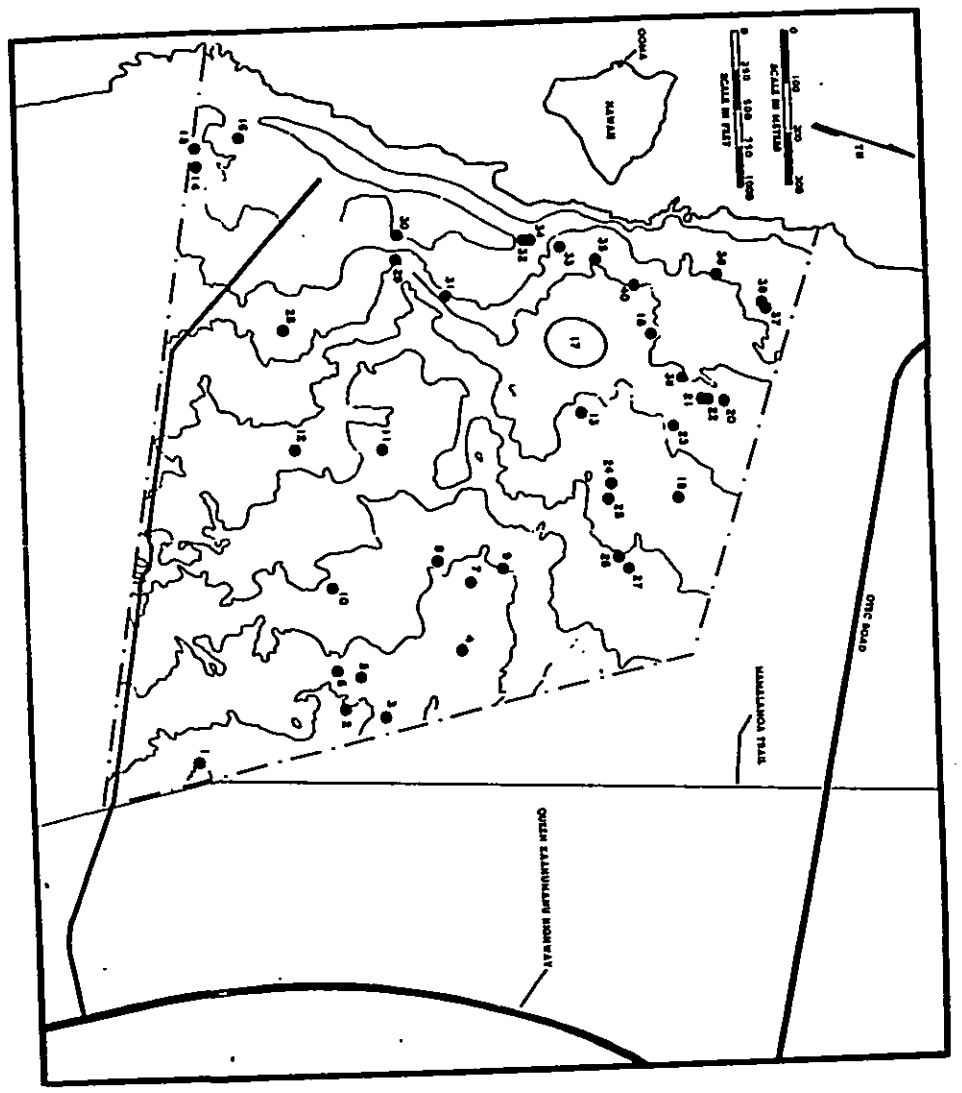
----------, and Patrick V. Kirch

1975 Archaeological Reconnaissance Survey of the Ke-Ahole Point Natural Energy Laboratory Site, North Kona, Hawaii Island. Ms. 111775, Department of Anthropology, Bernice P. Bishop Museum. Honolulu.



H. ARCHAEOLOGICAL FIELD CHECK

FIELDCHECK

OOMA 2, NORTH KONA, HAWAII

Ross Cordy, Ph.D.
Historic Sites Section
Division of State Parks
Department of Land & Natural Resources
State of Hawaii

June 1986

ABSTRACT

On June 12, 1986, an archaeological fieldcheck was made of portions of TMK 7-3-09:4 in Ooma 2, North Kona, Hawaii Island, to evaluate a 1985 archaeological reconnaissance survey (Barrera 1985). Inland portions of the parcel were generally found to be adequately surveyed, with nearly all sites found. A small amount of additional survey work is needed at a few sites in the inland area to fully document their significance. A check of part of the coastal area verified that the large coastal sites were not adequately surveyed. However, these larger sites have already been adequately inventoried by prior archaeological studies (DLNR 1971-72; Cordy 1975, 1981, 1985). Small sites and caves in the coastal area have yet to be completely inventoried, a point noted in the 1985 reconnaissance survey.

INTRODUCTION

In early June 1986, Helber, Hastert, Van Horn & Kimura -- a planning company -- asked us to review an archaeological reconnaissance survey report that had been done for their company. The survey covered a 314 acre coastal parcel in North Kona (TMK 7-3-09: 4), which is being planned for development as the Ooma II Resort. The report, "Ooma II, Hawaii: Archaeological Reconnaissance" was written by William Barrera in 1985. This report stated (1985:1) that

1. All large sites were searched for and identified in the coastal area.
2. All sites were searched for and identified in the inland area of the parcel, except for possible sites that were small clearings.
3. No sites were searched for seaward of the coastal jeep road because this area would not be impacted.

In our review, some problems became apparent. Prior work had already inventoried 12 sites on the shore, with test excavations, dates and significance evaluations (DLNR 1971-2; Cordy 1975, 1985). These were all the large sites along the shore. Barrera (1985) did not consult with our office, review the sites files, or review the prior work. As a result, he failed to identify some of these sites and poorly described others. Thus, his survey in the coastal areas had not adequately identified all large sites. This raised questions as to whether his survey of the inland parts of the parcel was adequate with all sites being found.

This situation created difficulties for Helber, Hastert, Van Horn & Kimura. While they realized more survey was needed in the coastal area for an EIS, they did not know what was needed inland. We recommended a fieldcheck of the inland parts of the parcel to evaluate the 1985 survey. They requested that our office conduct such a fieldcheck -- as a non-biased agency. Also, based on our findings, they requested that our office advise them on a scope of work to meet historic preservation requirements for an EIS for a Land Use Commission petition and a General Plan Amendment. We agreed to do the fieldcheck, which I conducted on June 12, 1986.

METHODS

The plan for this fieldcheck was to take sample units within the inland survey area and resurvey these units. Sites identified in Barrera (1985) were to be relocated and their descriptions and locations checked, and any new sites were to be located and described.

Once I got in the field, rather than check several small sample units, I chose to check one large unit. Figure 4 locates the area checked. It covers approximately one-third of the inland area surveyed by Barrera and includes areas where he found sites and sizable areas where he reported no sites. It is assumed analysis of this area is a representative check of the adequacy of his survey.

I also looked at several sites in the coastal area to see if they had been altered since 1975. Figure 4 shows the area checked.

FINDINGS -- COASTAL AREA

Terrain

The area checked includes a rocky shore with a narrow fringing sand zone on a pahoehoe substrate. This is seaward of the coastal jeep road. A rocky point is to the south. Inland of the sand is a flat stretch of light brown pahoehoe covered sparsely with tufts of grass. This extends ca. 300 meters (1,000 feet) inland. To the south, a high section of flat pahoehoe extends right up to the jeep road behind the rocky point. This pahoehoe area drops down to the flat pahoehoe area to the north and to the jeep road to the west and is a prominant feature in this northern part of Ooma 2.

Prior Archaeology

Three previous surveys had been done in coastal Ooma 2 -- a brief reconnaissance in 1930 by Reinecke (1930), a 1971-72 inventory of several known sites by the Department of Land & Natural Resources staff (DLNR 1971-72), and a 1975 intensive survey of larger sites by Cordy (Cordy 1975, 1981). This work was synthesized by the Historic Sites Section last year (Cordy 1985). Twelve larger sites were present in coastal Ooma 2. Table 1 identifies these sites, and Figure 5 locates them.

Appendix A provides detailed 1975 site maps with site interpretations and dates. Artifacts recovered in 1975 are listed in an appendix in Cordy (1981).

Barrera's 1985 Survey

Table 1 correlates Barrera's site numbers with the already known sites, and the footnotes in the table indicate problems. Of the 12 large coastal sites, only 9 were identified in the 1985 survey. (Two unidentified sites were located seaward of the jeep road in an area which Barrera did not survey.) Of the 9 identified sites, only a few of the known features were recorded at 3 sites (D15-1, -3, -6); and at 2 sites (D15-4, -8), descriptions do not easily compare with the 1975 intensive survey.

Barrera did identify 5 new, smaller sites in the coastal area (Table 2). Two seem to be features identified by Reinecke in 1930, with T-16 perhaps a buried site of larger size. Also, T-17 is a vaguely defined complex which includes caves. This complex was seen in 1975, but was not recorded as it did not include larger surface architecture.

Fieldcheck

I checked sites D15-4, -18, -5, -8, and -36 (south to north) to see if all features were still present as in 1975. The possibility did exist that some features had been destroyed and that Barrera's apparently incomplete description of the sites was actually complete. Also, the check was to see if new vandalism had occurred as indicated by Barrera (1985). All features were found to still be present, and no signs of new vandalism were seen. Barrera's evidence of vandalism seems to have actually been evidence of scientific excavation in 1975.

FINDINGS -- INLAND AREA

No survey had been done in this area before Barrera's 1985 work.

Terrain & Barrera's 1985 Survey

In the northern part of Ooma 2, about 300 meters (1,000 feet) inland from the shore, there is a step up or a rise in terrain to a higher flat pahoehoe area. This marks the start of Barrera's "inland" area. Sites T-20, -22, -21, and -39 are

located along the edge of the rise. T-20 and T-21, platforms, are particularly noticeable -- standing out clearly against the skyline, expecially the larger T-20. Table 3 lists these sites and the others found in the inland area.

The higher flat pahoehoe area is a light brown pahoehoe with sparse tufts of grass, like the pahoehoe nearer the coast. This area rises gradually and extends inland for about 500 meters (1,750 feet), where a high a'a lava flow is reached (ca. 800 meters inland, 2,750 feet). Two small sections of rough a'a lava also extend seaward through the pahoehoe area. This general pahoehoe area has some low, shallow, "sink-like" features and some small domes and crevices which contain some small caves.

Barrera found few sites in this pahoehoe and a'a area back from the edge overlooking the coast. There were 2 C-shaped enclosures which had very low walls and virtually no midden or deposits (T-23, T-25), and there were 2 small caves (T-24, T-27) with slight deposits. Two trails were found running north-south across each a'a section (T-19, T-26).

To the south of the high a'a flow, there is a high pahoehoe area with a few pronounced sinkholes which have large caves that extend underground from the inner edges of the sinkholes. Barrera found deposits in 2 such caves (T-4, T-7), and 2 mounds (T-9) were found near cave T-7. This higher ground then drops toward the shore in a steeply descending area of small pahoehoe knolls. Surprisingly, this area has hardly any caves. At the base of this knoll area, a flat pahoehoe terrain is reached. This is the inland portion of the high, flat pahoehoe ridge which extends to the jeep road and which has sites D15-4 and D15-8 on its coastal edge, and T-17 just behind these sites. Barrera found no sites in the inland part of this pahoehoe area.

Fieldcheck

Barrera found 14 sites in the inland area which was fieldchecked. Ten of these were relocated, with the approximate location of another determined. Three sites were not found, but it is expected that they are present. Appendix B provides further information collected at these sites. His locations are fairly accurate, although T-9 should be almost directly seaward of T-7.

Six new sites were found. (See Appendix C for details.) Two were in a shall sinkhole inland of T-39. These were a cave

and faint C-shaped enclosure. The cave definitely seems to be a new site, quite near T-13. The C-shape may be T-25. Another 2 sites, both caves, were found inland in the high a'a flow. It would seem that this flow was not checked. The last two sites are a set of two small mounds and a small cave.

The fact that 6 new sites were found is actually fairly insignificant. The high a'a area where T-41 and T-42 were found probably was thought not to contain sites, which is usually the case. T-43 and T-46 are very small, minor sites that are easy to overlook. In fact, there is a good chance that I may have missed a few small caves. Sometimes these are not seen, unless you are right on top of them. T-44 and T-45 should have been found, and I wonder if these may not actually be T-24 and T-25, with Barrera mislocating them on his map.

No small clearings which appeared to be historic sites were found in the fieldchecked area. Barrera (1985:1) indicated that these were common, but his descriptions do not clearly indicate that these clearings were cultural, in my view. The lack of cultural clearings in the fieldcheck area leads to a conclusion that these are not sites in the inland area of this Ooma 2 parcel, at least until new evidence indicates otherwise. This means that site T-2 can be deleted as a site and one of the features in T-1.

SUMMARY

I believe that Barrera's survey did find most sites in the inland areas of this parcel. A few extra sites might be found, but these are expected to be minor sites. The survey in this area can be considered fairly accurate for basic site inventory purposes, even though descriptions are quite brief. However, some additional information is needed from a few sites to verify ideas on site function.

In contrast, Barrera's coastal survey definitely is not complete enough for inventory purposes. Already identified larger sites which were seaward of the jeep road were not recorded, and they will definitely be affected by the resort project -- either directly or indirectly. Other known larger sites inland of the jeep road along the coast were not very well identified. However, these larger sites have already been recorded at the intensive survey level, so resurvey is not critical. What is needed in the coastal area is an intensive survey to identify all smaller sites.

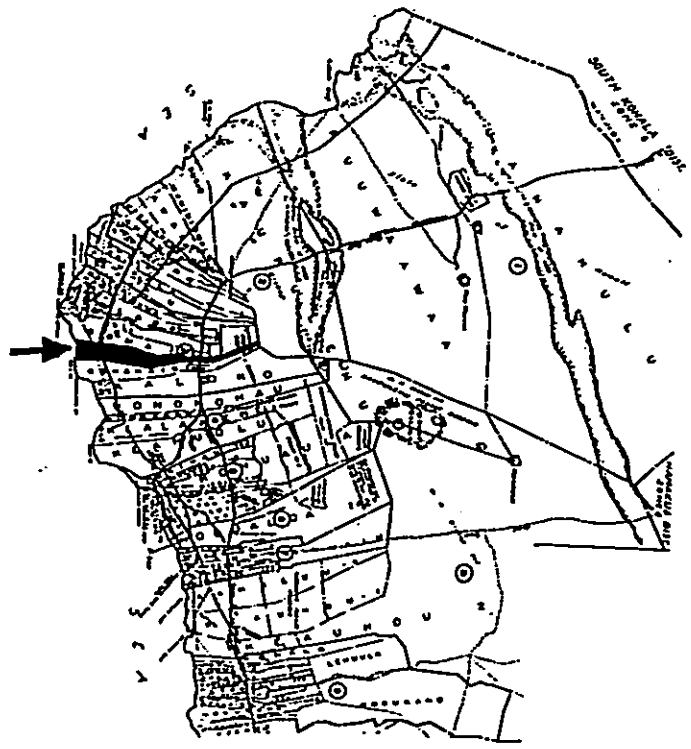
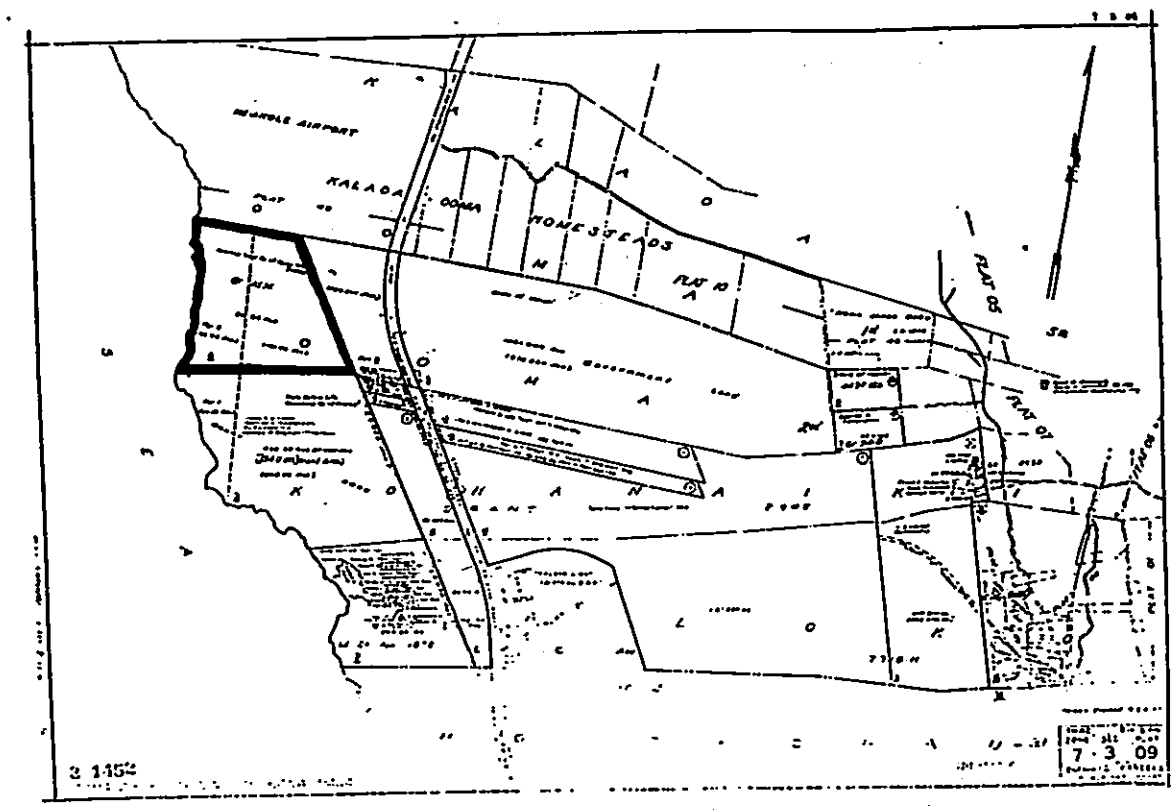


Figure 1. Location of Ooma 2 in North Kona District, Hawaii Island.



H-5

Figure 2. Location of Parcel 4 in Ooma 2. (From Tax Map Books.)

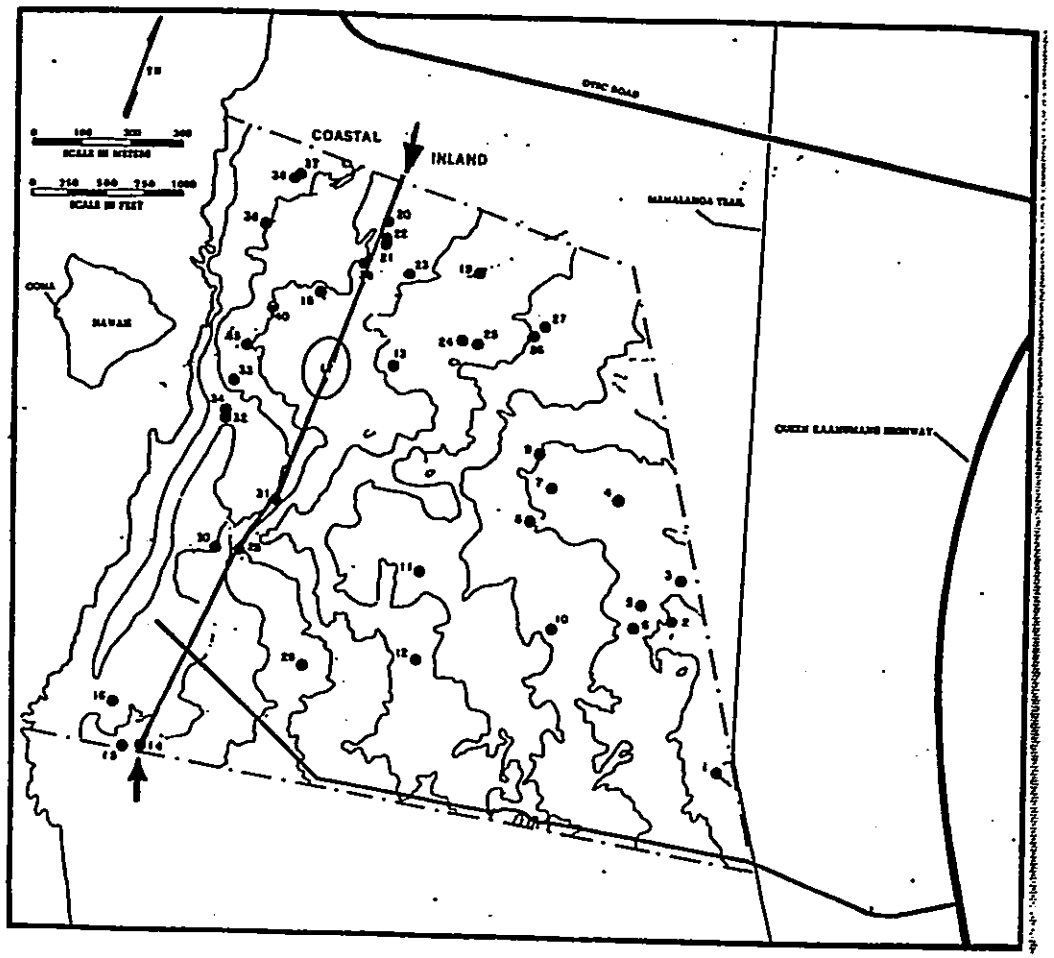


Figure 3. The Parcel Showing Barrera's Sites & the Coastal and Inland Survey Areas. (Map from Barrera 1985.)

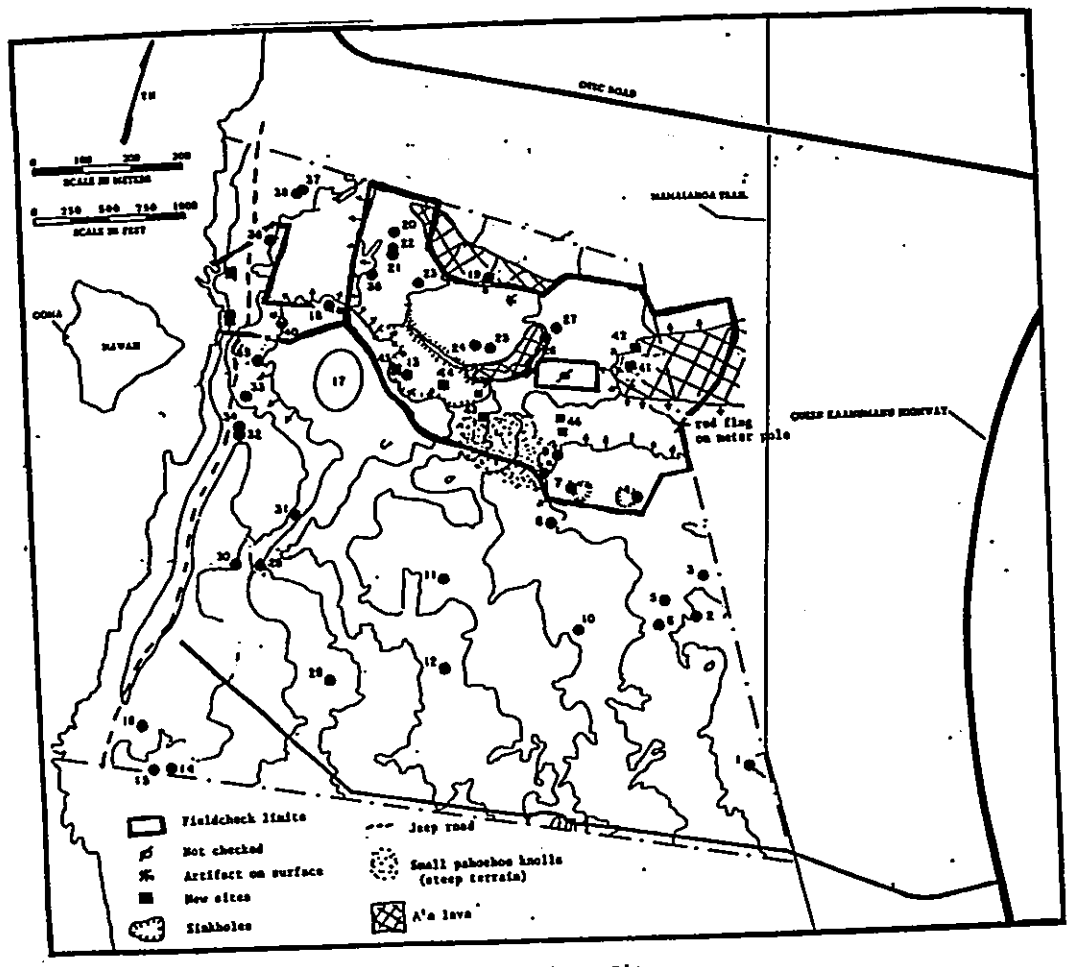


Figure 4. The Fieldcheck Sample Area, Terrain & Sites.

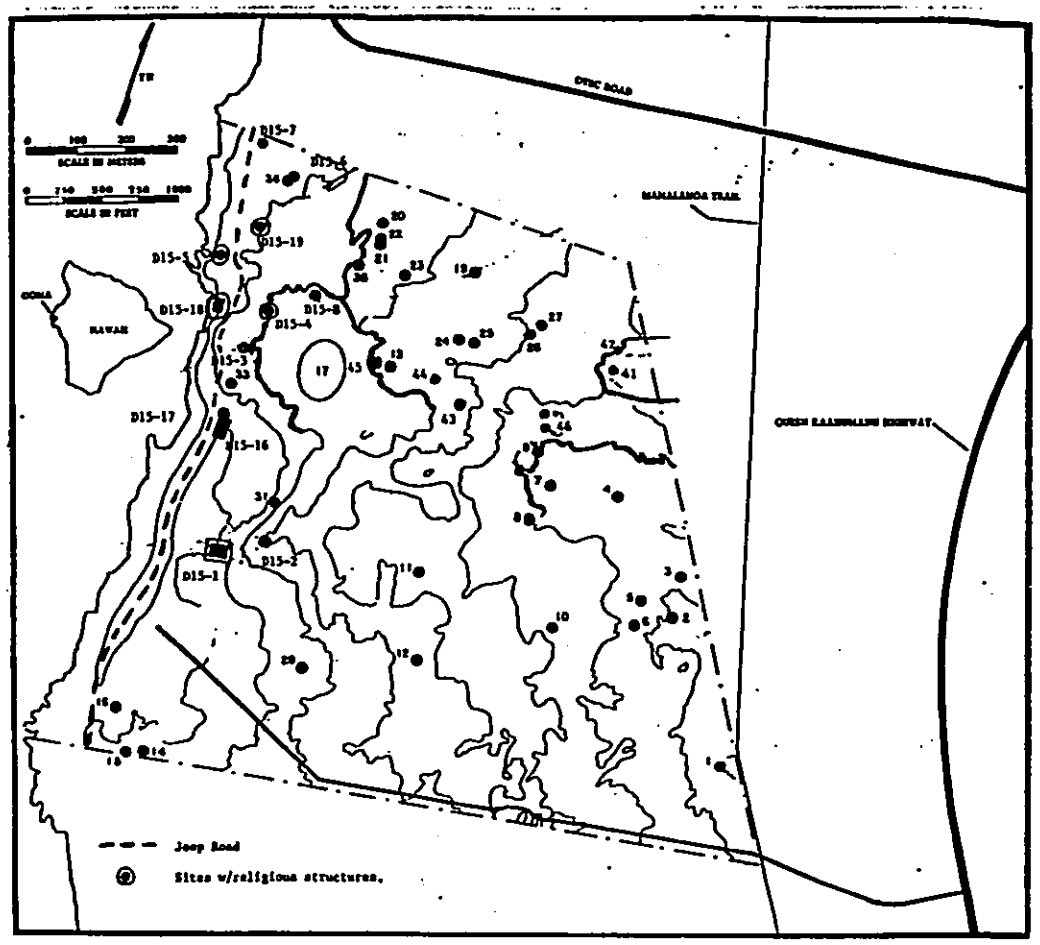


Figure 5. Site Locations in this Parcel of Ooma 2, Based on All Current Evidence.

Table 1

The Larger Sites in Coastal Ooma 2
(south to north)

Bishop Museum Number	Barrera Number	Historic Sites Section General Description	Function
D15-1	T-31[1]	Paving, platform, 2 enclosures.	PH w/men's house.
D15-2	T-29,-30[2]	2 enclosures.	PH.
D15-16	T-32	Large enclosure.	Animal Pen.
D15-17	T-34	Large platform(?), highly disturbed.	Unknown.
D15-3	T-35[3]	2 enclosures, 3 platforms.	PH.
D15-4*	T-40[4]	2 platforms (one w/3 uprights) and other features (caves,etc.).	PH w/men's house variant.
D15-8*	T-18[5]	2 platforms.	PH.
D15-18*	-----	Large enclosure w/2 internal platforms & 1 paving.	Heiau.
D15-5*	-----	Large enclosure.	PH, men's house.
D15-19*	T-36[6]	High platform.	Heiau.
D15-6	T-38[7]	Platform.	PH.
D15-7	-----	3 platforms.	PH.

* Fieldchecked. PH = permanent habitations.

1. T-31 might be Feature 1 of D15-1, which is a rectangular flat area with a basalt upright. But D15-1 is larger and is immediately seaward of D15-2. The other features of D15-1 were not identified by Barrera.
2. T-29 is Feature 2 and T-30 is Feature 1. See Appendix A map made in 1975.
3. T-35 seems to be Feature 2, a platform, identified and mapped in 1975. The adjacent 4 features are not identified by Barrera.
4. Barrera's measurements do not seem to be accurate, and the number of features seem inaccurate. Three uprights were present in 1975.

5. Barrera's descriptions must be checked. Two platforms were present in 1975, and are present today. Smaller features in the vicinity were not recorded in 1975. At least one stone cairn is present. No signs of looting were seen in the fieldcheck.
6. See Appendix A. No signs of vandalism were seen in this fieldcheck contrary to Barrera's (1985:41) statement.
7. It is difficult to determine from Barrera's description if his T-38 is D15-6 or if his T-37 and T-38 are two features in D15-7.

Table 2

Smaller Sites in Coastal Ooma 2
(south to north)

Barrera Number	Description	Likely Function
T-14	Enclosure (16 m^2) & cairn	Temporary housing
T-15[1]	Walled lava bubble w/steps down into it.	Well
T-16[2]	Wall 25 meters long, partly buried by sand. Likely to be a larger site.	Unknown, without further work.
T-33	Cairn.	Grave (?), cannot verify without excavation.
T-17	5 cairns, platform, enclosure caves.	Unknown, without further work.

1. Perhaps Reinecke's site 67.
2. Perhaps Reinecke's site 66.

Table 3

Inland Sites in the Fieldchecked Area
Ooma 2 Parcel

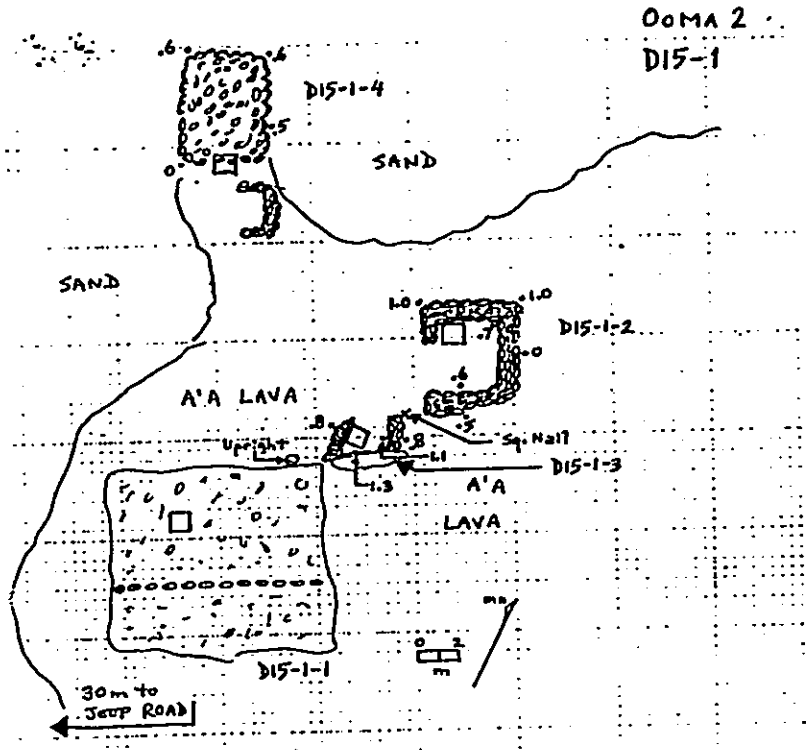
Number	# Features	Type of Features	Function
Top Edge of Pahoehoe Rise Overlooking Coast			
T-20	1	Platform	Grave (?)
T-22	1	Cave	Shelter
T-21	1	Platform,	Grave (?)
T-39	1	Midden under overhang	Shelter
Flat Pahoehoe Lands			
T-23	1	C-Shaped Enclosure	Shelter
T-13	1	Mound	?
T-45*	1	Rockshelter	Shelter
T-44*	1	C-Shaped Enclosure	Shelter
T-25	1	C-Shaped Enclosure	Shelter
T-24	1	Cave	Shelter
T-27	2	2 Caves	Shelters
T-46*	2	Cairns	Marker
North Small A'a Flow Across Flat Pahoehoe			
T-19	4	Trail, 3 mounds	Trail
South Small A'a Flow Across Flat Pahoehoe			
T-26	1	Trail	Trail
High A'a Flow Area (Inland Corner of Parcel)			
T-41*	2	Cave, cleared area	Shelter
T-42*	1	Cave	?
Higher Pahoehoe Land -- Inland Part of Parcel			
T-4	2	Cave, C-shaped Enclosure	Shelter
T-7	1	Cave	Shelter
T-9	2	Cairns	Marker
Steeply Descending Pahoehoe Knoll Area			
T-43*	1	Cave	Shelter

* Newly identified.

APPENDIX A

1975 SITE MAPS & PHOTOGRAPHS FOR THE LARGE COASTAL SITES

From Cordy (1975). All dates are volcanic glass dates.



H-11

SITE INTERPRETATION: Commoner Household

SITE DATE: AD 1490-European Contact

D15-1-1

Interpretation: Man's House
Dates: None

D15-1-4

Interpretation: Sleeping House
Dates: None

D15-1-2

Interpretation: Sleeping House

Dates: AD		
	1603 ± 84	1624 ± 94
	1552 ± 67	1657 ± 47
	1586 ± 33	1684 ± 37
	1593 ± 36	1693 ± 53
	1595 ± 62	

D15-1-3

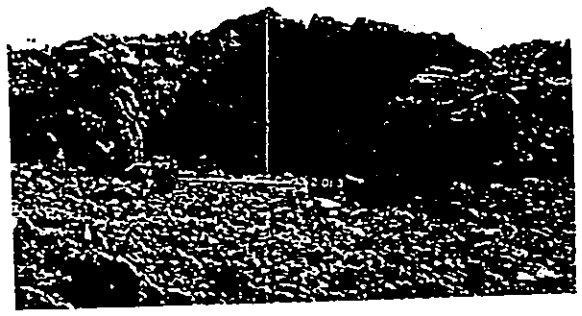
Interpretation: Special Purpose House

Dates: AD		
	1548 ± 63	1770 ± 62
	1644 ± 77	1593 ± 35
	1670 ± 43	1620 ± 65

Site D15-1

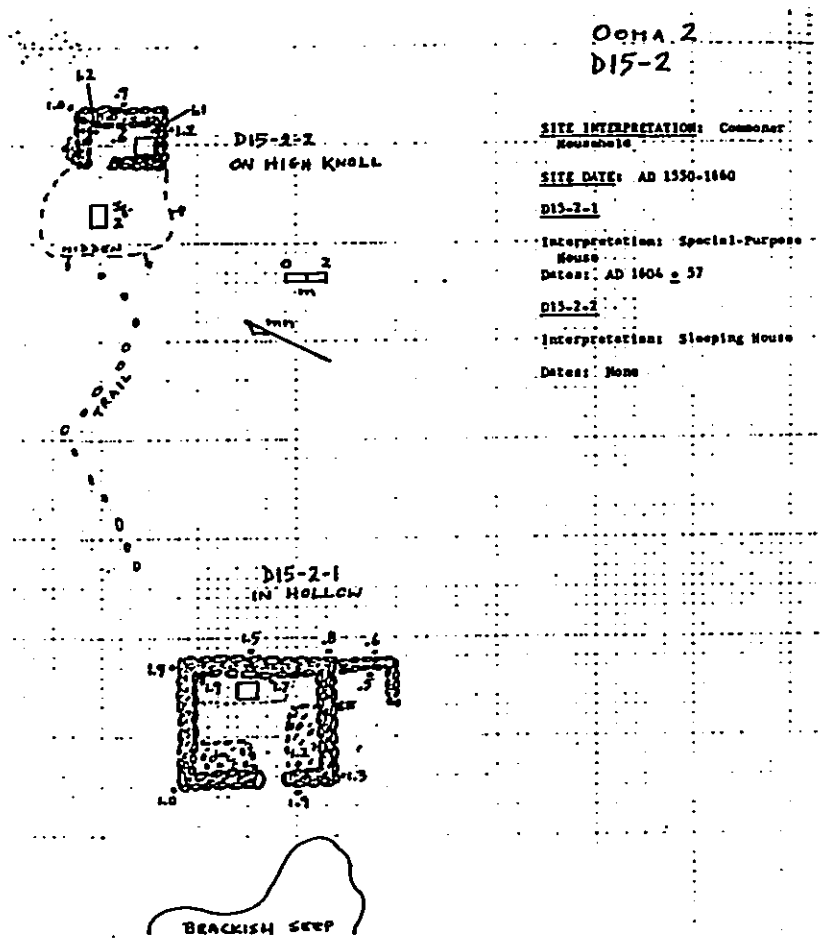
D15-1-1. Ooma 2. (from southwest).

D15-1-2. Ooma 2. (from southwest).

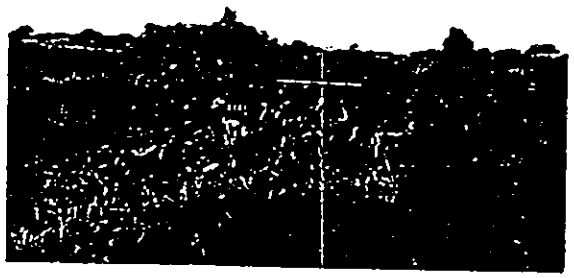


D15-1-3. Ooma 2. (from north).

D15-1-4. Ooma 2. (from south-southeast).



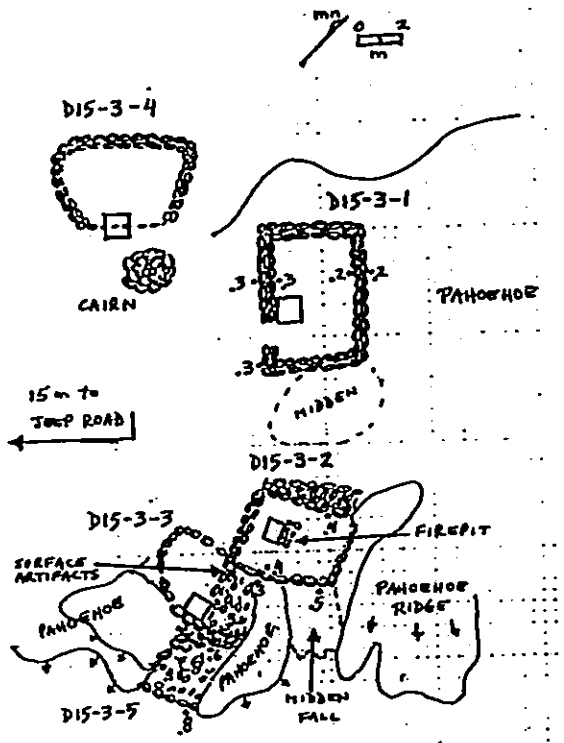
Site D15-2



D15-2-1. Ooma 2. (from northeast).

D15-2-2. Ooma 2. (from south-southeast).

D15-2-2. Ooma 2. Close-up of interior, southeast corner.



OOMA 2
D15-3

SITE INTERPRETATION:

Commoner Household

SITE DATE: AD 1560-1760

D15-3-1

Interpretation: Sleeping House
Dates: AD 1606 ± 47
1636 ± 43
1648 ± 39
1661 ± 61
1662 ± 67

D15-3-2

Interpretation: Sleepin House
Dates: None

D15-3-3

Interpretation: Special Purpose Structure
Dates: AD 1703 ± 61
1719 ± 28

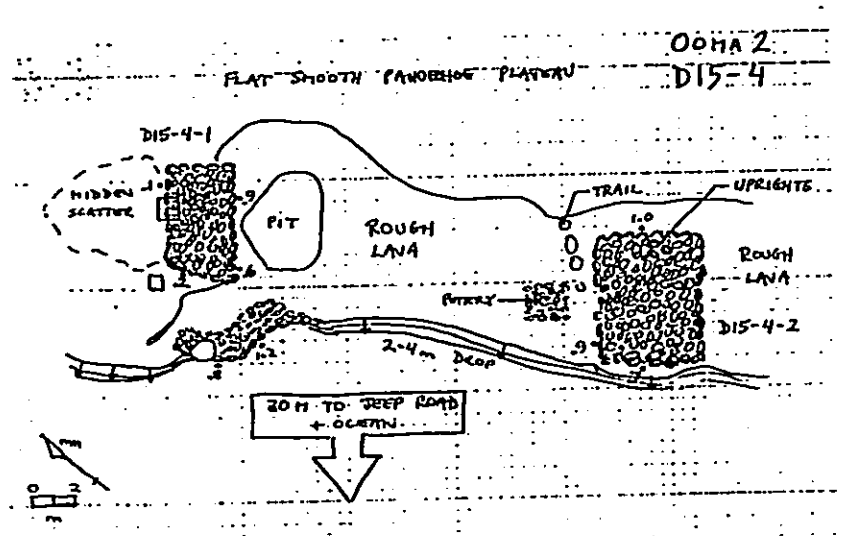
D15-3-4

Interpretation: Sleepin House
Dates: AD 1653 ± 52

D15-3-5

Interpretation: Special Purpose Structure
Dates: None

Site D15-3



OOMA 2
D15-4

SITE INTERPRETATION:

Commoner Household

SITE DATE: AD 1750-Contact

D15-4-1

Interpretation: Sleeping House

Dates: AD 1783 ± 38

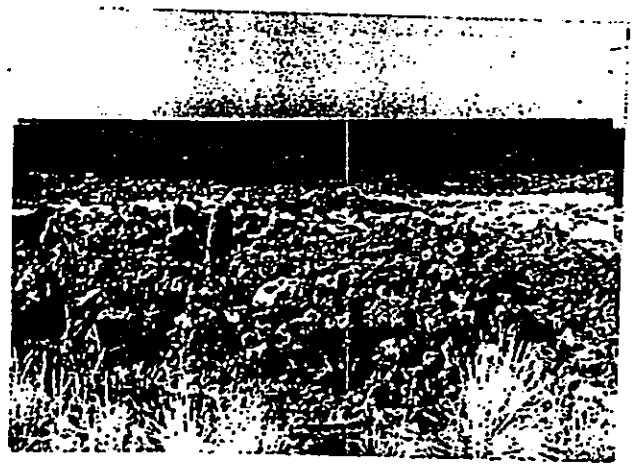
D15-4-2

Interpretation: Men's House Variant

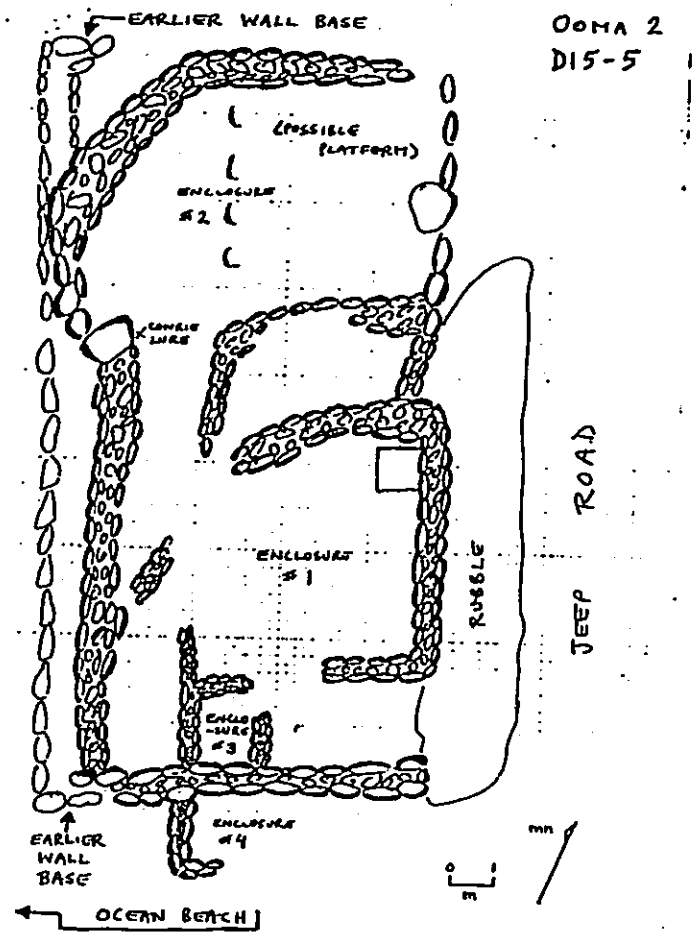
Dates: None

Site D15-4

H-14



D15-4-2. Ooma 2. (from east).



Site D15-5

D15-5: PHASE 1

Site Interpretation: Historic Structure Function Unknown

Date: Post-Contact

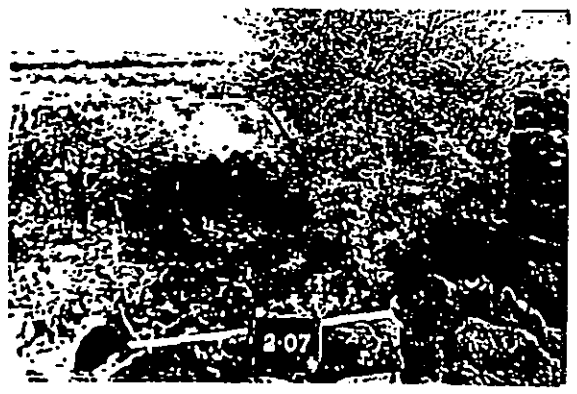
D15-5: PHASE 2 (below 8 cm)

Site Interpretation: Commoner Household with the major structure being a men's house

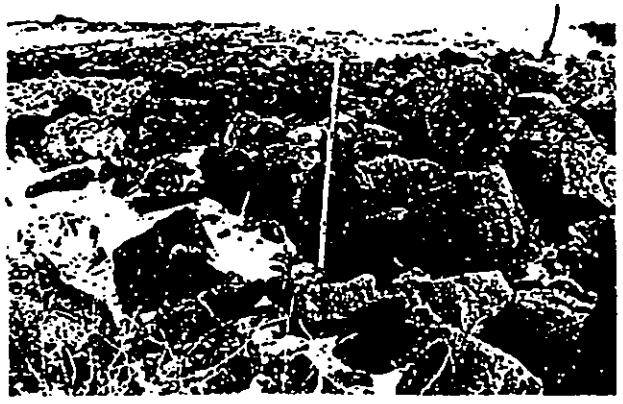
Dates: AD 1523 ± 96
1531 ± 100
1538 ± 98
1560 ± 75
1556 ± 46
1652 ± 70

Site Date: AD 1430-1720

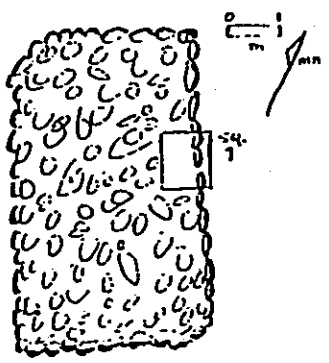
H-16



D15-5. Ooma 2. Shot across structure from southwest corner (including south wall to right.



D15-5. Ooma 2. Shot from south. View of older structure's base stones (alignment runs north-south & pole leans against it).



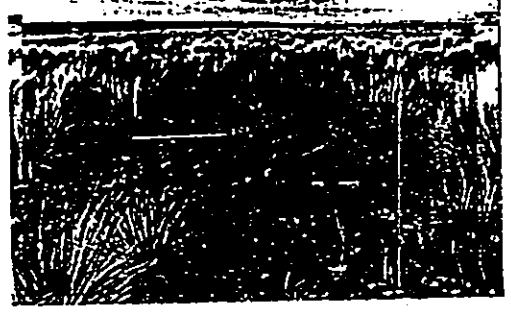
Ooma 2
D15-6

SITE INTERPRETATION: Commoner Household

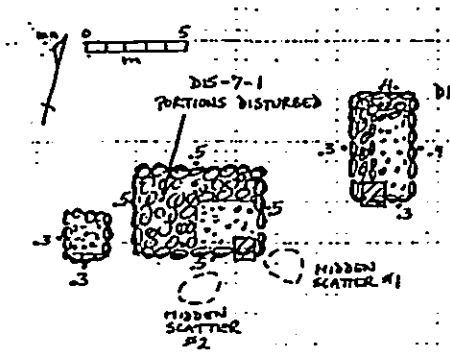
SITE DATE: AD 1540-1650

STRUCTURE INTERPRETATION: Sleeping House

DATES: AD 1581 ± 29
1594 ± 52



Site D15-6



Ooma 2
D15-7

SITE INTERPRETATION: Commoner Household

SITE DATE: AD 1490-Contact

D15-7-1

Interpretation: Sleeping House

Dates: AD 1575 ± 86
1736 ± 36
1740 ± 39
1597 ± 48 Midden #1
1705 ± 68 Midden #2

D15-7-2

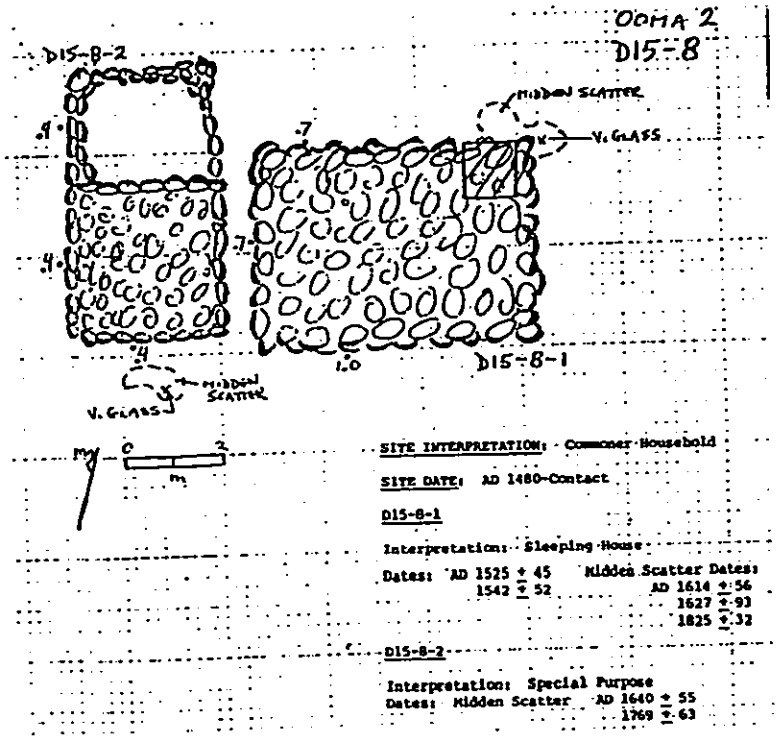
Interpretation: Special Purpose

Dates: None

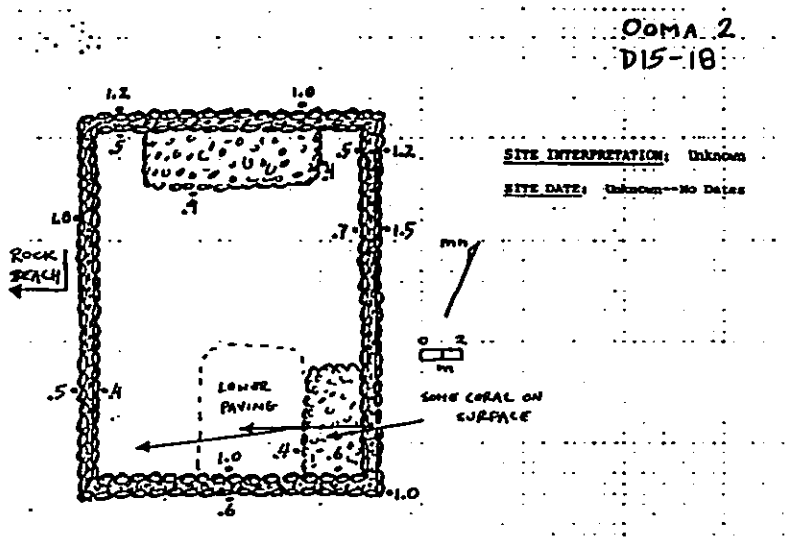
Site D15-7

D15-7-1. Ooma 2. (from east).

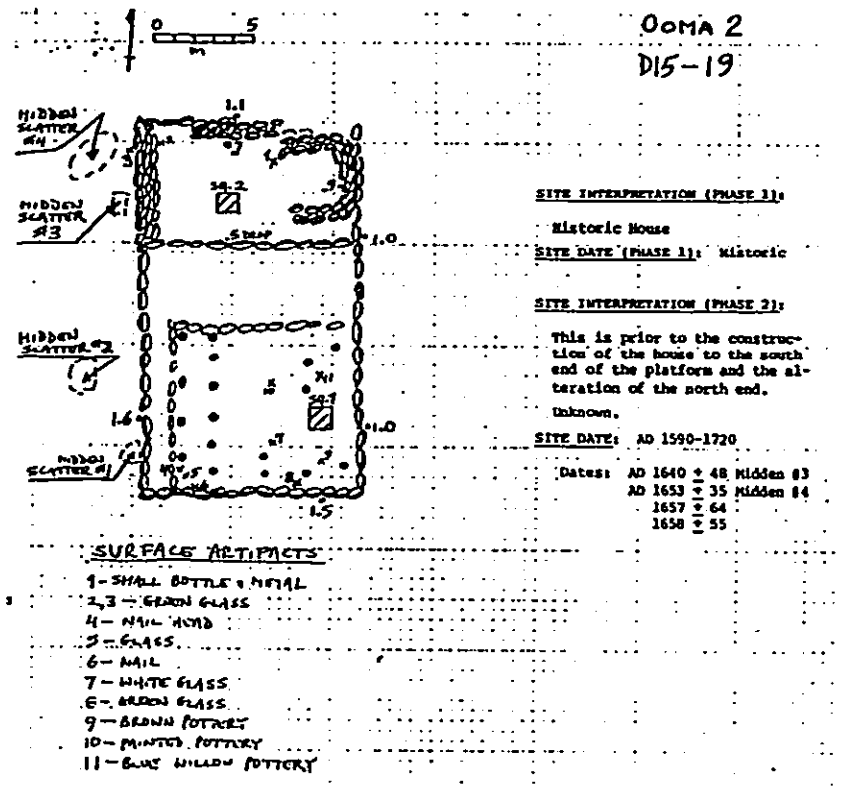
D15-7-2. Ooma 2. (from south).



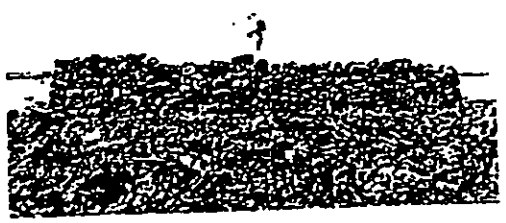
Site D15-8



Site D15-8 -- Probable Heiau.



Site D15-19 -- Probable Heiau Prehistorically.



D15-19. Ooma 2. (View from the south).

D15-19. Ooma 2. Southwest corner.

APPENDIX B

ADDITIONAL DESCRIPTIVE INFORMATION ON BARRERA'S INLAND SITES, OOMA 2

T-20 Platform --- Possible Grave

This platform is rectangular in shape. The stones are set on edge with large flat exposures in the facings. No midden or deposits are visible.

T-22 Cave --- Shelter

While "shell midden is scarce" (Barrera 1985:27), it is present as scattered pieces on the floor.

T-21 Platform --- Possible Grave

This platform also is rectangular in shape, although its facings have collapsed. No midden or deposits were seen.

T-39 Midden under Overhang --- Shelter

This midden is under an overhang (c. 1.6 m high), the remnant of the lava bubble. Barrera's photo (1985:44) shows this overhang on the right. The midden is shallow, less than 5-10 cm in depth, and is not extensive. It shows signs of disturbance in the center of the site. Three coral abraders and 2 sea urchin spine files had been placed on a rock by someone. As these were not in context, they were collected to prevent removal by casual visitors. They are at the Historic Sites Section and will be drafted and measured in a suppliment to this fieldcheck report.

T-23 C-shaped Enclosure --- Shelter

As described by Barrera (1985:28).

T-13 Mound

Not seen.

T-25 C-shaped Enclosure --- Shelter

Not seen, unless T-44 (App. C).

T-24 Cave --- Shelter

Not seen.

T-27 2 Caves --- Shelter

Main cave as described by Barrera (1985:32). This is a crevice, so the cave is reached by going down into it. A cairn is 2 meters to the north, and a second, smaller cave is in the same natural crevice feature 7-10 meters north.

T-19 Trail & 3 Cairns --- Trail

As described (Barrera 1985:24).

T-26 Trail --- Trail

Not seen.

T-4 Cave, C-shaped Enclosure --- Shelters

This cave is very large, extending off the inland side of the sinkhole. See sketch map. There are very shallow, scattered deposits on the floor, including midden and artifacts. The artifacts include abraders, besides picks. The two extreme ends of the cave were too dark to examine. Water drips inside also.

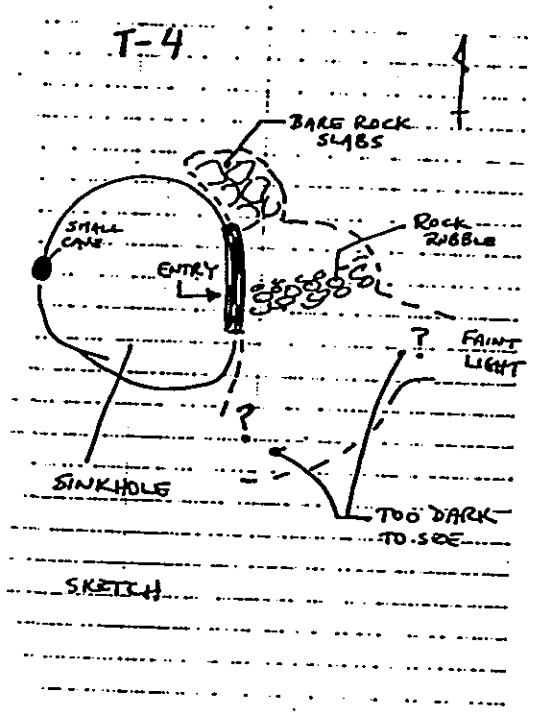
A small cave is present on the far side of the sinkhole, as a pit.

T-7 Cave --- Shelter

This cave also is quite large. It too has very shallow and scattered deposits. As described (Barrera 1985:10).

T-9 2 Cairns --- Markers

As described (Barrera 1985:12). The well constructed cairn, in Barrera's photo, is very near T-7 and is highly visible.



Sketch Map of T-4, Large Cave.

APPENDIX C

INFORMATION ON NEWLY DISCOVERED INLAND SITES, OOHA 2

T-41 Cave & Cleared Area --- Shelter

This site is just behind the high point of the large a'a flow. A sketch map of the site is attached.

The cave is c. 5-6 meters long and 2-3 meters deep. A section of deposit (c. 10 cm deep) is present at the entrance. Surface midden (large opihi, Nerita, etc.) and artifacts (abraders) are present throughout the cave, and a basalt beach stone is present. A broken neck fragment of a poi pounder was collected and is at the Historic Sites Section. The cave was photographed.

The cleared area is immediately adjacent and is roughly 4 x 4 meters in size, with some walling of a'a around it. No deposits were visible.

T-42 Cave --- Unknown

This is a small cave on the north side of the a'a flow, at its join with the adjacent pahoehoe. The cave is too small to stand or sit in. Low parallel walls run from it. See sketch map.

T-43 Cave --- Shelter

Just briefly glanced at. Small cave with slight deposits. On north side of knoll area.

T-44 C-shaped Enclosure --- Shelter

This might be T-25, if Barrera mislocated it. Not measured but about 3 x 3 meters, and only 1-2 stones high (less than 20 cm). No deposits are present.

T-45 Cave --- Shelter

Low cave or overhang at the south side of a sinkhole behind T-39. About 4-5 meters long, 2 meters deep, and 0.9 meters

high. A few pieces of midden are present. Photographs were taken and will be in the suppliment to this report.

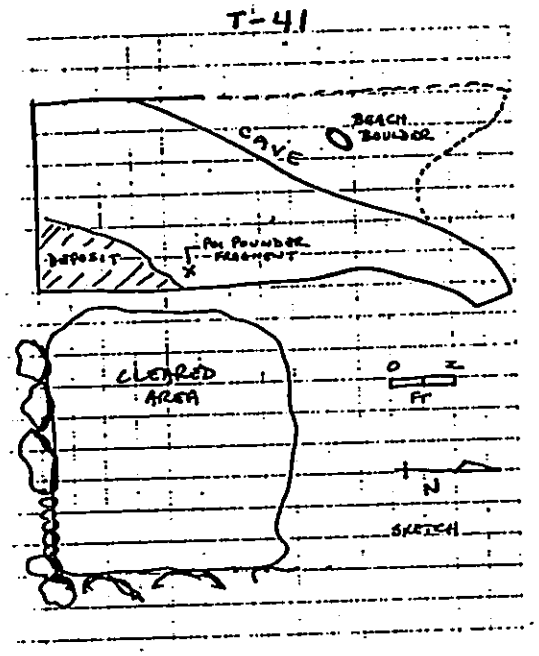
T-46 2 Cairns --- Marker

These are both small, about 1 x 1 meters and 1.0 meters high. They are perhaps 10 meters apart on the flat pahoehoe southwest of the high a'a flow.

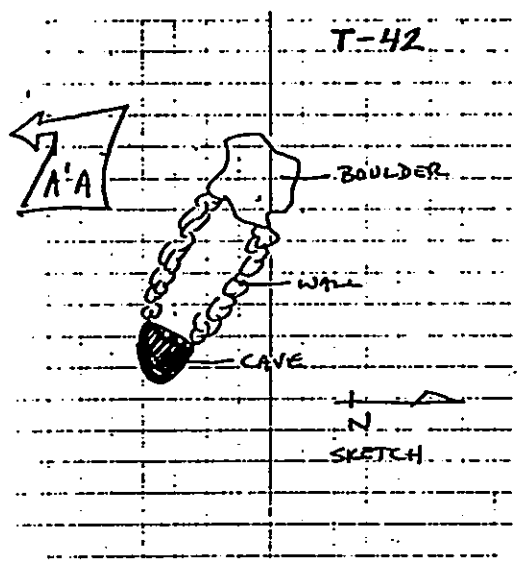
Surface Artifact Finds in Open Terrain

1. Coral Abrader. Found in the shallow sinkhole which contains T-43 and T-44, just inland of T-43. Collected.

2. Coral Abrader. Found on the flat pahoehoe, just southeast of T-19's entrance into the a'a.



Sketch Map T-41



Sketch Map T-42

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Cordy, Ross 1975. Site Maps (with photographs, interpretations, dates). On file, Historic Sites Section.

------ 1981. A Study of Prehistoric Social Change: The Development of Complex Societies in the Hawaiian Islands. New York, Academic Press.

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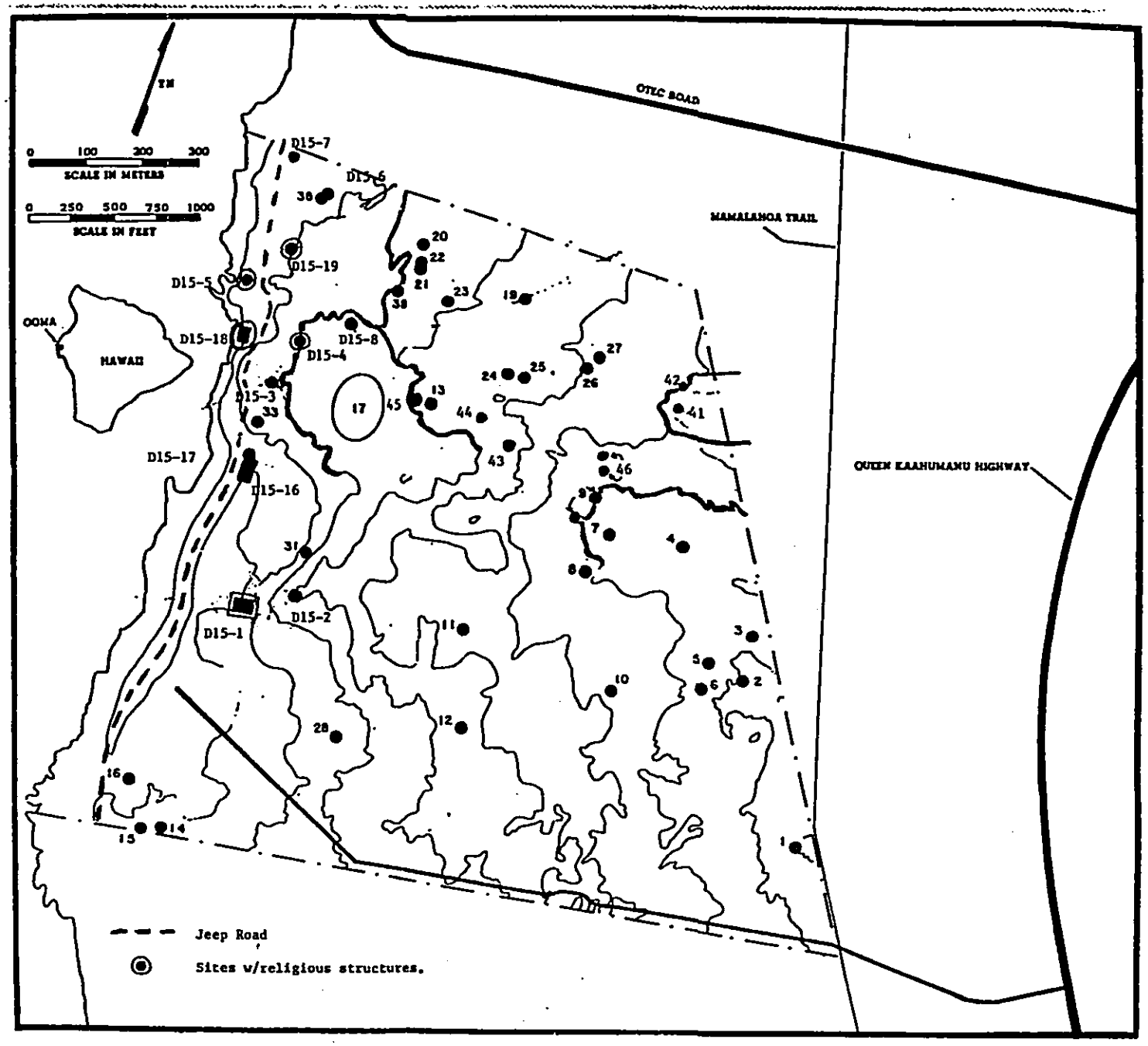
TH
0 100 200 300
SCALE IN METERS
0 250 500 750 1000
SCALE IN FEET
OTEC ROAD
MAMALAHOA TRAIL
QUEEN KAAHUMANU HIGHWAY
OOMA
HAWAII
D15-7
D15-6
D15-19
D15-5
D15-18
D15-8
D15-4
D15-3
D15-17
D15-16
D15-2
D15-1
Jeep Road
Sites w/religious structures.

I. PRELIMINARY REPORT: ARCHAEOLOGICAL SURVEY AND TESTING

PAUL H. ROSENDAHL, Ph.D., Inc.
Consulting Archaeologist

PRELIMINARY REPORT UPON COMPLETION OF FIELD WORK:

ARCHAEOLOGICAL SURVEY AND TESTING

OOMA II RESORT PROJECT AREA

Land of Ooma II

North Kona, Island of Hawaii

(TMK:3-7-3-09:4)

by

Theresa K. Donham, M.A.
Supervisory Archaeologist

Submitted to

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Honolulu, Hawaii 96813

July 31, 1986

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INTRODUCTION

An archaeological survey and testing program was conducted at the Ooma II Resort project area by Paul H. Rosendahl, Ph.D. Inc. (PHRI) under agreement with Helber, Hastert, Van Horn & Kimura. The purpose of this program was to provide technical information and preliminary site assessment statements that can be used in the preparation of a Draft Environmental Impact Statement (DEIS). This information will also be used for any zoning requests or Special Management Area (SMA) permit applications that might be made to the Hawaii County Planning Department.

The 314 acre project area includes the seaward portion of the Land of Ooma II, North Kona, Island of Hawaii (TMK:3-7-3-09:4). Field investigations were conducted July 16-23, 1986, under the direction of Principal Archaeologist Dr. Paul H. Rosendahl and Project Director Theresa K. Donham.

Prior to the present investigation, 45 archaeological sites with 88 component features had been recorded within the project area. Twenty-seven new sites with 105 features, and 61 new features at previously recorded sites, were located and identified during the present investigation. These new findings result in a cumulative total of 72 archaeological sites with 254 component features located to date within the project area. Subsurface testing or controlled surface collection was conducted at ten sites during this study. Detailed recording was conducted at all previously recorded and newly recorded sites, and scaled plan maps were compiled for 26 sites. A preliminary summary and evaluation assessment of all sites is presented in this report, which preceeds a final report of findings and recommendations.

The present document focuses on summarizing the data collected during the survey and testing program; it does not contain site-specific descriptions, synthesis of findings, or in-depth treatment of research problems. These latter discussions will be included in the final report, along with a summary and analysis of all materials recovered during excavations and surface collections. Hydration rind dates determined from recovered volcanic glass artifacts will also be discussed in the final report and compared with previously determined dates from Ooma II sites.

SCOPE OF WORK

The scope of work for this program was designed through consultations between Dr. Ross Cordy--staff archaeologist in the Historic Sites Section of the Hawaii State Department of Land and Natural Resources, Mr. Mark Hastert--Principal with Helber, Hastert, Van Horn & Kimura, Dr. Paul H. Rosendahl--PHRI Principal Archeolgist, and Dr. Alan E. Haun--PHRI Senior Archeologist. The original scope of work was based on a field inspection of the project area by Dr. Cordy (1986a, b), who found a number of deficiencies in a recently completed reconnaissance survey conducted by William J. Barrera, Jr. (1985). Cordy indicated that the inland portion

of the survey area had been adequately surveyed and that no additional reconnaissance for the purpose of locating new sites was needed (Cordy 1986a:5).

Barrera's survey was found to be deficient in the coastal portion of the project area, which includes all land within a minimum of 1000 ft from the shoreline (Cordy 1986a:5). Cordy indicated that the area seaward (west) of the coastal jeep road is within the affected project area and should be included within the archaeological survey area. He also stated that all small coastal sites observed but not recorded by Barrera should be inventoried and located. In addition, Cordy noted that Barrera failed to incorporate existing data that had been collected from Ooma II sites during a prior survey of the area by Cordy (1981).

The specific tasks outlined by Cordy (1986b) for Helber, Hastert, Van Horn & Kimura were designed to supplement existing archaeological data collected by Barrera (1985) and Cordy (1981), and to permit fulfillment of historic preservation concerns identified by the Department of Land and Natural Resources. These concerns were to be addressed in the DEIS prepared for the Ooma II Resort project area, and are as follows:

1. Identify all historic sites;
2. Collect enough information to evaluate the significance of each site;
3. Determine the significance of each site;
4. Establish the nature of impacts on significant sites; and
5. Provide a general mitigation plan which attempts to reduce impacts on significant sites (Cordy 1986b:1).

Concerns 1, 3, and 5 are directly relevant to this study. The fourth concern involves management decisions made by the developer, and are based on a number of factors that are beyond the scope of archaeological consultant involvement at this time.

The specific tasks of the scope of work were outlined as follows:

1. Intensive survey of the coastal area lying between a line of low sea bluffs situated 900 to 1200 ft inland and the shoreline;
2. Intensive survey of all previously identified sites, with the exception of previously recorded features at 12 coastal sites (D15-1 thru -8, and -16 thru -19; Bishop Museum site numbers) for which previous recording by Dr. Cordy, is considered by Dr. Cordy, to be sufficient. This work would include identification of component features and appropriate detailed recording (written descriptions, measurements, scaled plan maps, photographs and representative surface midden and artifact collections) at the following specific sites--

Coastal Area Sites T-14 thru -18, -33, -37, -39, and -40, plus any additional new sites identified during the coastal intensive survey,

Inland Area Sites T-1 thru -13, -19 thru -28, and -41 thru -46 (29 sites);

3. Testing by excavation at Site T-16 to determine the type and nature of the buried feature. At all other sites containing subsurface deposits, testing by probe or auger sufficient to determine in general the nature, depth, and content of stratigraphic deposits. No testing to be conducted at suspected burial features at Sites T-20, -21, and -33 (scope limitations per telephone conversation with Mr. Hastert, July 3, 1986);

4. Check caves approximately 400 feet west of Site T-1, and record if evidence of cultural use is present;

5. Laboratory analysis of data recovered from the archaeological survey and test excavations, including dating of "a few volcanic glass samples," if available from surface collections or test excavations; and

6. Preparation of written reports (Preliminary and Final). In addition to a final descriptive account of project findings, the Final Report will provide site-specific interpretations of site functions and ages, a general interpretation of past land use patterns in Ooma II, site-specific significance assessments, and recommendations for appropriate further treatment of significant sites.

T-3

Minor discrepancies were found in the specific sites listed in Tasks 2 and 3; Sites T-18, T-37, and T-40 are actually sites D15-8, D15-7, and D15-4, which had been previously tested by Cordy. Additional excavation was not conducted at these sites; however, scaled plan maps were compiled which included numerous new features not previously recorded by Cordy or Barrera. Site T-33 is listed as a site to be tested; it is also included in the list of burial features not to be disturbed at this stage of study (Task 3), and it is within the boundaries of Site D15-3 which was previously tested. This stone mound was therefore not disassembled.

Vegetation clearing and examination of the wall feature at Site T-16 indicated that small test excavation units as described in Task 3 would not provide new information about this feature. Erosion from wave action had created an undercut which exposed a 3.0 m long section of the western wall; this exposure confirmed that the remaining stones were the base of the wall and that no additional subsurface stones were present. The southern wall was sufficiently exposed to permit description and measurement (further discussed in the site description).

The significance of the archaeological resources identified and tested during this survey are evaluated in terms of potential scientific research, interpretive, and/or cultural values. Research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and cultural processes at the local, regional, and interregional levels of organization. The research value of individual sites is best explicated when a formal research design which outlines specific problems, prior hypotheses and newly collected data has been prepared for the project area.

A research design has been formulated for the Ooma II Resort project area, based on previous archaeological work, newly collected data and general research priorities identified for North Kona (cf. Draft Hawaii County Historic Preservation Plan 1986). This design is briefly outlined below, and will be further elaborated in the final report.

Interpretive value refers to the potential of archaeological resources for public education and recreation. Sites with high interpretive value are generally recommended for preservation, with possibly limited reconstruction and/or stoblization. Three sites within the Ooma II project area have been previously recommended for interpretive preservation by Dr. Cordy (1985:45). These and other sites with high interpretive value are discussed below.

Cultural value, within the framework for significance evaluation used here, refers to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and traditional values. Three sites within the Ooma II project area have been previously recommended for preservation for cultural significance reasons by Dr. Cordy (1985:45). These and other sites with potentially high cultural value are discussed below.

PROJECT AREA DESCRIPTION

The Ooma II Resort project area is a single parcel of approximately 314 acres, bordered on the west by the Pacific Ocean, on the south by the Land of Kohana-Iki, and on the north by the Land of Ooma I. The southeastern corner of the property is defined by the Mamalahoa Trail, and the eastern boundary angles c. 12 degrees westward away from the trail toward the northeastern property boundary (Figure 1). The property boundaries were not marked in the field and there is some confusion as to exactly where the boundary between the Ooma II and Kohana-Iki is located. A recent reconnaissance survey base map provided to PHRI by Helber, Hastert, Van Horn & Kimura indicates that the boundary is aligned with an access road to the coast. The Ooma II base map indicates that the boundary is 80 ft south of the road. If the latter boundary is correct, approximately six sites previously located in Kohana-Iki (Donham 1986) are actually within the Ooma II project area. Two of these boundary sites, recorded as Sites T-175 and T-176 in Kohana-Iki, were recorded for the Ooma II area by Barrera (T-14 and T-15).

The land of Ooma II is situated on the lower-southwestern slope of Hualalai Volcano, in the region of Kekaha, which includes those lands from Honokohau north to Pu'uanahulu (Springer 1985:87). The principal environmental features of Kekaha are the dry, hot climate of the region and the

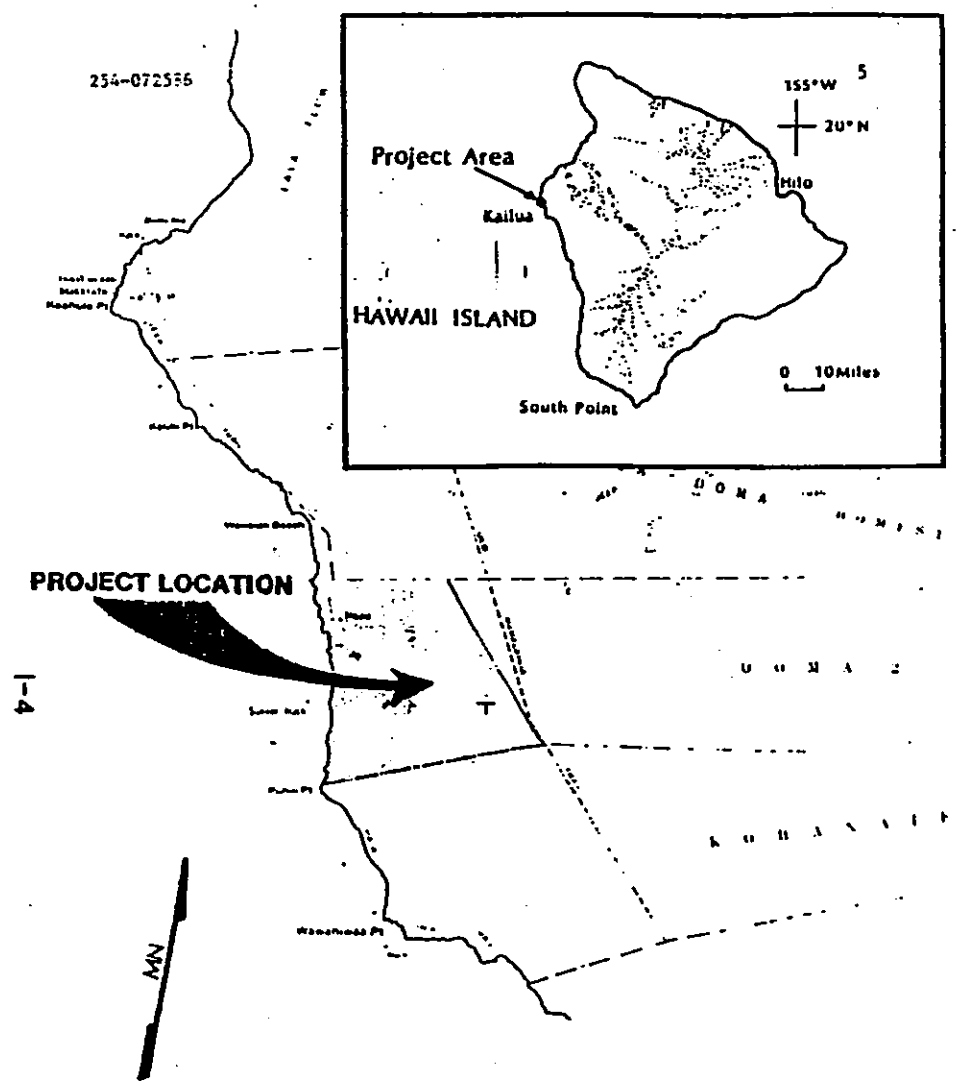

Figure 1. PROJECT LOCATION MAP.

Preliminary Report Upon Completion of Field Work:
Archaeological Survey and Testing
Ooma II Resort Project Area, Land of Ooca II
North Kona, Island of Hawaii (TMK:3-7-3-09:4)

PHRI Project 86-254 July 1986

extensive lava fields which have little to no soil accumulation. Local climatic patterns are affected by the mountains, which block moisture-laden northeast trade winds. Average annual rainfall ranges between 10 and 20 inches, with a slightly lower average along the coastal zone (Armstrong 1973:57). Mean temperatures range from 70 to 76 degrees F. (Hawaii Department of Land and Natural Resources 1970:81).

The current ground surface of the project area consists of prehistoric pahoehoe and aa lava flows derived from Hualalai Volcano (Macdonald, Abbott, and Peterson 1983:353). Relatively level, weathered, smooth pahoehoe occurs along c. 50% of the coastal zone, and is the locus of most of the vegetation within the project area. Smooth pahoehoe forms most of the rocky points along the shoreline that extend beyond the band of coral beach wash. With the exception of a narrow band of coral beach deposits, no soil zones are recorded within the project area by the Soil Conservation Service (Sato et al. 1973:Sheet 66). Soil accumulation observed in the rocklands during field investigations was limited to cave or overhang shelters that also had dense midden deposits.

A more recent deposit of mixed aa and rough to broken pahoehoe occurs in discontinuous patches across the project area. This more recent flow forms a definite topographic feature which curves inland from the southern coastal zone and roughly correlates with the inland/coastal zone boundary in the northern half of the project area. Archaeological sites tend to cluster along the west-facing crest of this flow ridge, where topographic relief is most pronounced. Nearly all located footpath segments were over aa and rough pahoehoe of this overlying flow; paths became extremely difficult or impossible to distinguish once the smooth weathered pahoehoe was encountered. The aa/rough pahoehoe flow extends to the shoreline in two disconnected deposits within the project area. Major coastal sites are concentrated either along the periphery or on prominent landforms within these two deposits, which cover approximately 50% of the immediate coastal area.

Two general environmental zones are distinguishable within the project area, the coastal and inland, or barren, zones. The coastal zone has an average width of 1000 ft (305 m) from the shoreline, and varies in elevation from sea level to 35 ft. The coastal zone survey stratum was defined prior to this study and was based on Barrera's definition of the coastal zone (1985:1). The inland boundary of this zone is an imaginary line connecting selected sites and ranges from 900 ft (207 m) inland at the southern boundary to 1200 ft (366 m) inland at the northern boundary.

Characteristic coastal vegetation includes tree heliotrope (Messerschoidia argentea [L.f.] Johnston), naupaka (Scaevola sericea Vahl), Christmas-berry (Schinus terebinthifolius Raddi), and beach morning glory (pohuehue, Ipomoea pes-caprae L.). Particularly dense stands of naupaka and Christmas-berry occur in the southern portion of the coastal zone, which is generally lower than the northern portion. Immediately inland of the naupaka stands on smooth pahoehoe are relatively dense stands of fountain grass (Pennisetum setaceum [Forsk.] Chiov.), with scattered Christmas-berry, noni (Morinda citrifolia L.), and kiawe (Prosopis pallida

[Humb. and Bonpl. ex Willd.] HBK.). Lantana (Lantana camara L.) and 'ilima (Sida fallax Walp.) occur throughout the coastal zone, and in lesser quantities in the barren inland zone. Most of the aa and rough pahoehoe areas are devoid of vegetation or support small patches of fountain grass in low, protected pockets. A few isolated kiawe trees also occur in the barren inland zone.

PREVIOUS ARCHAEOLOGICAL WORK

The earliest recorded field work recorded for Ooma II was conducted in 1930 by John E. Reinecke (Ms.), who located major coastal sites in the Districts of North Kona and South Kohala for the Bernice P. Bishop Museum (BPBM). Reinecke recorded ten sites along the Ooma II coast (Sites 66-75), seven of which have been correlated with BPBM sites later recorded by Cordy (1986a:27). Reinecke's site descriptions are somewhat vague, and definite correlation of his data with later survey findings is not possible in all cases. Some of his descriptions do, however, provide a historical perspective on the condition of some sites 56 years ago (Reinecke Ms:15-16).

In 1971-72, the Hawaii Department of Land and Natural Resources began an inventory of known archaeological sites, and revisited a number of sites located by Reinecke. State inventory numbers were assigned to seven coastal sites and four inland sites. Four coastal sites (1911 thru 1915*) were grouped as the Ooma II Complex (4165). These four sites were later subdivided by Cordy and designated as nine sites (D15-3 thru 6, 8, 16 thru 19#). State survey file information is being acquired and will be further discussed in the final report.

The most intensive prior archaeological work conducted within the project area was done in late 1975 by Ross H. Cordy, who conducted a coastal survey and site testing program in selected land divisions of west Hawaii. Cordy identified features of inferred permanent habitation function (platforms and terraces within a given size range), assigned Bishop Museum numbers, compiled sketch plan maps, and excavated one meter square units into the structures for the purpose of obtaining volcanic glass for dating. Twelve sites were recorded and nine were tested within the Ooma II project area (Table 1). Sites not tested include a large animal enclosure (D15-16) and adjacent platform (D15-17), and a large heiau (D15-19).

*Hawaii Register of Historic Places (HRHP) site designation system: all four-digit site numbers prefixed by 50-10-27- (50= State of Hawaii, 10=Island of Hawaii, 27=USGS 7.5' series quad map ["Keahole Point"]).

#B.P. Bishop Museum site designation system: all site numbers prefixed by 50-Ha-D15- (50=State of Hawaii, Ha=Island of Hawaii, D=District of North Kona, 15=Lands of Ooma (I and II).

Table 1.

SUMMARY OF EXCAVATIONS AND VOLCANIC GLASS DATES DETERMINED DURING CORDY'S 1975 DISSERTATION WORK IN OOMA II*

Site No.	Features Recorded	Test Units	Dated Glass Specimens	Range of Dates Determined
D15-1	4	4	8	AD 1490-1832
D15-2	2	3	1	1550-1660
D15-3	5	4	8	1560-1760
D15-4	2	1	1	1750-1821
D15-5	4	1	6	1430-1720
D15-6	1	1	2	1540-1650
D15-7	2	2	5	1590-1779
D15-8	2	1	7	1480-1857
D15-16	1	-	-	---
D15-17	1	-	-	---
D15-18	1	-	-	---
D15-19	1	2	4	1590-1720

*Source: Cordy 1981.

Data collected at Ooma II were incorporated with data from seven other North Kona land divisions and synthesized as part of Cordy's Ph.D. dissertation research (Cordy 1981). Cordy hypothesized that the permanent population of Ooma II consisted of commoners, who first occupied the area c. AD 1400. Cordy estimated the local population for 50 year time units, based on the size of structures assumed to be occupied contemporaneously. According to these estimates, the population reached its highest point (60 persons) between AD 1550 and 1650, and declined to 48 by AD 1780 (Cordy 1981:169-170).

Cordy interpreted most of the features investigated at Ooma II as sleeping houses; exceptions include men's houses at D15-1, D15-4, and D15-5, and special-purpose houses at D15-1, D15-2, D15-3 (2), D15-7, and D15-8 (Cordy 1986a:15-33). The functional interpretations of Ooma II sites offered by Cordy will be further examined in the final report. If alternative functional interpretations are feasible for certain sites or features, then other hypotheses concerning population size, composition, and structure will be critically examined.

Between 1975 and 1985, a number of survey projects were conducted in the area of the Keahole Airport and Agricultural Park Area, north of the project area. These surveys are summarized in an overview study of the Ooma and Kalaoa land units prepared by Cordy (1985). That 1985 overview was compiled as a working paper, from the Historic Sites Section of the Hawaii Department of Land and Natural Resources, for use by researchers and contractors working within the focal area. The paper is designed for use in cultural resource management, and contains information on local environment, prior archaeological work, site patterning, chronological data, and an interpretive overview. Cordy also lists specific sites known

to him that have high potential for preservation as interpretive or religious structures.

Additional field work was conducted at Ooma II in 1985 by William J. Barrera, Jr., who undertook a reconnaissance level survey of the Ooma II Resort project area for Helber, Hastert, Van Horn & Kimura (Barrera 1985). Barrera divided the project area into coastal and inland zones, and conducted different intensities of reconnaissance in each zone. In the inland zone, all features--with the exception of pahoehoe clearings--were given temporary site numbers, located, photographed, and briefly described. In the coastal zone, only the "larger and more substantial features" were located and described (Barrera 1985:1). Apparently having neglected to review available reports and records on prior work within the project area, Barrera recorded 40 temporary site numbers, 13 of which corresponded with features previously recorded by Cordy as BPBM sites. The Barrera survey therefore recorded 27 new sites with 54 new features. Recommendations are not given for specific sites, and Barrera concluded--without apparent justification--that "[f]rom the archaeological perspective, none of the sites found are of such significance that preservation should be required" (1985:46).

Due to problems with Barrera's report and level of work, Helber, Hastert, Van Horn & Kimura requested a review and field check of the Barrera work by Dr. Cordy of the Historic Sites Section-DLNR. Cordy returned to Ooma II and examined the northern one-third of the inland survey area, as well as a small section of the northern coastal survey area (Cordy 1986b). Six new sites with seven features were located in the inland area by Cordy during this field check (Sites T-41-46). Cordy's assessment of the inland survey was that Barrera's survey was "fairly accurate," with additional necessary work limited to gathering more complete data on recorded sites. Cordy apparently had problems relocating some of Barrera's sites (1986a:5). In contrast, the PHRI survey team was able to locate all of Barrera's inland sites, most of which were still labeled with a site number, and were accurately plotted on Barrera's project area map.

In his field check report, Cordy includes field notes and age determination data for the sites which he tested in 1975 at Ooma II. A table correlating BPBM site numbers and Barrera's temporary site numbers is included; however, there are a number of errors in this table. Many of the correlations were confirmed by PHRI in the field, using Barrera's site markers and photographs, and Cordy's site maps. A revised site correlation table is presented here (Table 2). Many of Cordy's statements which refer to erroneous feature measurements by Barrera are due to this confusion between correlated sites (Cordy 1986a:11-12). The recommendations and scope of work which resulted from Cordy's field check have been discussed in a preceeding section.

Field Procedures

Field work at the Ooma II Resort Project area began July 17, 1986 with two field teams of three persons each. An inland team concentrated on relocating all previously recorded sites east of Barrera's previously established line. Relocation efforts began at the northern end of the project area and moved southward. Upon relocation, all sites were tagged with an aluminum strip which included the temporary site number assigned by Barrera, PHRI project number (86-254), and date. Site designation information was also written on a strip of pink flagging tape and wrapped around a cobble-sized stone in order to insure longer preservation of the tag. The stone was placed in a protected but conspicuous place on the site.

The location of each site was checked, using a 1"=400' scale aerial photograph (R.M. Towill Corp., 1980:Photo No. 7895-16), and replotted if necessary. A standard PHRI site survey form was completed and 35 mm black-and-white photographs were taken. If surface midden was sparse with no soil deposit, all species of faunal remains represented were listed on

Table 2.

CORRELATION OF ASSIGNED SITE NUMBERS, OOMA II COASTAL ZONE

(1975) Bishop Museum	(1971-72) State Inventory	(1930) Reinecke	(1985) Barrera	Comments
D15-1	1910	68	-	-
D15-2	1910	-	29, 30	-
D15-3	1912	-	33	Barrera's number corresponds with a stone mound on the site
D15-4	1914	71	40	-
D15-5	1914	72	-	-
D15-6	-	-	-	-
D15-7	1916	75	37, 38	Barrera's 37 is Cordy's Fea. 2, 38 is Fea. 1
D15-8	1914	73	18	-
D15-16	1911	69	32	-
D15-17	1911	69	34	-
D15-18	1913	70	35	Barrera's number corresponds with an associated platform directly across the coastal jeep road from the heiau (D15-18)
D15-19	1915	-	36	-

the site form. When definable horizontal features, such as hearths or concentrations of midden, were observed, a scaled plan map of the site was compiled and the surface material was collected by feature provenience. All surface artifacts were collected and plotted on site plan maps.

Excavation was conducted when a sufficient amount of soil and midden had accumulated at the site. These accumulations were extremely limited in the inland survey area, and excavations were conducted at only six sites. Test units were small (0.5 x 0.5 m), reflecting the small area of deposits with any depth. No units could be extended beyond 10 cm deep, and most were terminated at bedrock between 2 to 5 cm below surface. All soil removed during excavation was screened through 1/8" mesh and material was bagged for laboratory analysis. Soil samples were collected from test units, and a single bulk sample for radiometric dating was collected. Relatively large pieces of charcoal were separated in the field prior to screening and wrapped in foil, in order to protect them from further damage. All charcoal is being sorted in the laboratory and samples of sufficient size from the inland sites will be considered for submission for radiometric age determination.

Additional work conducted in the inland zone included thte location of a series of caves c. 400 ft west of Site T-1, as specified in Task 4 of the scope of work. Previous descriptions of these caves by biolegists had suggested that they might contain cultural debris. The caves were located and examined, but no evidence of use by humans was indicated; however, the caves did exhibit evidence of occupation by feral goats.

The coastal field team began by conducting a systematic pedestrian survey of the coastal area, between the shoreline and Barrera's coastal/inland boundary. A series of twenty-five sweeps (three transects each) were walked, beginning at the southern project area boundary and moving northward in east-west lines. All sites encountered were located, tagged, and recorded as described above. Sites previously recorded by Cordy were tagged with BPBM numbers, while those previously recorded by Barrera were tagged with his assigned temporary site number (T-1 thru 40). Sites more recently identified by Cordy were tagged with his assigned temporary sites number (T-41 thru 46). All newly identified sites were tagged with a temporary site number, beginning with T-47. Sites with both BPBM and Barrera numbers were tagged with BPBM numbers, since these had been assigned prior to Barrera's survey.

Test excavations were conducted at the previously recorded sites listed in the scope of work; however, it was impossible to conduct excavations at all newly located features with substantial midden deposits. The complexity and large number of newly located features in the coastal area was not expected, given Cordy's remarks in his field check report that the larger sites had "already been recorded at the intensive survey level" (1986a:5). Scaled plan maps were compiled for four of the previously recorded and mapped sites, illustrating the extensiveness of associated features that had not been mentioned by either Cordy or Barrera. Additional scaled plan maps were compiled for the extensive complexes that consisted of small shelters, cairns, rubble piles, and pahoehoe clearings. These sites had no surface midden and will probably need no further recordation.

In summary, test excavations or controlled surface collections were conducted at ten sites. These include Sites T-4, 6, 12, 13, 17, 22, 24, 39, 41, and 45. Surface artifacts were collected and plotted at the above sites and at an additional seven sites: T-5, 15, 27, 61, 67, D15-7 and D15-8. The laboratory analysis of midden collections is currently in progress. This analysis consists of size sorting all midden collections into 1/4" and 1/8" size grades, with a complete sorting of 1/4" material and a thorough examination of all 1/8" material for artifacts and any faunal materials not represented in the 1/4" size grade.

All shellfish remains will be sorted by genera and species, and weights recorded by provenience. Vegetal materials will be identified to the degree possible, and vertebrate remains subdivided by class or species when possible. These remains generally require specialist examination for specific identification, which should be conducted as part of the mitigation phase. Volcanic glass and possibly charcoal samples from inland site collections will be submitted to Mohlab and Beta Analytic, Inc., respectively for age determinations.

FINDINGS

A total of 254 archaeological features at 72 sites have been recorded to date within the Ooma II Resort project area (Figure 2; Tables 3, 4, and 5, at end). Over half of these features (N=166, 65%) were recorded during the current PHRI survey and testing program. Sixty-one of these newly recorded features represent new data for previously recorded sites, while the remaining 105 features were located at 27 newly identified sites. The breakdown of this cumulative site and feature count is as follows:

Cordy (1975) coastal survey	12 sites	32 features
Barrera (1985) survey	27 new sites	56 new features
Cordy (1986) field check	6 new sites	7 new features
PHRI (1986) survey & testing	27 new sites	105 new features
Cordy (1975) sites	-	43 new features
Barrera (1985) sites	-	15 new features
Cordy (1986) sites	-	3 new features
Totals	72 sites	254 features

Twenty-five formal/functional types were identified among the 254 features located within the project area (Table 6). The majority of the type descriptions used are formal:, however, a few features, such as the stationary hearth, grinding stone and cupboards, have been assigned functional labels.

Platforms, terraces, and pavements comprise 20% of all features located. These formal types are differentiated on the basis of height above ground surface. Pavements consist of a single course of fill material above the general surface. Several courses may occur in crevices or depression that have been filled beneath the pavement in order to

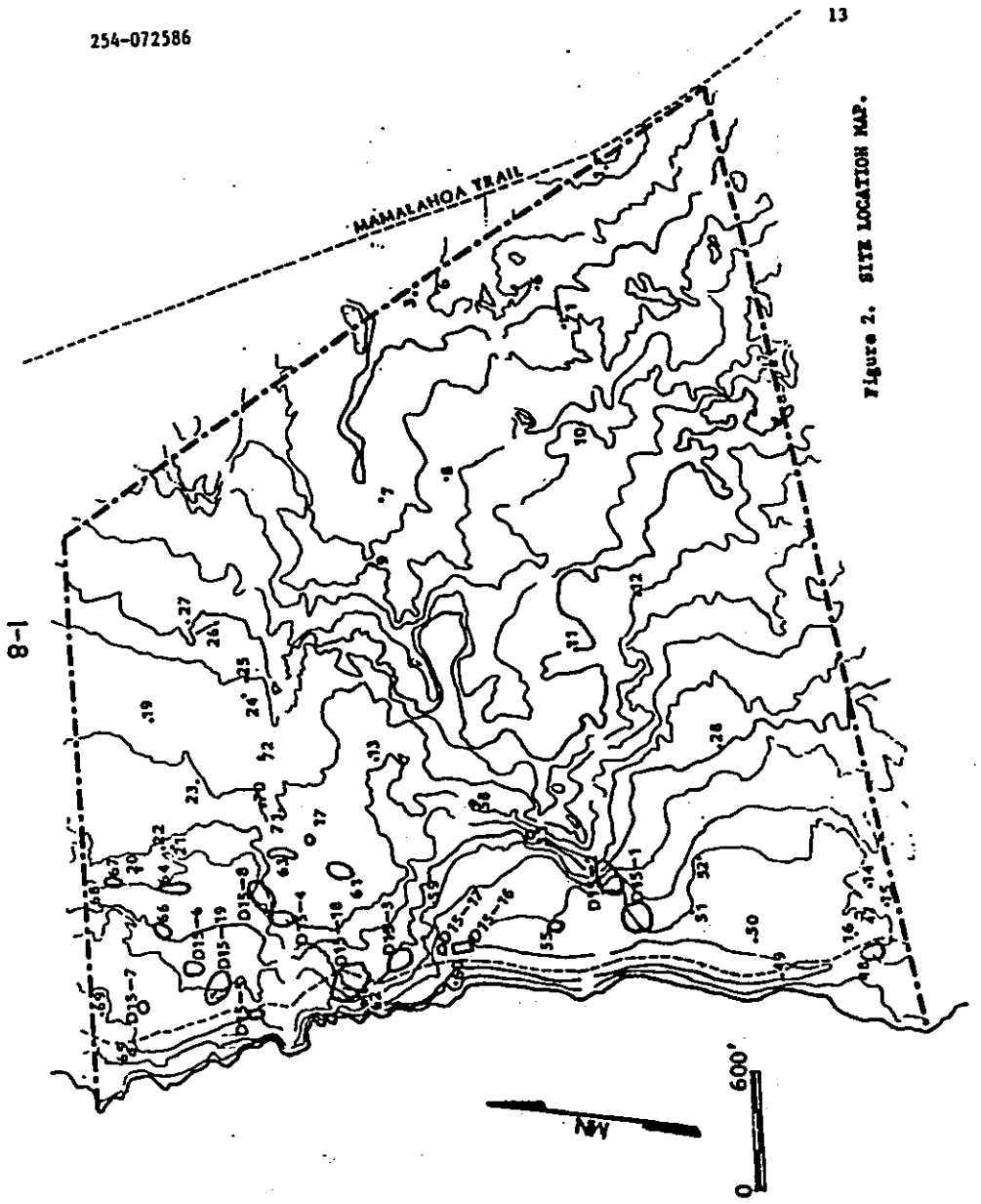

Figure 2. SITE LOCATION MAP.

Table 6.

FEATURE FREQUENCIES BY FORMAL/FUNCTION TYPE

Type	BPBM Sites*	Sites T-1 thru T-46	Sites T-47 thru T-73#	Total
Platform	20	2	5	27
Terrace	5	1	–	6
Pavement	11	4	3	18
Enclosure	7	–	1	8
Single wall	2	2	–	4
C-shape wall	2	3	11	16
Walled shelter	4	4	7	15
Cave shelter	5	15	9	29
Overhang shelter	–	4	8	12
Rock mound	2	2	–	4
Rubble pile	3	4	12	19
Filled depression	6	2	2	10
Cairn	2	19	24	45
Modified outcrop	–	–	8	8
Bedrock excavation	1	1	5	7
Pahoehoe clearing	–	5	3	8
Rock alignment	1	–	3	4
Petroglyph	–	1	–	1
Footpath	2	2	1	5
Well	–	1	–	1
Shrine	1	–	1	2
Cupboard	1	1	–	2
Surface midden	–	1	–	1
Stationary hearth	–	–	1	1
Stationary grindstone	–	–	1	1
Total	75	74	105	254

*Count includes previously and newly identified features at these sites.

#Sites identified during PHRI (1986) survey. All features newly identified.

create a level surface, but these are not visible. Pavement surfacing material used at the 18 pavement features at Ooma II includes coral transported from the storm beach, cobble to pebble-size pahoehoe pieces--some of which may have been purposely broken, and small chunks of aa lava. Coral pavement is generally considered to be the most elaborate and is often associated with features of a ceremonial (socio-political and/or religious) nature. For example, Cordy interprets the large coral pavement at Site D15-1 as a men's house, which had both religious and economic functions. Coral pavements also occur at Sites T-14 and T-31, which are smaller coastal complexes with possible ceremonial functions.

Twenty-seven platforms have been located at Ooma II, most of which occur at the large complexes located in the coastal zone (N=20). These features, which are raised above the ground on all sides, exhibit a wide range of variability, and are divisible into two general functional groups --structural platforms and burial platforms. Structural platforms generally exhibit a level surface that is paved with small cobbles or pebbles of coral or lava. Burial platforms may also be leveled on the surface and paved; however, they are usually slightly mounded, irregularly surfaced, and/or too small to function as a structure foundation. There are currently no proven standards for distinguishing burial platforms from structural platforms; features which do not conform to the perfect "type" models can be easily misinterpreted. This problem is critical in settlement pattern analysis, and is a major analytic concern for the Ooma II project area.

Terraces are less frequent at Ooma II (N=6), and appear to be platform variants, raised above the ground on one to three sides. All terraces are within the coastal zone and have either structural or burial functions. None of the terraces located at Ooma II were earth filled, and they do not represent agricultural features.

Two enclosure variants were observed within the project area. A single example of a high-walled animal enclosure (D15-16) occurs along the coast. The remaining seven enclosures appear to have been habitation features with low walls that probably supported wood and thatch superstructures. These features are closely related to the larger and more substantial C-shaped walls, which are more permanent variants of the temporary shelter C-shapes.

Sixteen C-shaped walls were recorded, five of which occur in large coastal complexes and are of substantial construction. Eleven C-shapes were located at sites interpreted as temporary habitations; most of these (N=7) occur in the coastal zone . Other temporary habitation features include cave shelters (N=29), overhang shelters (N=12), and walled shelters (N=15). These features occur on 34 sites, half of which (N=17) are in the coastal zone. It is likely that the number of temporary habitation sites is higher than indicated for the inland zone, given the degree of survey coverage conducted in this zone. A sample resurvey of this zone (c. 1/3 of the inland area) by Cordy resulted in an 80% increase in identified temporary habitation sites (Cordy 1985). On the basis of this sample, it is likely that there are at least 25 temporary habitation sites in the inland zone.

Rock mounds, rubble piles, cairns, and filled depressions together comprise 30% (N=76) of the recorded features. These features are differentiated by structural aspects, rather than building materials. Rock mounds are well-defined features constructed from chunks or slabs of pahoehoe. The base of these features is generally 2.0 m or greater and the height is at least 0.8 m; sides are either vertical or slightly in-sloping. Some rock mounds, such as Feature 5 at Site D15-19, have an interior chamber for interment purposes. All four of the rock mounds located within the project area have been interpreted as burial features.

Rubble piles are haphazard, poorly defined concentrations of stones. The bases of these features are generally scattered over areas 1.0 to 2.0 m in diameter; heights rarely exceed 0.4 m. Some of these features may represent dismantled cairns, or loose stones that were cleared from a selected area and simply thrown into a pile. Others may have supported structural posts, racks, or small constructions. The spatial patterning of rubble piles has been mapped for three coastal complexes, where a large number of these features occur. Analysis of these data may provide new information that will aid in interpreting these features, 19 of which have been located within the project area.

A total of 45 cairns were located, 24 of which are newly identified features. Cairns are differentiated from rubble piles on the basis of overall base to height proportions. Cairns also exhibit purposive construction, not indicated for rubble piles. Cairns are generally assumed to be markers of paths, boundaries, locales, or specific events at given locales. Definitive functional interpretation of cairns can only be offered when they are in direct association with another identifiable feature, such as a path or cave. Six sites were recorded which consist exclusively of cairns. One of these sites is a single cairn and all others consist of two or three cairns in association. These sites all occur in the inland zone.

Fifteen pahoehoe clearings and bedrock excavations were located within the project area. Pahoehoe clearings (N=8) are depressions or horizontal holes cleared in areas where naturally loose stones occur, such as collapsed blisters or tubes. Some pahoehoe clearings are large enough to have functioned as shelters, others are the size of cupboards. Pahoehoe clearings are associated with adjacent piles or scatterings of removed stones; no portable remains were located at these features, and it is difficult to assign them to a specific function. A few clearings may represent removal of rooffall from blisters or crevices by relic hunters looking for burials or artifacts.

Bedrock excavations (N=7) are vertical holes created by the removal of once intact bedrock. These features exhibit battering around the orifice where force was used to break away sections of pahoehoe. Bedrock excavations may or may not have associated piles of stone, reflecting removal of quarried stone from some excavations to another locale. Several bedrock excavations were located at Site T-67, in addition to two basalt hammerstone tools that had apparently been used at these features. One of the hammerstones is of sufficient size to easily break away sections of the 0.3 m thick layer of pahoehoe. These excavations are assumed to have a different function than pahoehoe clearings, and appear to represent quarry sites for either the search or acquisition of specific types of lava.

With the exception of the stationary hearth (Site T-60), all other features listed in Table 3 occur at complexes with additional component features. The petroglyphs were newly located at Site T-22, a temporary habitation cave shelter and walled shelter site. The stationary grinding stone was located at a newly located beach complex which includes a small platform (burial?) and two larger platforms (Site T-48).

Two small shrines were newly identified, one at Site D15-4 and one at Site T-63. Both shrines are in very good preservation, with the latter has been recently attended, as evidenced by the presence of a glass vase with dried flowers.

Tentative functional interpretations have been inferred at this time for 60 of the 72 recorded archaeological sites. The inferred functional interpretation and an inventory of component features identified for each site is listed in Tables 3, 4, and 5 (at end). Eighteen permanent habitation complexes have been identified; six of these sites appear to have component features suggestive of ceremonial activities, and two appear to have associated burial features. Temporary habitation sites are most frequent, and represent 48% (N=29) of the sites assigned to a functional category. A number of the temporary habitation sites located in the coastal zone are complexes and have component features suggestive of a variety of activities, such as storage and lava quarrying.

Ten sites appear to have single functional purposes. These include four trails, four burial sites, one storage site, and one animal pen. Three additional sites have been tentatively interpreted as having ceremonial functions only.

CONCLUSION

The evaluations and recommendations made here are based on an incomplete data base, as field notes and recovered materials are currently being analyzed prior to preparation of the final report. Recommendations are therefore subject to modification in the final report, pending the results of the data analyses now in progress.

PRELIMINARY SIGNIFICANCE EVALUATIONS

Tentative significance evaluations are summarized on a site-specific basis in Tables 3, 4, and 5 (at end). Prior evaluations have been briefly outlined by Cordy for the major coastal complexes (1986b), and four of these sites have been discussed in terms of their preservation potential (Cordy 1986a). These prior evaluations are included below where relevant.

As indicated in a preceeding section, the significance of cultural remains can be defined in terms of potential scientific research, interpretive, and/or cultural values. The research potential of a given archaeological site is best determined when research problems are explicated and the site is shown to contain information that may aid in solving these problems. Previous work by Cordy at Ooma II and other North Kona study areas has provided a base from which to direct further research. Cordy's hypotheses concerning the dates of earliest settlement, the social structure of the local population, and the functional uses of coastal sites have not been tested by other researchers. As is evident at

Ooma II, new data are certainly present, both at the previously recorded sites and at newly recorded coastal sites. Specific problems that can be addressed at Ooma II include refining the means by which platforms, pavements, and terraces are functionally categorized. Until this problem is solved, higher levels of interpretation are possibly subject to major error. Sites with potentially significant information content in developing more accurate functional models include Sites D15-1 thru 8, T-31, 39, and 48.

In addition to defining the function of individual features, further work is badly needed in defining and interpreting the range of features present at the various coastal complexes. The categorization of markedly varied sites such as D15-1 thru 8 as commoner households may be sufficient for generalization purposes, but it is not sufficient for understanding local or regional socio-economic patterns. In addition, Cordy's designation of these sites as commoner households is an untested hypothesis. This designation is derived from two models, one based on differential levels of energy expenditure used in the construction of features, and one based on the number of structures expected to occur on commoner versus chiefly or priestly habitation sites as suggested in historic sources (Cordy 1981). The applicability of the first model has not been adequately examined. There are obvious differences in the energy used in the construction of the two heiau sites (D15-18 and 19) as compared with platforms at the other coastal sites. There are also differences in the degree of structural elaboration within and between other coastal complexes. The possible implications of this differentiation is open to considerable question. The second model is sufficiently general so as to permit considerable latitude in fitting the archaeological data to the definition of a commoner household. This model is highly dependent upon where site boundaries are established and how features are defined.

The problem of better understanding land use and resource exploitation requires intensive investigation at temporary habitation and extractive sites located in various environmental zones. Site patterning, chronological data, and inferred site functions are the principal data sets used in developing land use models. Much of this data has been collected at Ooma II, and will be synthesized in the final report. Significant data is still uncollected at two newly recorded coastal area sites, Site T-61 and T-67, and at previously recorded sites T-17 and 22. Intensive survey at these sites has indicated that they warrant additional data recovery in a mitigation program. Their value lies primarily in the extremely rich deposits of subsistence remains, presence of various feature forms, and their potential for offering revisions in the temporary habitation site model. It is currently assumed that natural features such as caves, overhangs, or sinkholes were not used as permanent habitation sites. The differences between these sites and other utilized caves or walled shelters suggests that a distinction between permanent, semi- permanent, and temporary habitations may be more useful for settlement pattern analysis. This observation will be examined further in the final report. Additional work is also warranted at Sites T-14 and 15, which also contain important information relevant to this research problem. These sites have been previously assessed for the adjacent Kohana-Iki Resort project area (Donham 1986); their inclusion in this mitigation program is contingent upon accurate location of the project area boundary in the field.

In summary, future research at Ooma II should find significant new data for the further examination of the following research topics:

Culture history—Examine and possibly revise the existing settlement chronology through dating of inland sites and features not yet dated at coastal complexes;

Past lifeways—Refine the functional model used to define households, document the range of variation reflected at habitation sites, determine archaeological correlates for ceremonial features; and

Culture process—Identify variables which indicate synchronic variation possibly reflective of socio-political or soci-economic stratification within the project area, discuss temporal, functional, and organizational implications on the areal and regional level, explore the role of marine, upland, and barren inland resource exploitation through time, as indicated from portable remains, site locations and other functional inferences.

A number of sites within the project area have information of importance in addressing the above issues. This information has been collected at most of the inland and coastal sites, but additional information is present at 16 sites--D15-1 thru 8, T-14, 15, 17, 22, 31, 48, 61, and 67.

Archaeological sites with potentially high interpretive value are identified at this stage of analysis by considering the following criteria:

1. Site integrity—Are the structural remains of the site sufficiently well preserved, or can original structural features be accurately reconstructed?

2. Site function—Can site function be accurately determined and sufficiantly described so as to be informative to the general public? Can the temporal, social, and ethnic background of site builders/occupants be ascertained or reasonably indicated?

3. Site information—Does the site, together with interpretive data, create a non-redundant, informative, and generally interesting locale? Is the site representative of a structural or functional type, or a unique feature which has not been previously identified?

Three coastal sites have been previously identified by Cordy as having high interpretive potential. These include D15-1, D15-4, and D15-19 (Cordy 1985:45). A fourth coastal site with high interpretive potential is T-15, an extensively modified sinkhole with a faced well, pavement, walls, and modified overhangs. This site also contains important research

information, all of which can be gathered without damage to the various structures within the site. Further work at this and Sites D15-1 and D15-4 are needed if the sites are to be properly interpreted.

A few additional inland sites have some potential for use as interpretive displays, due to the well preserved or unique nature of the sites. Site T-51 is a well preserved example of C-shaped shelters constructed in aa lava. Site T-22 has the only petroglyphs located to date within the project area; these petroglyphs are five anthropomorphic figures carved within a two meter area. They are very close to Site T-21, a rock mound that is probably a burial. This adjacent feature could be easily preserved in conjunction with the petroglyphs. Additional sites with interpretive value also have cultural value and are recommended for preservation; these are listed below.

Sites with potentially high cultural value are those locations with traditional uses, and locations which have significant meaning in the context of a traditional way of life. Three sites within the project area have been previously identified by Cordy as having high cultural value as religious structures; these are D15-18, D15-19, and D15-4 (1986:45). Other sites with high cultural value are burial mounds or platforms, a number of which appear to be present within the project area. Mounds at T-13 and D15-19 are confirmed burial features, and it is likely that burials occur in very similar mounds T-21 and T-33 (D15-3). At least one burial platform is indicated at Sites T-48, T-62, T-20, D15-1, D15-3, D15-8, D15-18, and D15-19. The shrine at Site T-63 may be associated with a crevice burial. Preservation or a suitable reinterment program is warranted for burial features.

PRELIMINARY RECOMMENDATIONS

Additional data recovery is recommended at this time for sixteen sites which have archaeological information of high research value. These include major coastal complexes D15-1 thru 8; a newly identified coastal complex, Site T-48; a modified sinkhole and well, Site T-15; and two coastal sites that were possibly ceremonial in nature, T-14 and T-31. Data recovery is also recommended at four cave shelter sites with midden deposits; Sites T-17, 22, 61, and 67. Among these four site, the deposits at Sites T-17 and T-61 are the most substantial in information content.

Preservation is recommended for seven sites; four of these have high interpretive value, two have high interpretive and cultural value, and one has high cultural value. Sites D15-1, D15-4, and D15-19 have been previously selected as sites with high interpretive value (Cordy 1986a). An additional site, T-15 is also recommended for preservation. These sites are all relatively well preserved, and they are good examples of specific site types. Additional data recovery is recommended at Sites D15-1, D15-4, and T-15; such recovery is considered imperative if these sites are to be properly interpreted. Data recovery at Sites D15-1 and D15-4 should permit a clear definition of those specific features which are of preservation quality. Both sites are quite large in area, and it may not be necessary to preserve the complexes in their entirety.

Five additional sites have potential for interpretive development; however, their preservation is less important than those listed above. These include coastal complexes D15-2 and 8, the petroglyphs at Site T-22, and the adjacent burial mound at T-21, and well preserved C-shape shelters at Site T-51.

Preservation of sites with high cultural value is recommended for Sites D15-18, D15-19, and D15-4. Two of these sites (D15-18,19) are heiau and one (D15-4) has at least two shrines. The latter site also has high interpretive and research value. These three sites have been previously recommended for preservation by Dr. Cordy (Cordy 1986a).

Finally, a number of burial features occur within the project area. Burials were confirmed to be present in rock mounds at Sites T-13 and D15-19, and it is expected that they are present in mounds of very similar construction at Sites T-21 and D15-3 (Site T-33). Burial platforms have been tentatively identified at Sites D15-1, 8, 18, 19, and T-48. Sites D15-1, 3, and 8 have been recommended for further work, and it is assumed that the potential burial features at these sites would be tested at that time. Sites D15-18 and 19 have been recommended for preservation; the associated platforms could therefore be preserved along with the heiau, or the features could be tested, with reinterment of burials if warranted. It might be added that the burial mound associated with Site D15-19 is c. 30 m from the heiau, and additional platform burials(?) occur between these features. In this case, preservation of the entire complex would require that a relatively large area be set aside.

Isolated burial mounds at Sites T-21 and T-13 should be either preserved or disassembled during the mitigation phase, with reinterment of the remaining skeletal material in a proper location, preferably within Ooma II. Finally, a recent small shrine at Site T-63 may indicate the presence of a crevice burial at the site (directly below the shrine). This feature should be examined.

In summary, sufficient research information was collected at the majority (N=50) of the 72 archaeological sites within the Ooma II project area during the intensive survey and testing program to permit a recommendation of no further work for most of the sites. A few sites merit preservation for their interpretive and/or cultural values, and additional research information is present at sixteen sites. All 22 sites for which further work and/or preservation is recommended are summarized below, with a brief description and summary of recommended further actions.

Site D15-1 Major coastal complex with 11 component features, including a large coral pavement, two burial platforms, four shelters, and other features.

Recommendations: Additional data recovery--map all component features, test burial platforms and rubble filled depressions, collect midden in shelters, excavate additional units in coral platform to obtain construction and subsistence data.

Preservation--indicated for major features only, including coral paving, burial platforms, larger shelters (data recovery required for accurate interpretation of site).

Site D15-2 Major coastal complex with four component features, including two habitation enclosures and a walled shelter.

Recommendations: Additional data recovery--map all component features, collect midden from all features.

Preservation--the enclosure features are not particularly unique, but they are well preserved and have preservation potential, one or both could be incorporated into a landscape plan if desired.

Site D15-3 Major coastal complex with six component features, including four terraces, an enclosure, and a burial mound (Site T-33).

Recommendations: Additional data recovery--map all component features, excavate all platforms to extent necessary in order to determine function.

Preservation--the burial mound may be preserved, or reinterment of any preserved skeletal material will be necessary.

Site D15-4 Major coastal complex with 13 component features, including three platforms, three pavements, a shrine, cave shelter, and two enclosures.

Recommendations: Data recovery--map all component features, test platforms, excavate midden deposit in cave, and collect surface midden, test pavements and filled depressions.

Preservation--the major platforms and shrine should minimally be preserved, peripheral features may not require preservation. This site was identified by the Historic Sites Section as having high interpretive and cultural values, and it also has high research value.

Site D15-5 Coastal complex with three component features within a large enclosed area.

Recommendations: Data recovery--excavate to the extent necessary in order to determine more precisely the nature and function of the site, it is badly eroded and may not require extensive excavation.

Preservation--not indicated at this time.

Site D15-6 Coastal complex with four component features, including a platform, pavement and wall.

Recommendations: Data recovery--map component features, excavate additional units in platform and pavement in order to collect subsistence information, examine possible relationship between this site and D15-19, which is nearby.

Preservation--not indicated at this time.

Site D15-7 Major coastal complex with nine features, including three platforms, pavements, rubble piles, and a cave shelter.

Recommendations: Data recovery--excavate units in platforms in order to collect subsistence data, collect deposit in cave, including dating materials.

Preservation--not indicated at this time, the site has been affected by recent recreational activities.

Site D15-8 Major coastal complex with 13 component features, including platforms, terraces, cave shelters, pavements, walls, and rubble filled depressions.

Recommendations: Data recovery--map all component features, excavate deposits in caves, collect surface midden, conduct excavation of platforms and terraces in order to better determine feature function and to collect subsistence material.

Preservation--not imperative at this time, but, data recovery findings may indicate features with high cultural value, this site is located very close to D15-4 and may therefore be functionally related.

Site D15-18 Coastal heiau site with four associated platforms, one was recorded at Site T-35 by Barrera.

Recommendations: Data recovery--map component features and complete detailed plans and profiles of heiau, test platforms in order to determine if they are burials or structural features, obtain dating and subsistence data if the latter function is indicated (these platforms have not been previously tested by Cordy).

Preservation--the heiau has been recommended for preservation by the Historic Sites Section, recommendation of preservation of associated platforms is contingent upon data recovery findings.

Site D15-19 Coastal heiau site with five associated features, including pavements, rubble mounds and one confirmed burial mound.

Recommendations: Data recovery--map component features and complete detailed plans and profiles of the heiau platform, test associated features in order to determine if they are burials.

Preservation--the heiau has been recommended for preservation by the Historic Sites Section, preservation of the associated burial mound and other features (if burials) is optional, reinterment of any remaining skeletal material will be necessary if these are not preserved.

Site T-13 Isolated burial mound in inland zone, burial confirmed.

Recommendations: Disassemble mound and reinter remaining skeletal material, or preserve the feature intact.

Site T-14 Small coastal complex with five component features, including two small coral pavements and a rubble-filled blister. This site has been recorded for the Kohana-Iki project area as well.

Recommendations: Data recovery--determine project area boundary in relation to this site prior to any further work, map component features, test filled blister and collect subsistence and dating data.

Preservation--not indicated at this time.

Site T-15 Extensively modified sinkhole in coastal zone with seven component features, including a faced well, overhang shelters, paving and walls. This site was previously recorded within the Kohama-Iki project area.

Recommendations: Data recovery--determine location of project area boundary prior to data recovery, collect midden deposits in overhangs, clear all vegetation and complete detailed plan and profile maps.

Preservation--recommended by virtue of the unique nature of the site and well preserved features, all of which are contained within a relatively small space, value is interpretive rather than cultural.

Site T-17 Inland/coastal transition zone complex with four component features, including cave shelters and a platform.

Recommendations: Data recovery--excavate all midden deposits in caves, test platform or excavate to extent possible in order to determine function, collect surface materials.

Preservation--not indicated at this time.

Site T-20 Rock mound, interpreted as probable burial.

Recommendations: Disassemble and reinter any remaining skeletal material, or preserve the feature intact.

Site T-21 Rock mound interpreted as probable burial.

Recommendations: Disassemble and reinter any remaining skeletal material, or preserve intact.

Site T-22 Cave and petroglyph complex located adjacent to the Site T-21 burial.

Recommendations: Data recovery--mapping and detailed plans of petroglyphs have been completed, surface collection of cave deposit is suggested.

Preservation--the petroglyphs have a degree of interpretive value, preservation would not be difficult if the adjacent Site T-21 were also preserved.

Site T-48 Coastal complex with three platforms and a stationary grinding stone, not previously tested or mapped.

Recommendations: Data recovery--map all component features, excavate features in order to obtain dating and subsistence data.

Preservation--not indicated at this time; however, the large grinding stone has interpretive value as a display item; it should be curated, or displayed in an appropriate place within the project area.

Site T-61 Complex in coastal/inland interface zone with nine component features, including five cave or overhang shelters and rubble piles.

Recommendations: Data recovery--map all component features, excavate midden deposits in caves, collect surface material.

Preservation--not indicated at this time.

Site T-62 Single platform probably associated with the Site D15-18 complex, badly eroded by wave action.

Recommendations: Data recovery--excavate a few units in order to obtain dating and subsistence material.

Preservation--not indicated at this time.

Site T-63 Complex with 13 component features, including recent shrine over what may be crevice burial. Other features are rubble piles, pavements, walled shelters.

Recommendations: Data recovery--examine filled crevices and one large cairn in order to determine if burials are present at the site, collect surface materials.

Preservation--not indicated at this time, however, additional findings may alter this recommendation.

Site T-67 Complex with 17 component features in coastal/inland interface zone, two caves, several cairns, walled shelters and bedrock excavations present.

Recommendations: Data recovery--map all component features, excavate cave deposit, collect surface midden.

Preservation--not indicated at this time.

As an important initial step of further work in the project area, it is recommended that the project area boundaries be accurately marked in the field by professional surveyors, and that all sites be accurately plotted on an appropriately scaled map by professional surveyors, with the help of a qualified archaeologist. This would greatly aid development planning and help in management decisions regarding sites with preservation value.

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Table 3.

SUMMARY OF SITES AND FEATURES NEWLY IDENTIFIED BY PHRI (1986)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	*Significance Evaluation R	I	C	#Field Work Tasks DR	SC	EX	Comments
T-47	Complex (2)+	Temporary habitation	L/M	L	L		None		Thin deposit, disturbed by recent activities
A	Overhang shelter								
B	Cave shelter								
T-48	Complex (4)	Habitation/ burial	M/H	M/H	H	+	+	+	Site affected by storm wash; Feas. A and C prob. burials; Fea. B has high interp. value (for display)
A	Platform								
B	Grinding stone								
C	Platform								
D	Platform								
T-49	Platform	Habitation	M	L	L		None		Severly eroded and affected by recent campers
T-50	Modified outcrop	Temporary habitation	M	L	L		None		Cleared depression, a portion walled, no portable remains
T-51	Complex (2)	Temporary habitation	M	M	L		None		Well preserved walled shelters, no portable remains
A	C-shape wall								
B	C-shape wall								
T-52	Modified outcrop	Temporary habitation	M	L	L		None		Natural shelter leveled and portion excavated, no portable remains
T-53	Marked footpath	Trail	M	L	M/L		None		Poorly defined segment with associated small cairn
A	Cairn								
B	Path								

*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 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation R	I	C	Field Work Tasks DR	SC	EX	Comments
T-54	Faced excavation	Storage	L/M	L	L	None			An area cleared and orifice faced with stacked slabs, too small for shelter
T-55	Complex (3)	Temporary habitation	M	L	L	None			No portable remains except modern rubbish. Feature B currently a lua
A	C-shape wall								
B	Modified outcrop								
C	Modified outcrop								
T-56	Complex (4)	Indeterminate	L	L	L	None			No portable remains no indications of functions
A	Cairn								
B	Paboehoe clearing								
C	Paboehoe clearing								
D	Cairn								
T-57	Complex (3)	Temporary habitation	M	L	L	None			A few pieces of shell present and recorded, walls are poorly preserved
A	C-shaped wall								
B	C-shaped wall								
C	Cairn								
T-58	Complex (4)	Temporary habitation	M	L	L	None			Minimal modification to create a small shelter with associated storage (?) excavation. Large basalt wedge on site
A	Modified outcrop shelter								
B	Cairn								
C	Wall								
D	Filled crevice								
T-59	Walled shelter	Temporary habitation	M	L	L	None			Crude wall across a portion of collapsed blister small amount of shellfish remains
T-60	Isolated hearth	Temporary habitation	M	L	L	None			On beach, probably historic, no recent refuse associated

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation R	I	C	Field Work Tasks DR	SC	EX	Comments
T-61	Complex (9)	Temporary habitation	M/H	L	L	+	+	+	Features A and B have midden deposit artifacts, vol. glass collected
A	Cave shelter								
B	Cave shelter								
C	Overhang shelter								
D	Overhang shelter								
E	Cairn								
F	Rubble pile								
G	Rubble pile								
H	Overhang shelter								
I	Pavement								
T-62	Platform	Possible burial	M/H	L/M	L/M	-	-	+	Feature is severly eroded, probably associated with site D15-18, which is 26 m north
T-63	Complex (13)	Habitation	M	M/L	M/L	None			Little to no portable remains; Feature K shrine is recent-glass vase with flovers present- Feature H has sparse shell midden, Feature F is well-preserved substantial V-shape wall,possibly for permanent shelter
A	Cairn/Mound								
B	Cairn								
C	Walled shelter								
D	Rubble pile								
E	Pavement								
F	Walled shelter								
G	Rubble pile								
H	Rubble pile								
I	Alignment								
J	Modified outcrop								
K	Cairn/shrine								
L	Large cairn								
M	Cave shelter								
T-64	Complex (18)	Habitation	L	L	L	-	-	+	Area of continous small features and modifications with no substantial features and sparse midden scatters. Features F and H may have been semipermanent habitation structures. Recording and mapping completed
A	C-shape wall								
B	Excavations								
C	Overhang shelters								
D	Rubble pile								
E	Rubble piled								
F	Enclosure/ walled shelter								
G	Rubble pile								
H	C-shaped wall								
I	Pavement								

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation R	I	C	Field Work Tasks DR	SC	EX	Comments
T-64 (Cont.)									
J	Walled, filled crevice								
K	Rubble pile								
L	Cairns								
M	Modified outcrop								
N	Surface midden/rubble								
O	Cave shelter								
P	Cairn								
Q	Cleared blister shelter								
R	Cairns (2)								
T-65	Walls (partial)	Habitation	L	L	L	-	-	+	Several eroded wall sections on beach intact portions may be buried
T-66	Complex (5)	Habitation	M	M	L	None			Very sparse surface midden. Some branch coral and water worn basalt associated with Feature A. Most features partially dismantled except Feature C which is well-preserved
A	C-shaped wall								
B	Cairns (3)								
C	Walled depression								
D	U-shaped wall								
E	Rubble piles								
T-67	Complex (17)	Habitation/ miscellaneous activities	M/H	M	L	+	+	+	Further work limited to Feature A cave, which has midden/soil deposit c. 5 cm thick, wide range and shellfish artifacts and other subsistence materials Large and small basalt hammerstones associated directly with Feature E pahoehoe excavations
A	Cave shelter								
B	Cave shelter								
C	Large cairn								
D	Cairn								
E	Pahoehoe excavation area								
F	Cairn								
G	Walled shelter								
H	Cairn								
I	Rubble-filled depression								
J	Cave shelter								
K	Small cairn								

Table 3. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation R	I	C	Field Work Tasks DR	SC	EX	Comments
T-67 (Cont.)									
L	Modified overhang								
M	Alignment								
N	Pahoehoe excavation								
O	Pahoehoe excavation								
P	Cairn								
Q	Modified overhang (2)								
T-68	Modified blister	Indeterminate	L	L	L	None			Natural opening in collapsed blister, partially walled and excavated no portable remains
T-69	Complex	Temporary habitation	M	L	L	None			Features partially dismantled and recently utilized, sparse shell in Feature B, heavy recent rubbish
A	Walled shelter								
B	Walled shelter								
C	Cairn								
D	Alignment and surface rubble								
T-70	Complex (2)	Temporary habitation	L	L	L	+	-	-	No surface deposit. Walls in poor condition, collapsed
A	C-shape								
B	C-shape								
C	Cairn								
T-71	Footpath	Trail	M	M	M/H	+	-	-	12.0 m section of steppingstone path
T-72	Rubble pile	Indeterminate	L	L	L	None			Haphazard pile does not appear to be burial; adjacent to small sinkhole
T-73	Cairns (2)	Indeterminate	L	L	L	None			Two poorly preserved cairns 8.0 m apart

Table 4.

SUMMARY OF SITES AND FEATURES PREVIOUSLY IDENTIFIED BY BARRERA (1985) AND CORDY (1986)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	*Significance Evaluation R	I	C	#Field Work Tasks DR	SC	EX	Comments
T-1	Complex (4)+	Indeterminate	L	L	L	None			Cairn near Mamalahoa Trail
A	Cairn								
B-D	Pahoehoe clearings								
T-2	Pahoehoe clearing	Indeterminate	L	L	L	None			Loose rockfall pulled away from ledge, no structure to pile
T-3	Cairns (2)	Temporary habitation	L	L	L	None			Very crude, haphazard piles, pahoehoe boulders
T-4	Complex (4)	Temporary habitation	M	M	M	None			Data collection completed, midden and artifacts concentrated in Fea. A.
A	Cave shelter								
B	Walled shelter								
C-D	Cairns								
T-5	Modified overhang shelter	Temporary habitation	M	L	L	None			Sparse midden deposit, some filling and leveling at entrance
T-6	Cave shelter	Temporary habitation	M	M	M	None			Thin ash deposits on floor with sparse midden scatter
T-7	Cave shelter	Temporary habitation	L	L	L	None			Sparse surface scatter, no modifications
T-8	Rubble piles (4)	Indeterminate	L	L	L	None			

*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.

NOTE: Barrera (1985) sites = T-1 thru 40, Cordy (1986) sites = T-41 thru 46.

Table 4. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation R	I	C	Field Work Tasks DR	SC	EX	Comments
T-9	Cairns (2)	Indeterminate	L	L	L	None			-
T-10	Cairns (3)	Indeterminate	L	L	L	None			-
T-11	Cave shelter	Temporary habitation	L/M	L	L	None			Very sparse surface midden, no soil
T-12	Cave shelter	Temporary habitation	M	M	M	None			Moderate midden deposit, data recovery completed
T-13	Mound	Burial	M	M	H	-	-	+	Tested, skeletal material located
T-14	Complex (5)	Habitation/ ceremonial	M/H	M	M/H	+	+	+	Recorded as T-175 in Kohana-Iki, recommended for further work
A	Filled blister								
B	Coral pavement								
C	Coral pavement								
D	Filled depression								
E	Cairn								
T-15	Complex (7)	Habitation/ ceremonial	H	H	H	+	+	+	Recorded as T-176 in Kohana-Iki, recommended for further work; dense midden in Feas. C and D; numerous historic artifacts
A	Faced wall								
B	Pavement								
C	Overhang shelter								
D	Overhang shelter								
E	Well								
F	Large cairn								
G	Faced terrace								
T-16	Wall	Indeterminate	L/M	L	L	None			Extremely eroded, only basal wall remains in sections
T-17	Complex (4)	Habitation	H	M	M	-	+	-	Very dense deposit in Fea. A, additional excavation indicated
A	Walled sinkhole								
B	Cave shelter								
C	Low platform								
D	Surface midden								
T-19	Complex (3)	Trail	L	L	M	None			Trail discernable for 24.0 m over aa, no associated deposit
A	Trail								
B-D	Cairns								
T-20	Platform	Burial or shrine	H	M/H	H	None			Interpreted as possible grave by Barrera (1985)

Table 4. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation R	I	C	Field Work Tasks DR	SC	EX	Comments
T-21	Rock mound	Burial?	L/M	M	M/H	+	-	+	Burial possible, given results of Site T-13 test
T-22	Complex (3)	Temporary habitation	L	L/M	L	-	+	-	All surface material in Fea. A cave
A	Cave shelter								
B	Petroglyphs								
C	L-shaped wall								
T-23	Walled shelter	Temporary habitation	L/M	L	L	None			No portable remains, data recovery completed
T-24	Cave shelter	Temporary habitation	M	L	L	None			One hearth area present, data recovery completed
T-25	C-shape wall	Temporary habitation	L	L	L	None			Very little surface material, data recovery completed
T-26	Footpath	Trail	L/M	L	M/H	None			Short (10.0 m) section of path over as
T-27	Cave shelter	Temporary habitation	M	L/M	L/M	None			No modifications, very sparse surface midden in cracks only
T-28	Cairn	Indeterminate	L	L	L	None			Poorly preserved, two additional cairns (T-73) to southwest
T-31	Complex (3)	Ceremonial	M/H	M	M/H	None			Has been vandalized, but has preservation potential, no subsistence material observed, two uprights and horizontal waterworn boulders on pavement
A	Coral pavement								
B-C	Cairns								
T-39	Collapsed blister	Temporary habitation	M/H	L	L	None			Four horizontal features, moderate midden deposit, data collection completed

Table 4. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation R	I	C	Field Work Tasks DR	SC	EX	Comments
T-41	Complex (4)	Temporary habitation	M	M	M	None			All surface material in Fea. A cave, data recovery completed
A	Cave shelter								
B	Cleared/ leveled area								
C	Cupboard								
D	Faced excavation								
T-42	Walled blister	Indeterminate	L	L	L	None			Wall associated with natural cave, no surface deposit
T-43	Complex (2)	Temporary habitation	L	L	L	None			Very light shell scatter in Fea. A only, species list obtained
A	Cave shelter								
B	Cave shelter								
C	Cairn								
T-44	C-shape	Temporary habitation	L	L	L	None			No portable remains, poor condition
T-45	Cave shelter	Temporary habitation	L/M	L	L	None			Very sparse surface scatter, species list completed, no internal features or modifications
T-46	Cairns (2)	Indeterminate	L	L	L	None			Poor condition

Table 5.

SUMMARY OF SITES AND FEATURES PREVIOUSLY IDENTIFIED BY CORDY (1975) AND COMPONENT FEATURES NEWLY IDENTIFIED BY PHRI (1986)

BPBM Site No. 50-Ha-	Formal Site/Fea. Type	Tentative Functional Interp.	*Significance Evaluation R I C	#Field Work Tasks DR SC EX	Comments
D15-1	Complex (11)+	Habitation/ ceremonial	H H H	+ + +	Interpreted by Cordy as commoner household with men's house (Fea. 1), sleeping houses (Feas. 2,4) and special purpose house (Fea. 3); Feas. 1-4 tested, dates range AD 1490-1832; midden deposit thickest in Feas. 2,3 and 5
1	Coral pavement				
2	C-shape				
3	Walled shelter				
4	Platform				
**5	Walled shelter				
**6	Small platforms (2)				
**7	Steppingstone path				
**8	Rubble-filled depression				
**9	Leveled and filled depression				
**10	C-shape wall				
**11	Filled depression				
D15-2	Complex (4)	Habitation/ ceremonial	H H H	+ + +	Interpreted by Cordy as commoner household with special-purpose (Fea. 1) and sleeping house (Fea. 2); both features tested dates range AD 1550-1660
1	Enclosure				
2	Enclosure				
3	Steppingstone path				
**4	Walled shelter				
D15-3	Complex (6)	Habitation/ poss. burial	M M M	+ + +	Interpreted by Cordy as commoner household with three sleeping houses (3 and 5), dates range AD 1650-1760, Feas. 1-4 tested; Fea. 6 interpreted by Barrera as possible grave
1	Low enclosure				
2	Terrace				
3	Terrace				
4	Terrace				
5	Double terrace				
6	Rock mound (also T-33)				

*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.

**Component feature newly identified by PHRI (1986).

Table 5. (Cont.)

BPBM Site No. 50-Ha-	Formal Site/Fea. Type	Tentative Functional Interp.	Significance Evaluation R I C	Field Work Tasks DR SC EX	Comments
D15-4	Complex (13)	Habitation/ ceremonial	H H H	+ + +	Interpreted by Cordy as commoner household with three sleeping houses (-3 & 5); dates range AD 1650-1760, Feas. 1-4 tested; Fea. 6 interpreted by Barrera as possible grave
1	Platform				
2	Platform				
3	Small platform				
4	Faced depression				
5	Pavement				
**6	Shrine				
**7	Pavement/ midden				
**8	Pavement				
**9	Enclosure				
**10	Enclosure				
**11	Cave shelter				
**12	Excavation (cupboard)				
**13	Cairn				
D15-5	Complex (3)	Habitation/ indeterminate	M L L	+ + +	Site is badly eroded and possibly partially buried; interpreted by Cordy as men's house with historic modifications; dates from Fea. 1 range AD 1430-1720
1	Platform				
2	Enclosure/ platform				
3	Enclosure				
D15-6	Complex (4)	Habitation	H M M	+ + +	This site is 20.0 m NE from D15-9 and is probably associated; interpreted by Cordy as sleeping house; one test unit excavated, dates range AD 1540-1650; surface midden to side of platform
1	Platform platform				
**2	Paving				
**3	Cupboard				
**4	Wall				
D15-7	Complex (9)	Habitation	H M M	+ + +	Interpreted by Cordy as sleeping house (Fea. 1) and special purpose structure (Fea. 2); dates from Fea. 1 range AD 1490-contact; area between platform and cave is paved; dense midden observed in excavation unit of Fea. 1
1	Platform				
2	Platform				
3	Platform				
**4	Large paved area				
**5	Rubble pile				
**6	Pavement				
**7	Walled cave shelter				
**8	Coral concentration				
**9	Alignment				

Table 5. (Cont.)

BPBM Site No. 50-Ha-	Formal Site/Fea. Type	Tentative Functional Interp.	Significance Evaluation R I C	Field Work Tasks DR SC EX	Comments
D15-8	Complex (13)	Habitation/ ceremonial	H H H	+ + +	One feature (1) tested by Cordy, who collected additional glass from surface midden; dates for site (H-7) range AD 1480-1857, additional features suggest possible burials, esp. Fea. 13; midden deposits dense in Fea. 4-8 area; evidence of looting activities on the site
1	Platform				
2	Platform				
**3	Modified/paved depression				
**4	Cave shelter				
**5	Terrace				
**6	Wall				
**7	Cave shelter				
**8	Midden piles				
**9	Platform				
**10	Rubble filled depression				
**11	Paved depression				
**12	Cave shelter				
**13	Cairn on platform				
D15-16	High walled enclosure	Animal pen	M H M	None	Associated with D15-17, which is 12.7 m west from this structure; walls are relatively well preserved
D15-17	Platform	Habitation	M/H M M	+ + +	Associated with D15-16
D15-18	Complex (4)	Ceremonial	H H H	+ + +	Interpreted by Cordy as prob. heiau; not texted; associated features directly across jeep road; Site T-62 is prob. also associated; these may be burial platforms
1	Enclosed platform				
**2	Platform				
**3	Platform				
**4	Small platform				
D15-19	Complex (6)	Ceremonial	H H H	+ + +	Fea. A is heiau; four volcanic glass dates range AD 1590-1720; Cordy suggests historic period house site on platform; Fea. 5 confirmed burial mound; other features may contain burials as well; Fea. 1 is well preserved and relatively unaltered
1	Platform				
**2	Pavement				
**3	Low walled shelter				
**4	Rubble piles				
**5	Rock mound				
**6	Filled depression				

PAUL H. ROSENDAHL, Ph.D., Inc.
Consulting Archaeologist

254-081586

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS FOR ARCHAEOLOGICAL SITES OOMA II RESORT DEVELOPMENT PROJECT AREA

General significance assessments and recommended general treatments for all archaeological sites identified within the Ooma II Resort Development project area are summarized in the attached Table 1. Fifty-seven of the 72 archaeological sites have been determined to be significant solely for their information content. Sufficient data were collected from 49 of these 57 sites during the intensive survey and testing. These 49 sites therefore no longer contain endangered information, and a recommendation of no further data collection work has been made for all of them. The 49 sites included in this category are the following:

T-1 thru 12, T-16, T-19, T-22 thru 28, T-39, T-41 thru 47, T-49 thru 60, T-64 thru 66, T-68 thru 70, T-72, and T-73.

The remaining ten sites determined to be significant solely for their information content still contain significant information, and additional data collection (data recovery) has been recommended at these sites.

Six sites have been determined to be significant for their information content and may also have cultural significance as burial sites, pending the findings of further investigation. Data collection is recommended at this time; if burials are found to occur at any site, recommended treatment of these sites will be to preserve and protect the 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 the skeletal remains. Reburial of skeletal remains according to appropriate State Health Department regulations and procedures is recommended, after completion of proper scientific study.

One site has significant information content and is an excellent example of a site type. Four additional sites have been determined to be significant for information content, as excellent site type examples, and for their cultural value as well. Recommended treatments for all five sites are to conduct data collection (data recovery) at all features, and then develop the principal features of the complexes as interpretive locales, or at least minimally preserve the principal features "as is" and protect them from adverse effects of development.

The remaining four sites have been determined to be significant for their information content and for cultural values--three as burial sites, and one as a shrine. Recommended treatment for all four of these sites is to preserve and protect the sites. If this is not feasible, data collection (data recovery) would have to be conducted. For the four burial sites, disinterment of skeletal remains would have to be conducted, with additional studies focused on the skeletal remains. Reburial of skeletal remains according to appropriate State Health Department regulations and procedures is recommended, after completion of proper scientific study.

305 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 or 966-8038

Table 1.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS
AND RECOMMENDED GENERAL TREATMENTS
OCMA II RESORT DEVELOPMENT PROJECT AREA

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
D15-2	+	–	–	–	+	–	–	–
D15-5	+	–	–	–	+	–	–	–
D15-6	+	–	–	–	+	–	–	–
D15-7	+	–	–	–	+	–	–	–
T-17	+	–	–	–	+	–	–	–
T-61	+	–	–	–	+		–	–
T-67	+	–	–	–	+	–	–	–
T-71	+	–	–	–	+	–	–	–
Subtotal: 8	8	0	0	0	8	0	0	0

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);
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);
NFW=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);
PAI=Preservation "as is," with no further work (and possible inclusion into landscaping), or minimal further data collection necessary.

Table 1. (Cont.).

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS
AND RECOMMENDED GENERAL TREATMENTS
OCMA II RESORT DEVELOPMENT PROJECT AREA

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
T-48	+	–	–	*	+	–	–	*
D15-3	+	–	–	*	+	–	–	*
D15-8	+	–	–	*	+	–	–	*
T-14	+	–	–	*	+	–	–	*
T-62	+	–	–	*	+	–	–	*
T-63	+	–	–	*	+	–	–	*
Subtotal: 6	6	0	0	6	6	0	0	6
T-15	+	–	+	–	+	–	+	–
Subtotal: 1	1	0	1	0	1	0	1	0
D15-1	+	–	+	+	+	–	+	–
D15-4	+	–	+	+	+	–	+	–
D15-18	+	–	+	+	+	–	+	–
D15-19	+	–	+	+				
Subtotal: 4	4	0	4	4	4	0	4	0
T-13	+	–	–	+	–	–	–	+
T-20	+	–	–	+	–	–	–	+
T-21	+	–	–	+	–	–	–	+
T-31	+	–	–	+				
Subtotal: 4	4	0	0	4	0	0	0	4
All others	–	+	–	–	–	+	–	–
Subtotal: 49	0	49	0	0	0	49	0	0
Total: 72	13	49	5	14	19	49	5	10

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

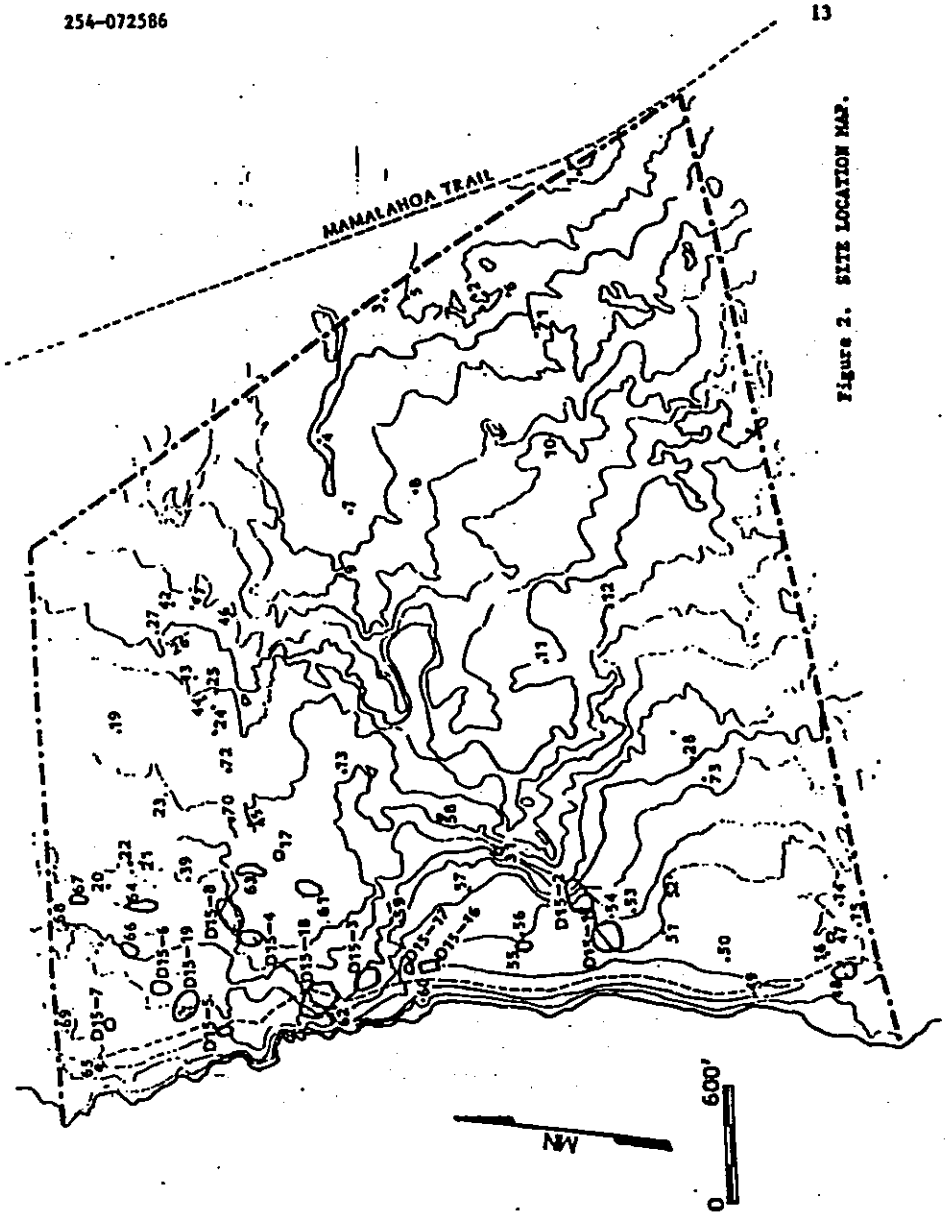


Figure 2. SITE LOCATION MAP.

J. CONSERVATION DISTRICT USE APPLICATION FOR CONSOLIDATION AND RESUBDIVISION O'OMA II, NORTH KONA, HAWAII (TMK: 7-3-09:04)

CONSERVATION DISTRICT USE APPLICATION
FOR CONSOLIDATION AND RESUBDIVISION
O'OMA II, NORTH KONA, HAWAII (TMK: 7-3-09:04)

I. Description of Parcel

A. Existing Structures/Use

There are no structures within the subject area, which is currently unimproved except for several poorly maintained jeep roads and archaeological remains. The coastal area is used for recreational purposes, such as fishing and diving, and for access to Pine Trees Beach, a popular beach area south of the property.

B. Existing Utilities

The property is not serviced by utilities. A 12-inch gravity water main runs along Queen Kaahumanu Highway. Water distribution begins at the Kahaluu wells and shaft and terminates at a 0.3 million gallon reservoir directly mauka of the Keahole Airport. A 69-KV, overhead electrical line and telephone lines are also located in the Queen Kaahumanu Highway corridor.

C. Existing Access

Two vehicular access points are found on the site. A coastal jeep trail runs along the makai frontage of the site with entry off the NELH Access Road north of the subject property. A second access road connects the coastal jeep road and Queen Kaahumanu Highway, following an alignment along the southern boundary of the property. This access road passes through an easement approximately 1,400 feet long across the adjoining State-owned land (part of the Hawaii Ocean Science and Technology Park), which separates the subject property from the highway. The present conditions of both accesses are considered poor and use of four-wheel-drive vehicles is recommended.

D. Vegetation and Wildlife

Two broadly defined vegetation types are recognized on the O'oma II parcel. Scrub vegetation, comprised of a mixture of grass and shrub species, occupies almost 95 percent of the project area. Strand vegetation, comprised primarily of beach naupaka (Scaevola taccada) three to six feet tall, is found in a narrow belt along the coast. In a recent biological survey of the area (June 1986), 51 vascular plant species were inventoried. Of these, 31 are exotic (or introduced), 18 are native, and 2 are of Polynesian introduction. None of the native plant species is listed as endangered or threatened by the U.S. Fish and Wildlife Service.

No anchialine ponds or other areas with standing water are known to exist on the property. Vertebrate fauna is largely composed of introduced species. The June 1986 biological survey did not observe any endangered wildlife species on the subject property.

E. Topography

The Keahole Point area, including the subject property, was formed by progressive layering of prehistoric lava flows from Hualalai. The lavas are mostly pahoehoe with thicknesses varying from 6 inches to 100 feet. The layers are porous and contain numerous lava tubes, cracks, and fissures. The elevation of the O'oma II property ranges from sea level at the coastline to approximately 85 feet above mean sea level at the southern-mauka boundary. The terrain is gently rolling with slopes ranging, on average, from 0 to 5 percent. Localized mounds and depressions, characteristic of lava flows are present throughout the site.

F. Shoreline Area

According to the Water Quality Management Plan for the County of Hawaii (Section 208) prepared by the State Department of Health and the County of Hawaii, the property's coastal edge would be classified as a "lava rock shoreline" and the near-shore waters as "open coastal." Reef flats, located immediately off-shore, and sandy beaches are interspersed among the lava rocks. As mentioned previously, the primary access to the O'oma II shoreline is via the NELH Access Road and the coastal jeep road. Another access road, which runs along the southern boundary of the property is available; however, passage is more precarious.

G. Existing Covenants, Easements, and Restrictions

Restrictions on the property relate to the reservation of minerals to the State of Hawaii, the presence of a government triangulation station for surveying purpose, the right to measure the shoreline setback area, and a covenant of land trust.

H. Historic Sites Affected

An archaeological survey of the property conducted in May 1985 found 40 archaeological sites. Subsequent discussions with the State Historic Preservation Office (SHPO) have confirmed the presence of 12 major sites that have been inventoried by that office (see Table 1). The 1985 survey did not identify three of the SHPO sites and a follow-up archaeological reconnaissance is currently under way. Included in the scope of work for the current contract is a site significance assessment and recommendations for the disposition of each site: preservation, salvage, or data recovery. Figure 3 shows the sites identified by the 1985 survey as well as the 12 sites documented by the SHPO.

II. Description of Proposed Action

This CDUA is submitted in support of a proposal to consolidate the subject property with approximately 85 acres of State lands adjoining the property to the east. Consolidation will be followed immediately by resubdivision at a line perpendicular to the shoreline, which would yield a second parcel of approximately 85 acres. Survey of the property is pending; however, a preliminary consolidation and resubdivision plan is shown in Figure 4. Upon completion of the resubdivision, the northern parcel would become part of the existing Hawaii Ocean Science and Technology (HOST) Park site. The State-owned consolidation parcel is at the southernmost periphery of the planned HOST Park development and would become part of the O'oma II property. It is in the State Urban District and is designated for industrial use by the County General Plan.

The O'oma II property has been proposed for a multi-use development. A petition for State land use redistricting is being processed by the State Land Use Commission. The property is also the subject of a County General Plan amendment for which an Environmental Impact Statement is being prepared, pursuant to Chapter 343, Hawaii Revised Statutes.

If the consolidation/resubdivision occurs, the HOST Park parcel will be integrated into the overall development plan. Reconfiguring the proposed O'oma II site would be advantageous for the following reasons:

- o It would provide direct access from Queen Kaahumanu Highway;
- o Highway frontage would increase the visibility of the area, which is conceived as gathering place and activity center; and
- o Acquisition of land further away from the airport that would be less impacted by aircraft noise.

The action also holds significant advantages for the HOST Park, including the following:

- o Land in close proximity to the ocean would reduce the amount of piping required for the nutrient-rich cold ocean water, which is a key park resource;
- o Increased ocean frontage would increase the flexibility for future design of pipeline routes; and
- o Availability of low-lying land that is well suited for aquaculture would minimize pumping costs.

III. Consistency with the Subzone Objective

Resource (R) Subzone

The objective of this subzone is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas.

The land contained in the resource subzone is not suitable for cultivation; however, it is currently used for fishing, diving, and surfing. In addition, the waters off the coast have been identified as a valuable resource for aquaculture and mariculture, a fledgling, but potentially major, economic activity for the North Kona region. Keahole Point was selected for the proposed HOST Park because of the nearby availability of cold, deep ocean water and a warm ocean surface layer. Protection of these resources has been an integral consideration in planning of the high-tech industrial park, whose success depends on maintaining pristine source waters. The proposed development would also seek to maintain and enhance the natural beauty of land as proximity to the coast and its aesthetic quality are primary attractions of the site. The area makai of the jeep trail has been designated a "no build" area that would be accessible for continued public recreational use.

General (G) Subzone

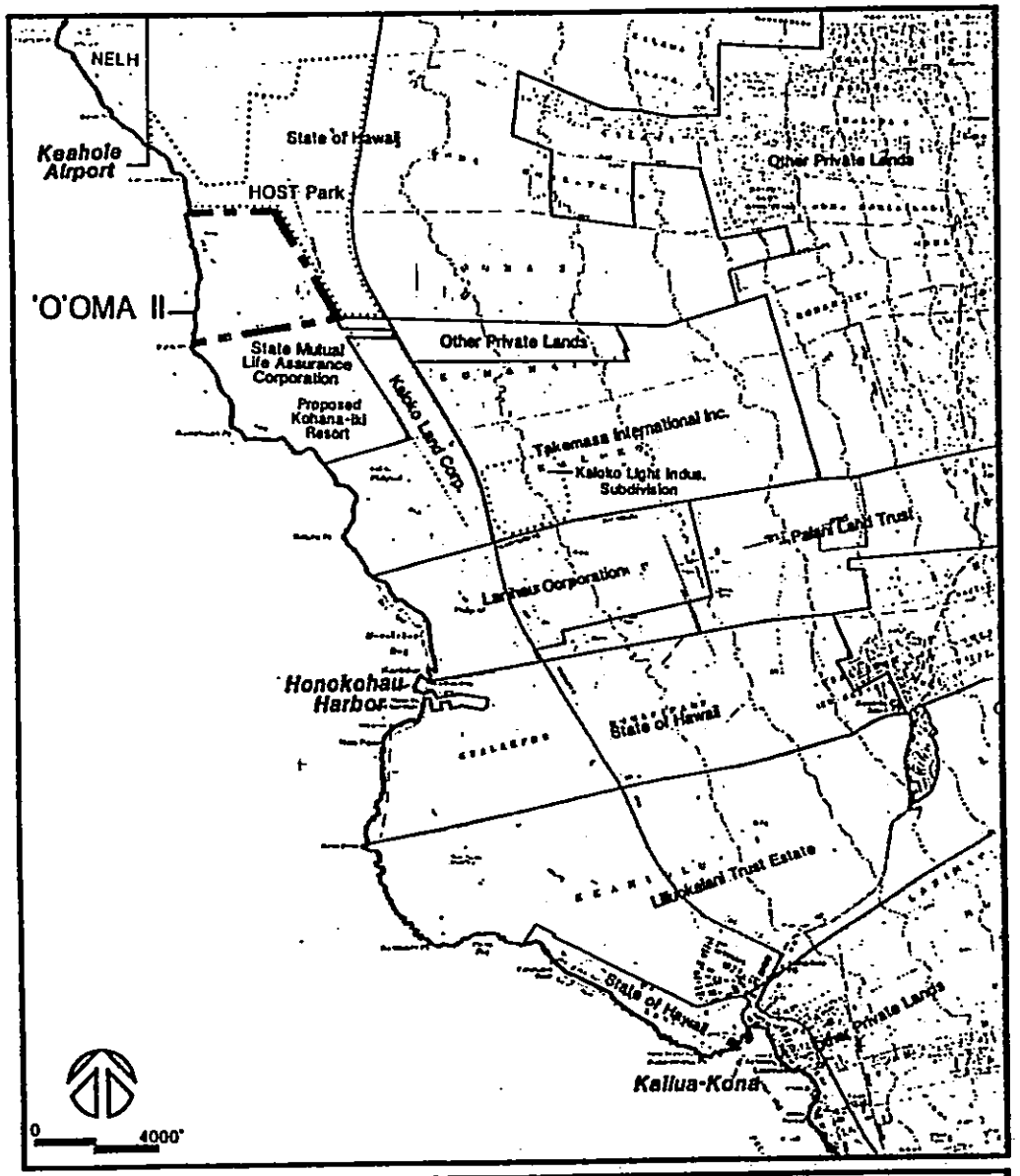
The objective of the general subzone is to designate open space where specific conservation uses may not be defined, but where urban use would be premature. This subzone functions largely as a "holding" land-use designation in which the timing of development is a major factor.

Both the HOST Park and the proposed O'oma II resort developments are based on market studies which indicate that markets are available for the types of development proposed and that economic returns will offset the substantial investments required. Conversely, given the lead times for development, another consideration is the necessity to develop suitable facilities in anticipation of projected market demand, thereby precluding opportunity losses.

IV. Names and Addresses of Adjacent Property Owners

State of Hawaii (lands to north and east)
Hawaii Technology Development Corporation
220 South King Street, Suite 252
Honolulu, HI 96813
Attention: William M. Bass, Jr., Executive Director

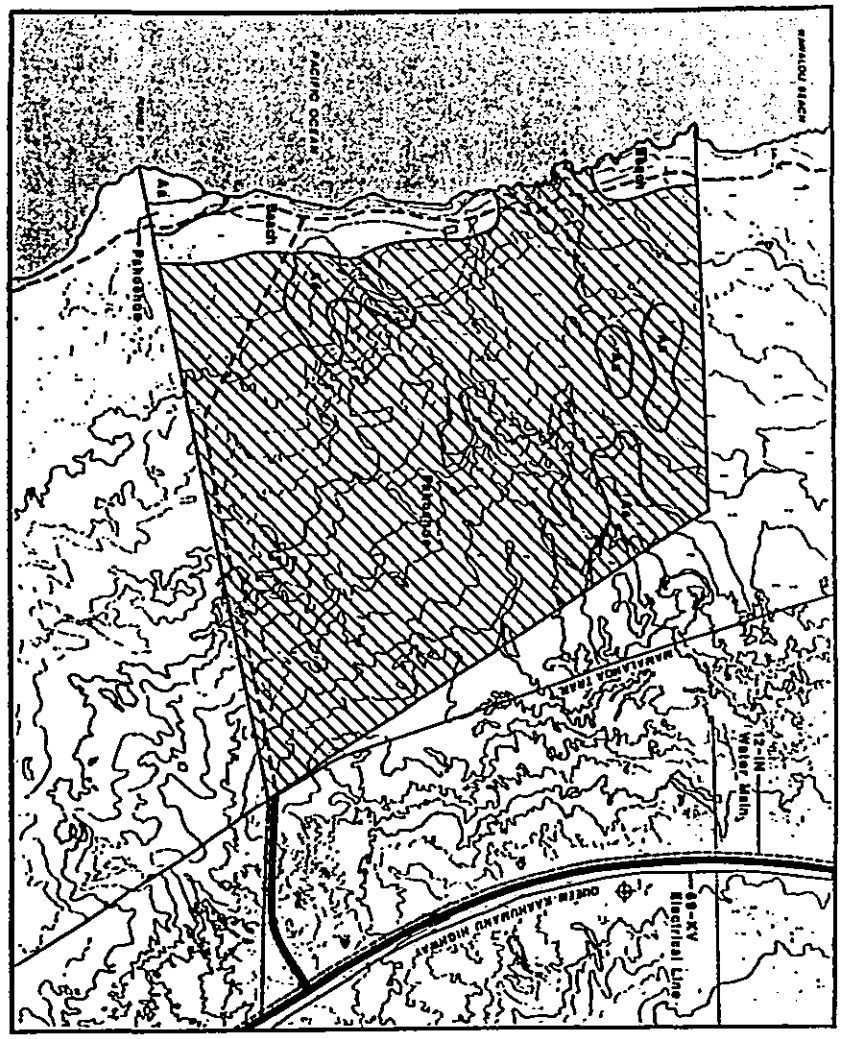
State Mutual Life Assurance Corporation (land to south)
440 Lincoln Street
Worcester, MA 01605
Attention: John W. Nunley, Second Vice President



Area Map
'O'OMA II

Figure: 1

HELBER, HASTERT, VAN HORN & KIMURA



Site Map

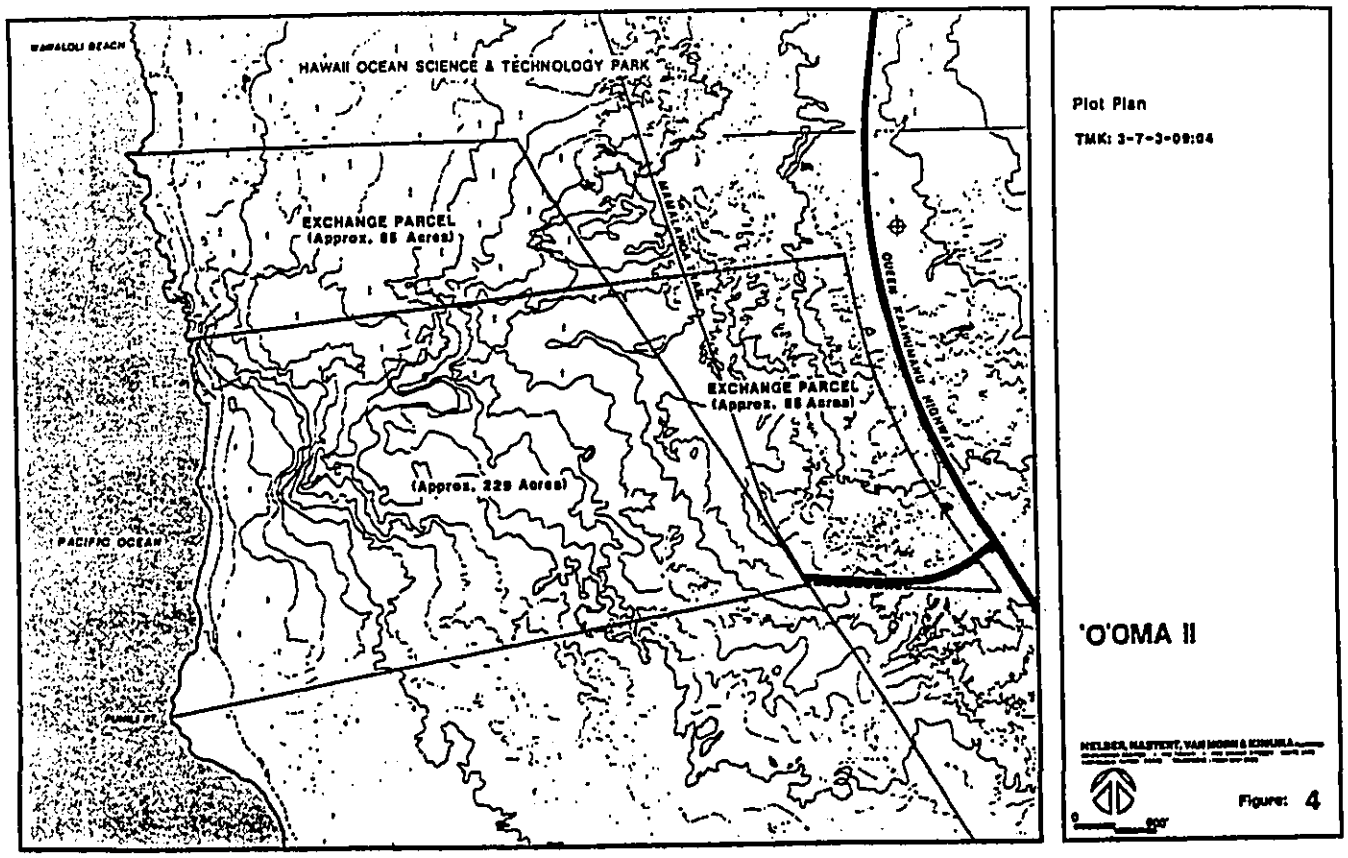
LEGEND

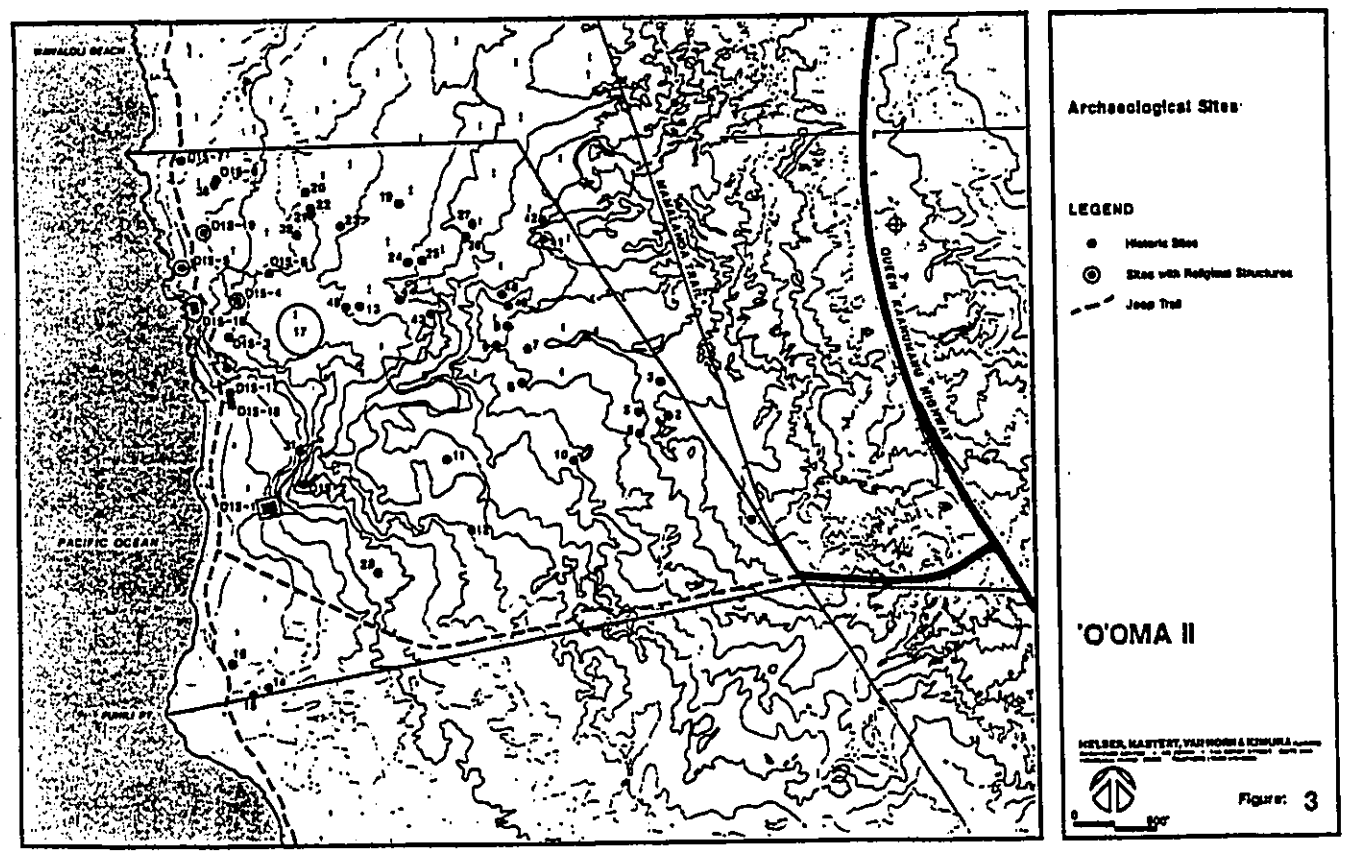
Scrub Vegetation
Coastal Strand
Jeep Trail

'O'OMA II

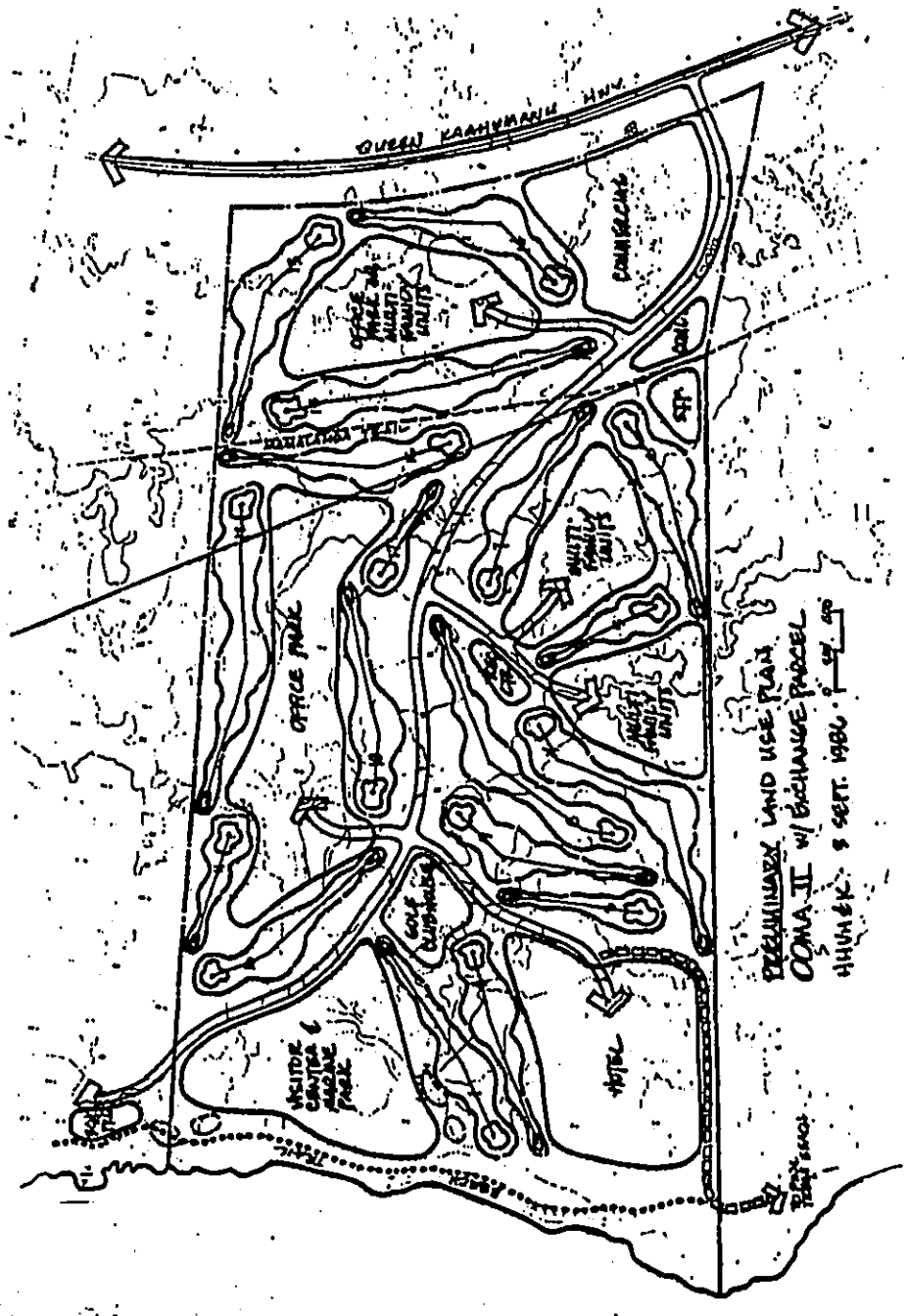
Figure: 2

HELBER, HASTERT, VAN HORN & KIMURA


WAIALOLI BEACH
HAWAII OCEAN SCIENCE & TECHNOLOGY PARK
EXCHANGE PARCEL
(Approx. 85 Acres)
EXCHANGE PARCEL
(Approx. 85 Acres)
(Approx. 229 Acres)
PACIFIC OCEAN
PUHILI PT.
QUEEN KAAHUMANU HIGHWAY
Plot Plan
TMK: 3-7-3-09:04
'O'OMA II
Figure: 4


WAIALOLI BEACH
PACIFIC OCEAN
QUEEN KAAHUMANU HIGHWAY
Archaeological Sites
LEGEND
Historic Sites
Sites with Religious Structures
Jeep Trail
'O'OMA II
Figure: 3

K. PRELIMINARY LAND USE PLAN
O'OMA II WITH EXCHANGE PARCEL


QUEEN KAAHUMANU HWY.
OFFICE PARK
MULTI-FAMILY UNITS
COMMERCIAL
PARK
SCHOOL
MULTI-FAMILY UNITS
MULTI-FAMILY UNITS
GOLF CLUBHOUSE
HOTEL
HAWAIIAN CANOE PARK
PRELIMINARY LAND USE PLAN
KOHANAIKI PHASE II
KAILUA-KONA, HAWAII
SEPT. 1980

L. NELH WATER QUALITY DATA

University of Hawaii at Manoa

Department of Oceanography

RECEIVED
JUL 31 1986
NELH

MEMORANDUM

July 29, 1986

TO: Jack Huizingh and Tom Daniel
Natural Energy Laboratory of Hawaii

FROM: Ted Walsh, Analytical Services
HIMB

SUBJECT: Additional Water Quality Plots

I have enclosed the following plots: (for 1982-1987)

1) Surface and deep seawater temperature data in both units of Fahrenheit and Centigrade. The surface shows the obvious seasonal trends while the deep temperatures are essentially a reflection of changing deep water flow rates.

2) Surface pH data: Except for some questionable low values around mid-1983 the pH data is fairly constant. (See note 4)).

3) Deep pH data: I have calculated these deep pH's to two different temperatures. One set has been corrected to the lab tap temperatures. These pH values reflect the true pH of the deep water as it passes through the lab's heat transfer units i.e. - the correct pH's of interest regarding corrosion/biofouling studies. The second deep pH set has been corrected to the actual field temp of ca. 6°C. These pH values represent the true "in-situ" pH of the 586 meter deep seawater.

4) Please note: Much of the variability observed in the pH data can be attributed to day-to-day pH accuracy (calibration) errors on the NELH pH meter. (i.e. - the SSW and DSW follow the same pH time trend).

5) I have also enclosed all the corrected pH data tables for Tom. It will be interesting to try to correct out these pH accuracy problems. Using the DSW as an internal pH standard (~constant), we could correct all the SSW pH's to it and see if any seasonal trends appear.

I have also enclosed the 1985 and 1982-1986 W.Q. data tables with the mean ± std. dev. values. Note: All these tables have been retyped into Wordstar software and are saved onto diskette (5 1/4" floppy). The enclosed tables were

printed out on an HP Laser printer for the best letter quality. If you have or prefer another printer, I can send you diskette copies. The intake locations on these tables have also been corrected according to Tom's notes to me after my first letter.

TW:ec
Enclosures

NELH WATER QUALITY DATA

Seawater as Delivered to the Laboratory by 12 inch Dia. System
(Weekly samples 1982 - 1986)
(Values shown are averages ± standard deviation)

Parameter	Warm Seawater	Cold Seawater
Temperature °C	25.99 ± 0.93	8.91 ± 0.95
Temperature °F	78.79 ± 2.82	48.04 ± 5.12
Salinity (°/oo)	34.816 ± 0.172	34.298 ± 0.033
pH	8.227 ± 0.049	7.563 ± 0.040
Alkalinity (meq/l)	2.318 ± 0.020	2.354 ± 0.021
NO_3 + NO_2 (micromolar)	0.20 ± 0.08	38.97 ± 1.19
PO_4 (micromolar)	0.16 ± 0.04	2.96 ± 0.08
Si (micromolar)	2.98 ± 1.53	74.59 ± 4.36
NH_4 (micromolar)	0.36 ± 0.21	0.19 ± 0.20
Dissolved Organic N (micromolar)	4.34 ± 0.71	1.78 ± 0.61
Dissolved Organic P (micromolar)	0.24 ± 0.05	0.05 ± 0.06
Dissolved Oxygen (mg/l)*	6.98 ± 0.33	1.21 ± 0.19
Total Organic C (mg/l)	0.77 ± 0.33	0.36 ± 0.14
Particulate Organic C (micromolar)	2.88 ± 0.85	0.96 ± 0.35
Total Suspended Solids (TSS-mg/l)	0.61 ± 0.52	0.25 ± 0.13

Intake Locations

Warm Water: 303' (92.4m) Offshore; 20' (6.1m) above Seafloor; Water Depth 65' (20m); 45' (13.7m) below Surface

Cold Water: 4650' (1417m) Offshore; 70' (21m) above Seafloor; Water Depth 1995' (608m); 1925' (586m) below Surface

*Dissolved O_2 data from 1985 only (most reliable data)

NELH WATER QUALITY DATA

Seawater as Delivered to the Laboratory by 12 inch Dia. System
(Weekly samples 1982)
(Values shown are averages ± standard deviation)

Parameter	Warm Seawater	Cold Seawater
Temperature °C	27.14 ± 0.71	10.23 ± 0.48
Temperature °F	80.85 ± 2.12	50.41 ± 2.37
Salinity (°/oo)	34.536 ± 0.108	34.320 ± 0.026
pH	8.248 ± 0.043	7.567 ± 0.028
Alkalinity (meq/l)	2.321 ± 0.012	2.377 ± 0.019
NO_3 + NO_2 (micromolar)	0.20 ± 0.09	39.76 ± 1.01
PO_4 (micromolar)	0.14 ± 0.04	3.06 ± 0.07
Si (micromolar)	3.71 ± 2.14	78.13 ± 3.49
NH_4 (micromolar)	0.57 ± 0.20	0.40 ± 0.16
Dissolved Organic N (micromolar)	4.10 ± 0.77	2.11 ± 1.19
Dissolved Organic P (micromolar)	0.22 ± 0.03	0.02 ± 0.04
Dissolved Oxygen (mg/l)	---	---
Total Organic C (mg/l)	0.88 ± 0.18	0.49 ± 0.11
Particulate Organic C (micromolar)	3.34 ± 2.46	1.38 ± 1.31

Intake Locations

Warm Water: 40' (12.2m) Offshore; 5' (1.5m) above Seafloor; Water Depth 20' (6.1m); 15' (4.6m) below Surface

Cold Water: 4650' (1417m) Offshore; 70' (21m) above Seafloor; Water Depth 1995' (608m); 1925' (586m) below Surface

NELH WATER QUALITY DATA

Seawater as Delivered to the Laboratory by 12 inch Dia. System
(Weekly samples 1983)
(Values shown are averages ± standard deviation)

Parameter	Warm Seawater	Cold Seawater
Temperature °C	25.84 ± 0.71	9.28 ± 0.60
Temperature °F	78.51 ± 2.16	48.70 ± 3.15
Salinity (°/oo)	34.817 ± 0.106	34.282 ± 0.027
pH	8.207 ± 0.062	7.541 ± 0.037
Alkalinity (meq/l)	2.320 ± 0.023	2.366 ± 0.017
NO_3 + NO_2 (micromolar)	0.15 ± 0.06	39.56 ± 1.05
PO_4 (micromolar)	0.15 ± 0.03	2.97 ± 0.08
Si (micromolar)	3.35 ± 0.93	77.33 ± 3.65
NH_4 (micromolar)	0.46 ± 0.15	0.31 ± 0.16
Dissolved Organic N (micromolar)	3.12 ± 0.61	1.35 ± 0.81
Dissolved Organic P (micromolar)	0.20 ± 0.03	0.04 ± 0.04
Dissolved Oxygen (mg/l)	8.50 ± 1.64	2.12 ± 1.05
Total Organic C (mg/l)	0.73 ± 0.14	0.36 ± 0.10
Particulate Organic C (micromolar)	2.82 ± 1.21	0.58 ± 0.24
Total Suspended Solids (TSS-mg/l)	0.66 ± 0.52	0.26 ± 0.13

Intake Locations

Warm Water: 303' (92.4m) Offshore Water Depth 65' (20m)
20' (6.1m) above Seafloor; 45' (13.7m) below Surface

Cold Water: 4650' (1417m) Offshore Water Depth 1995' (608m)
70' (21m) above Seafloor; 1925' (586m) below Surface

NELH WATER QUALITY DATA

Seawater as Delivered to the Laboratory by 12 inch Dia. System
(Weekly samples 1984)
(Values shown are averages ± standard deviation)

Parameter	Warm Seawater	Cold Seawater
Temperature °C	26.11 ± 0.78	9.24 ± 0.79
Temperature °F	79.00 ± 2.36	48.63 ± 4.16
Salinity (°/oo)	34.952 ± 0.126	34.300 ± 0.025
pH	8.266 ± 0.015	7.554 ± 0.020
Alkalinity (meq/l)	2.325 ± 0.012	2.344 ± 0.014
NO_3 + NO_2 (micromolar)	0.19 ± 0.07	38.23 ± 1.17
PO_4 (micromolar)	0.17 ± 0.03	2.94 ± 0.07
Si (micromolar)	2.67 ± 0.97	71.05 ± 3.02
NH_4 (micromolar)	0.33 ± 0.13	0.15 ± 0.09
Dissolved Organic N (micromolar)	4.85 ± 1.95	1.72 ± 1.10
Dissolved Organic P (micromolar)	0.24 ± 0.07	0.05 ± 0.04
Dissolved Oxygen (mg/l)	8.84 ± 1.67	2.46 ± 1.75
Total Organic C (mg/l)	0.77 ± 0.23	0.37 ± 0.19
Particulate Organic C (micromolar)	2.85 ± 1.35	0.67 ± 0.26
Total Suspended Solids (TSS-mg/l)	0.86 ± 0.45	0.35 ± 0.17

Intake Locations

Warm Water: 303' (92.4m) Offshore Water Depth 65' (20m)
20' (6.1m) above Seafloor; 45' (13.7m) below Surface

Cold Water: 4650' (1417m) Offshore Water Depth 1995' (608m)
70' (21m) above Seafloor; 1925' (586m) below Surface

NELH WATER QUALITY DATA

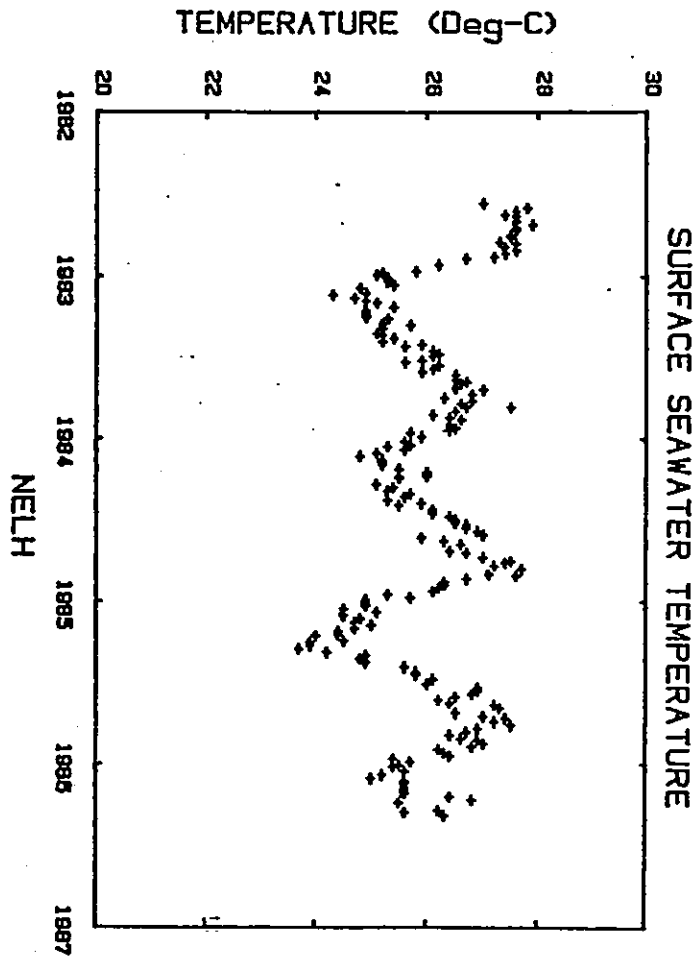
Seawater as Delivered to the Laboratory by 12 inch Dia. System
(Weekly samples 1985)
(Values shown are averages ± standard deviation)

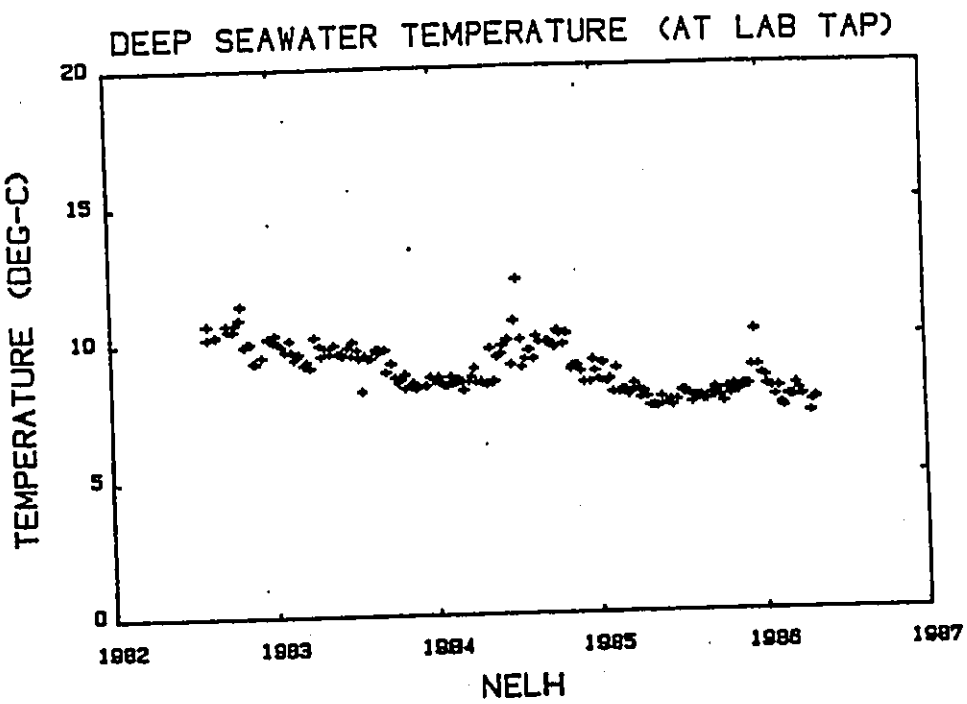
Parameter	Warm Seawater	Cold Seawater
Temperature °C	25.74 ± 1.13	8.07 ± 0.94
Temperature °F	78.34 ± 2.03	46.53 ± 5.42
Salinity (°/oo)	34.802 ± 0.145	34.292 ± 0.040
pH	8.205 ± 0.039	7.590 ± 0.037
Alkalinity (meq/l)	2.307 ± 0.017	2.339 ± 0.019
NO_3 + NO_2 (micromolar)	0.25 ± 0.07	38.76 ± 1.02
PO_4 (micromolar)	0.18 ± 0.03	2.92 ± 0.07
Si (micromolar)	2.70 ± 2.05	73.87 ± 3.90
NH_4 (micromolar)	0.17 ± 0.14	0.07 ± 0.05
Dissolved Organic N (micromolar)	5.21 ± 0.65	2.12 ± 0.59
Dissolved Organic P (micromolar)	0.29 ± 0.04	0.09 ± 0.06
Dissolved Oxygen (mg/l)	6.98 ± 0.33	1.21 ± 0.19
Total Organic C (mg/l)	0.76 ± 0.32	0.29 ± 0.10
Particulate Organic C (micromolar)	2.06 ± 0.87	0.82 ± 0.36
Total Suspanded Solids (TSS-mg/l)	0.72 ± 0.51	0.29 ± 0.12

Intake Locations

Warm Water: 303' (92.4m) Offshore Water Depth 65' (20m)
20' (6.1m) above Seafloor; 45' (13.7m) below Surface

Cold Water: 4650' (1417m) Offshore Water Depth 1995' (608m)
70' (21m) above Seafloor; I925' (586m) below Surface

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TEMPERATURE (DEG-C)
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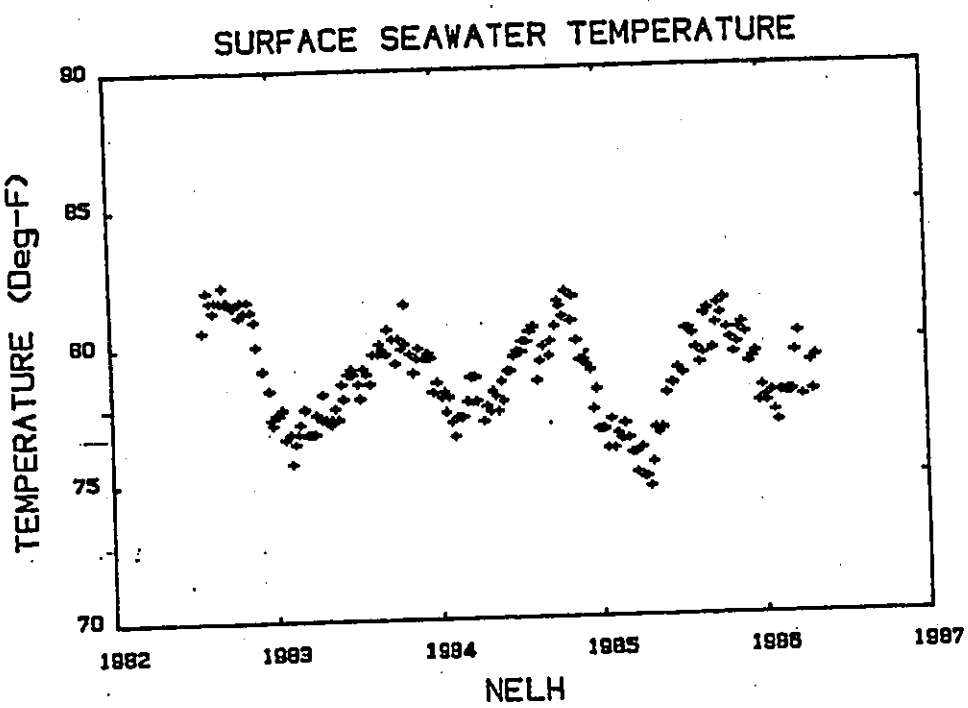
15
10
5
0
1982
1983
1984
1985
1986
1987
NELH


SURFACE SEAWATER TEMPERATURE
TEMPERATURE (Deg-F)
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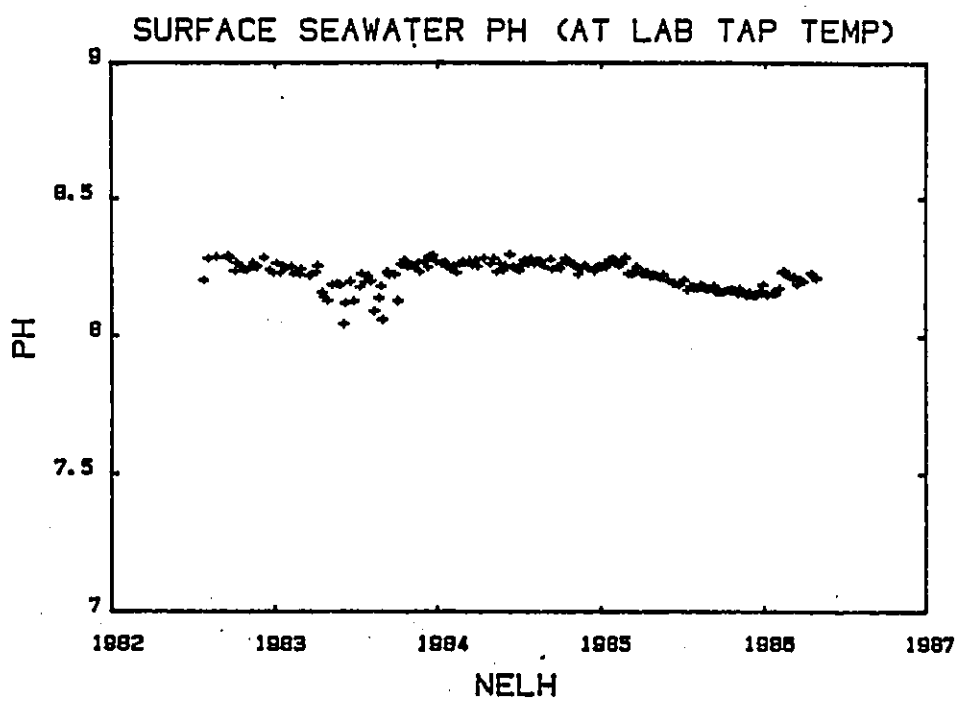
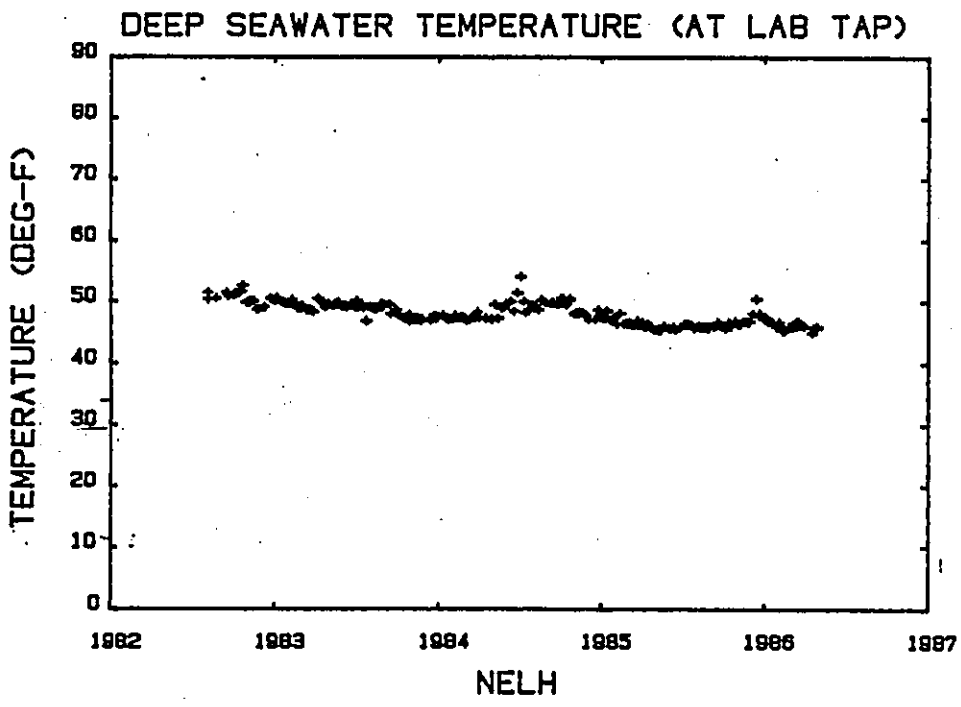
85
80
75
70
1982
1983
1984
1985
1986
1987
NELH


SURFACE SEAWATER PH (AT LAB TAP TEMP)
PH
9
8.5
8
7.5
7
1982
1983
1984
1985
1986
1987
NELH


DEEP SEAWATER TEMPERATURE (AT LAB TAP)
TEMPERATURE (DEG-F)
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60
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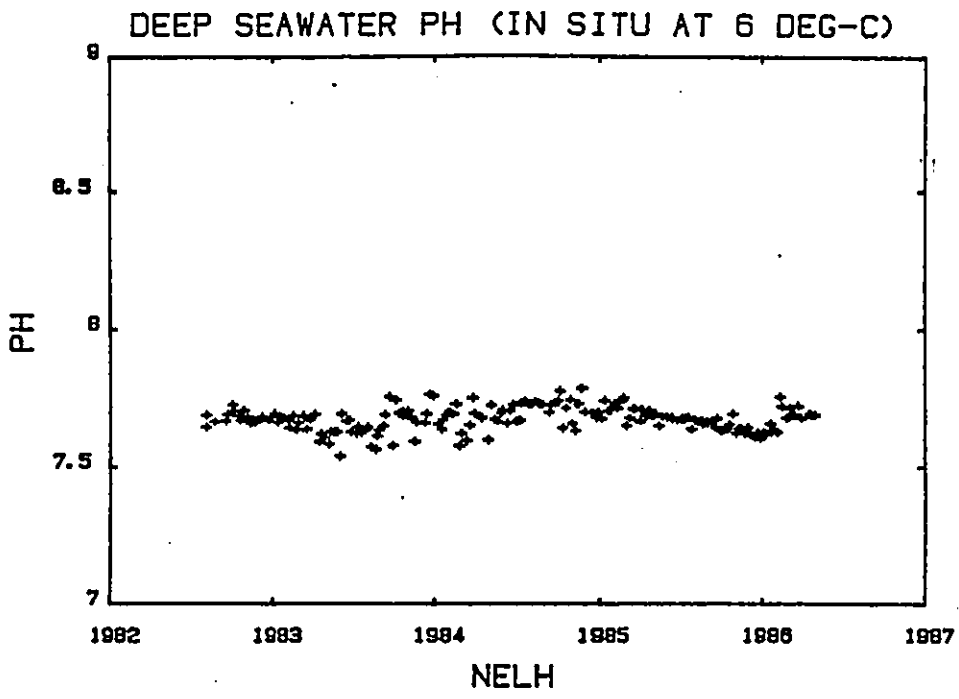
1982
1983
1984
1985
1986
1987
NELH


DEEP SEAWATER PH (IN SITU AT 6 DEG-C)
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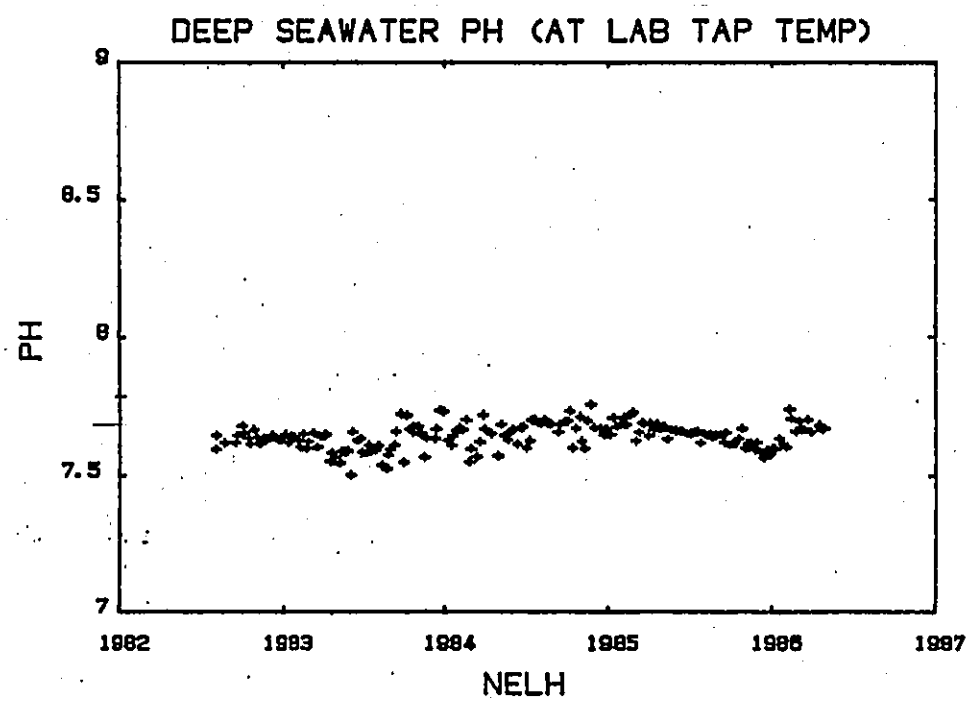
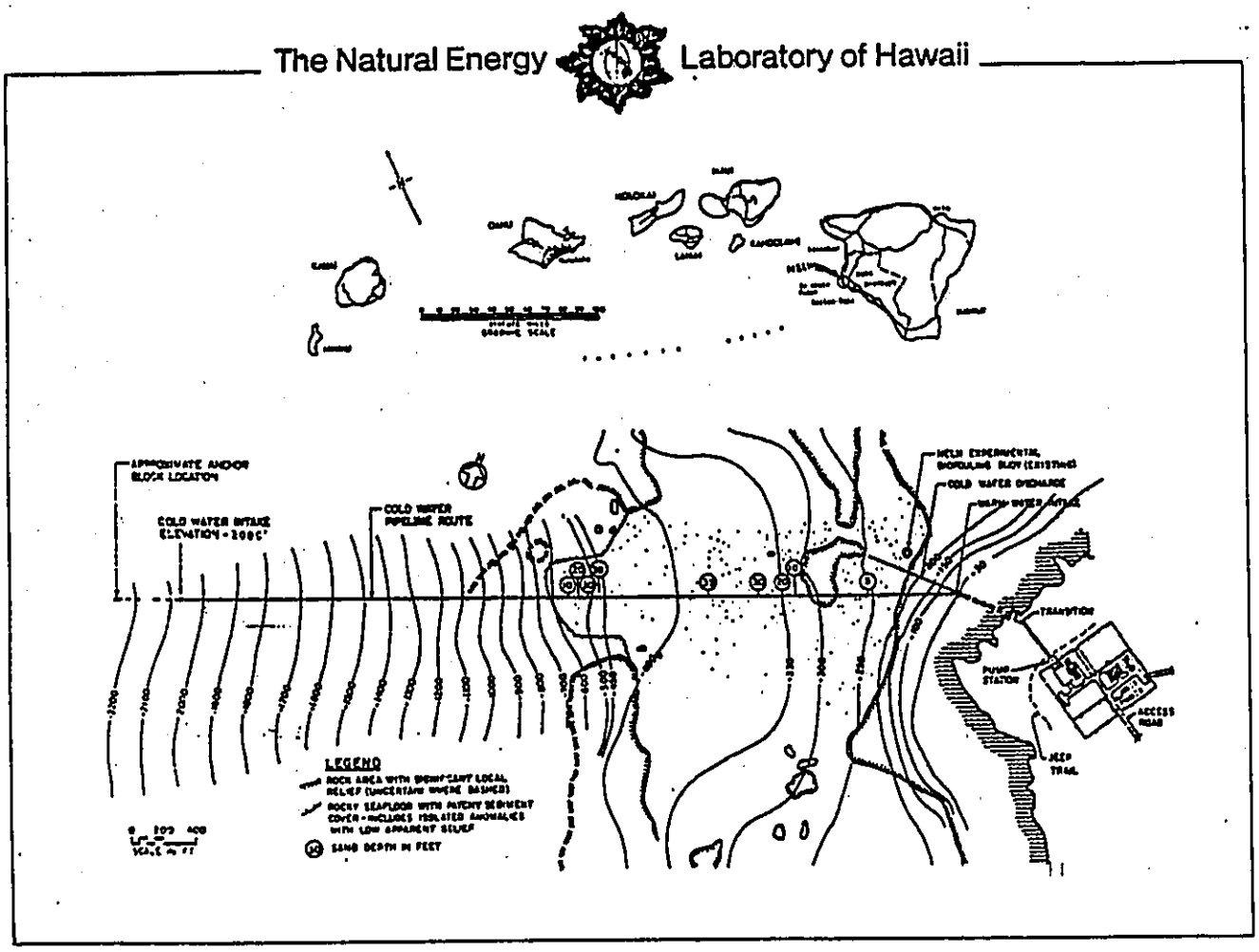
8
7.5
7
PH
1982
1983
1984
1985
1986
1987
NELH


DEEP SEAWATER PH (AT LAB TAP TEMP)
9
8.5
8
7.5
7
PH
1982
1983
1984
1985
1986
1987
NELH

The Natural Energy Laboratory of Hawaii



M. NOISE CONTOUR SET FOR KEAHOLE AIRPORT

86/451

GORDON BRICKEN & ASSOCIATES
CONSULTING ACOUSTICAL and ENERGY ENGINEERS

August 25, 1986

MR. THOMAS FEE
HHVH&K -- PLANNERS
Grosvenor Center, PRI Tower
733 Bishop Street, Ste. 2590
Honolulu, Hawaii, 96813

SUBJECT: NOISE CONTOUR SET -- KEAHOLE AIRPORT

Dear Mr. Fee:

We are enclosing the Noise Contours for 1985, 1995, and 2005 for the Keahole Airport based on the data you supplied recently. The 60 and 65 Contours are shown for the side of the Airport that affects your property the most. The operational inputs that produced the Contours are shown in Tables 1, 2, and 3.

Thank you, and if you have any questions, please do not hesitate to call.

Prepared by:

Gordon Bricken
President

/mmb

1621 East Seventeenth Street, Suite K • Santa Ana, California 92701 • Phone (714) 835-0249

M-1

TABLE 1

1985 OPERATIONAL ASSUMPTIONS(1)

Total Operations.....74,300
Runway Length..... 6,500 feet

AIRCRAFT TYPE	PATH	PERCENT AIRCRAFT	PERCENT PATH USAGE	STAGE LENGTH
DASH 7	17A	9.42	80	0-500
DC-9/727	17A	16.02	80	0-500
DC-8	17A	2.15	80	0-500
DASH 7*	17B	9.42	20	N/A
DC-9/72*	17B	16.02	20	N/A
DC-8*	17B	2.15	20	N/A
Air Taxi	17B	42.40	80	0-500
General Aviation	17B	30.01	80	0-500
Air Taxi*	17B	42.40	20	N/A
General Aviation*	17B	30.01	20	N/A

(1) * Indicates landing aircraft. All others are takeoffs.

TABLE 2

1995 OPERATIONAL ASSUMPTIONS[1]

Total Operations.....103,000
Runway Length.....12,000 feet

AIRCRAFT TYPE	PATH	PERCENT AIRCRAFT	PERCENT PATH USAGE	STAGE LENGTH
DC-9/727	17A	20.60	80	0-500
DC-10/L-1011	17A	1.70	80	0-500
DC-10/L-1011	17A	1.70	80	350+
747	17A	0.45	80	0-500
747	17A	0.45	80	350+
DC-9/727*	17B	20.60	20	N/A
DC-10/L-1011*	17B	3.3	20	N/A
747*	17B	0.9	20	N/A
All Taxi	17B	38.84	80	0-500
General Aviation	17B	36.41	80	0-500
All Taxi*	17B	38.84	20	N/A
General Aviation*	17B	36.41	20	N/A

(1) * Indicates landing aircraft. All others are takeoffs.

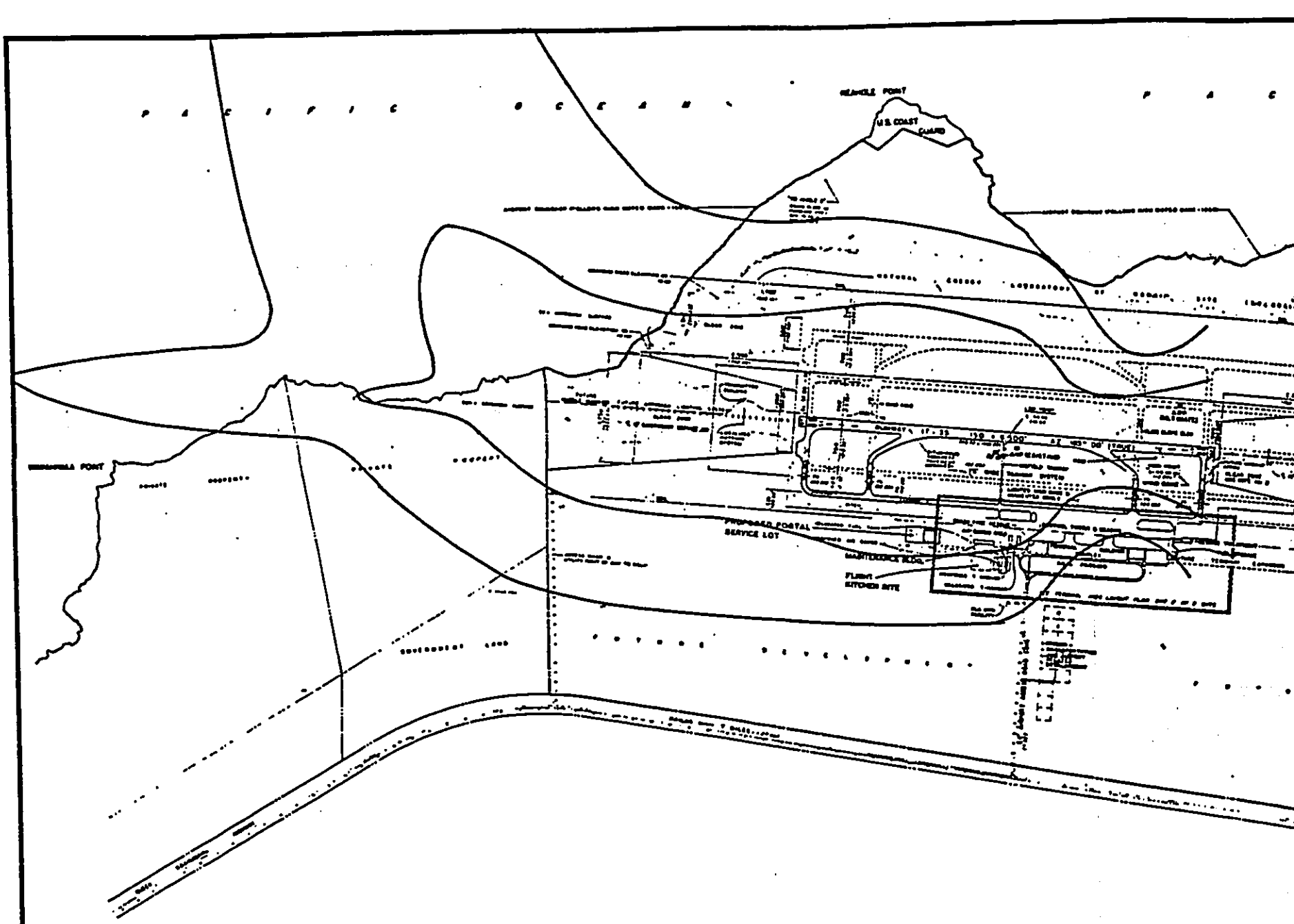
TABLE 3

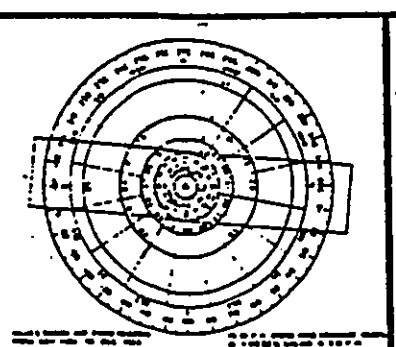
YEAR 2005 OPERATIONAL ASSUMPTIONS[1]

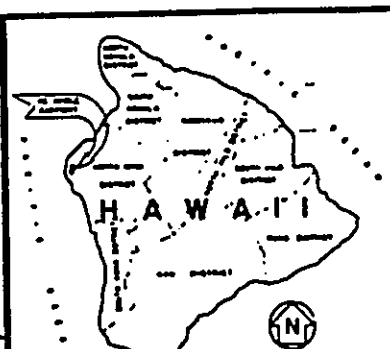
Total Operations.....137,300
Runway Length..... 12,000 feet

AIRCRAFT TYPE	PATH	PERCENT AIRCRAFT	PERCENT PATH USAGE	STAGE LENGTH
DC-9/727	17A	15.59	80	0-500
DC-10/L-1011	17A	2.62	80	0-500
747	17A	0.45	80	0-500
DC-10/L-1011	17A	2.62	80	350+
747	17A	0.45	80	350+
DC-9/72*	17B	15.59	20	N/A
DC-10/L-1011*	17B	2.62	20	N/A
747*	17B	0.45	20	N/A
Air Taxi	17B	40.06	80	0-500
General Aviation	17B	38.24	80	0-500
Air Taxi*	17B	40.06	20	N/A
General Aviation*	17B	38.24	20	N/A

(1) * Indicates landing aircraft. All others are takeoffs.







RUNWAY DATA

AIRPORT DATA

NOTE

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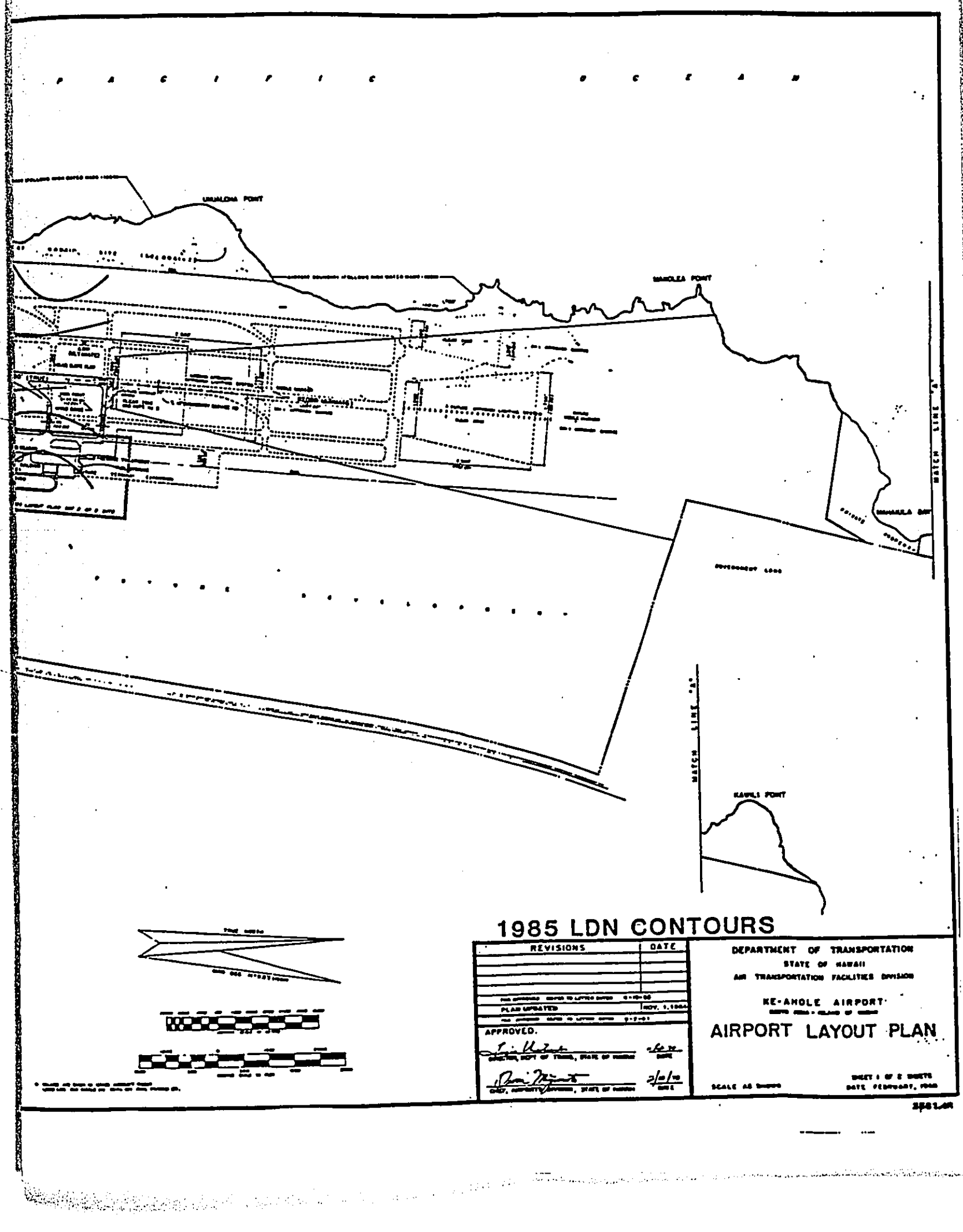
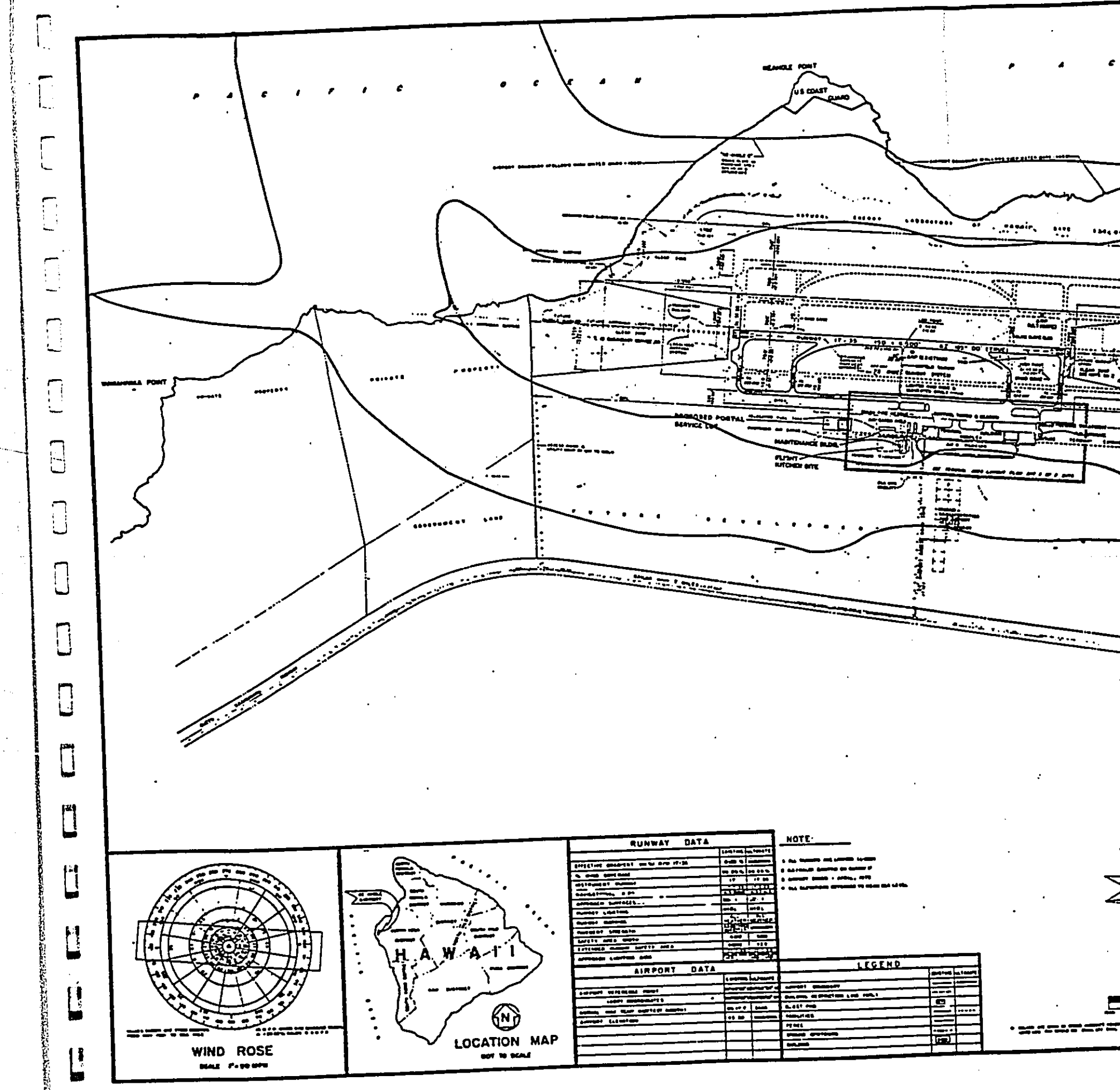

P A C I F I C O C E A N
UKUMEHAME POINT
MAKOLEA POINT
MATCH LINE "A"
MATCH LINE "A"
KAWILI POINT
1985 LDN CONTOURS
REVISIONS
DATE
PLANS UPDATED
NOV. 1, 1984
APPROVED.
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII
AIR TRANSPORTATION FACILITIES DIVISION
KE-AHOLE AIRPORT
AIRPORT LAYOUT PLAN
SCALE AS SHOWN
DATE FEBRUARY, 1988


P A C I F I C O C E A N
KEAHOLE POINT
U.S. COAST GUARD
MAKAHUELA POINT
PROPOSED POSTAL SERVICE BLDG.
MAINTENANCE BLDG.
FLIGHT KITCHEN SITE
RUNWAY DATA
AIRPORT DATA
NOTE:
LEGEND
WIND ROSE
H A W A I I
N
LOCATION MAP

M-4

P A C I F I C O C E A N

MANOLEA POINT

MANAWAI BAY

MATCH LINE "A"

KAWILI POINT

1995 LDN CONTOURS

REVISIONS	DATE
PLAN UPDATED	NOV. 7, 1994

APPROVED.

DIRECTOR, DEPT OF TRANSP., STATE OF HAWAII — DATE

CHIEF, AIRPORTS DIVISION, STATE OF HAWAII — 2/6/96 DATE

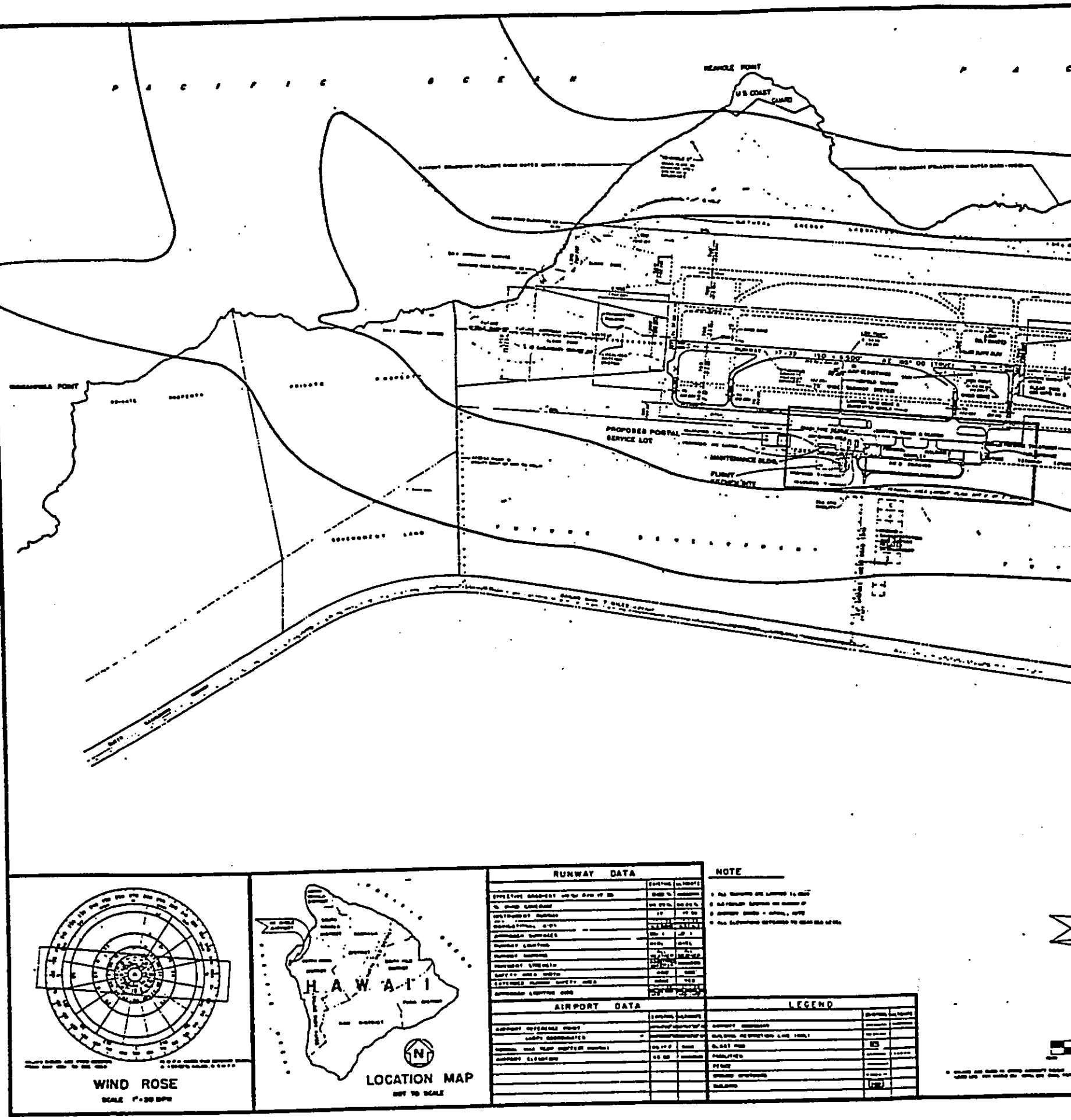
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII
AIR TRANSPORTATION FACILITIES DIVISION

KE-AHOLE AIRPORT
WEST HAWAII - ISLAND OF HAWAII

AIRPORT LAYOUT PLAN

SCALE AS SHOWN

SHEET 1 OF 2 SHEETS
DATE FEBRUARY, 1996

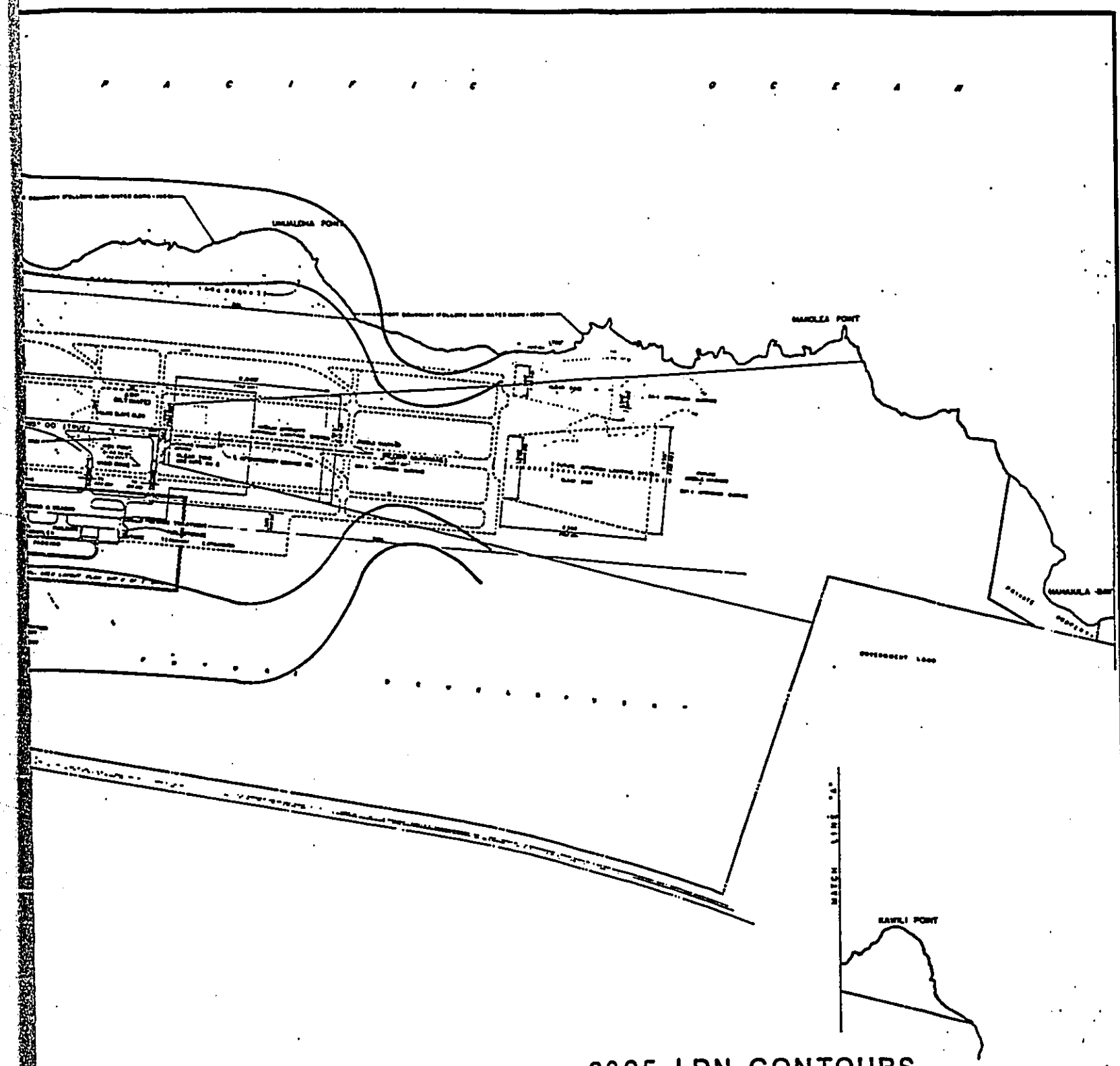


RUNWAY DATA		

AIRPORT DATA		

NOTE

LEGEND



2005 LDN CONTOURS

REVISIONS	DATE
FLOW UPDATED	NOV. 1, 1990
	2-7-91

APPROVED:

DIRECTOR, DEPT OF TRANS., STATE OF HAWAII — DATE

CHIEF, AIRPORTS DIVISION, STATE OF HAWAII — 2/8/91 DATE

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII
AIR TRANSPORTATION FACILITIES DIVISION

KE-AHOLE AIRPORT
WEST HAWAII - ISLAND OF HAWAII

AIRPORT LAYOUT PLAN

SCALE AS SHOWN

SHEET 1 OF 2 SHEETS
DATE FEBRUARY, 1990

KEAHOLE AIRPORT:
PRELIMINARY AIRCRAFT OPERATIONS FORECAST

I. Basic Assumptions

The forecasts for future aircraft operations in and out of Keahole Airport are based on a number of assumptions. In studying the data over the past fifteen years (the length of time that Keahole Airport has been in operation) there appears to be a close correlation between the number of visitors to the island of Hawaii and the number of commercial air carrier operations in and out of Keahole. Assuming that this relationship continues (and there appears to be no reason to assume otherwise), we have based these forecasts on recently released projections of annual visitors to the Big Island prepared by the Hawaii County Planning Department (Series "C" Population and Visitor Industry Projections, Draft General Plan). Although the Planning Department prepared three different growth scenarios, we have selected the most optimistic growth series in order to illustrate a worst-case situation.

Based on existing aircraft operations, it appears that approximately 15 percent of passengers arriving/departing from Keahole are on Mainland air carriers (currently United DC-8s). We have assumed that in 1995 that will increase to 35 percent and by 2005 it will grow to 50 percent. We have assumed that half of these Mainland carrier flights in 1995 and 2005 will depart fully loaded with fuel and half will seek refueling elsewhere in the State before continuing on to Mainland destinations. We have distributed this growth in direct flights to wide-bodied planes, particularly the DC 10/L1011 type. We have also included a number of 747s (approximately 10 percent of all passengers for both 1995 and 2005). In addition, we assumed that by 1995 there will no longer be any commercial air carriers using prop planes (YS-11s and Dash 7s) and that the DC-8s will be replaced by the larger wide-bodied planes.

All this growth in direct Mainland flights with wide-bodied planes can occur only if the present runway is increased in length. Although no timetable has been set to lengthen the runway, it is assumed that the State's current master planning studies will recommend it. Therefore, we have assumed that the runway will be extended to 12,000 feet as shown in the current Airport Master Plan by 1995.

Also included are forecasts for air taxi, general aviation and military flight operations. We have shown increases in both air taxi and general aviation operations, but have indicated a reduction in military flights in 2005, assuming that these training activities will drop off as the airport becomes busier with other types of aircraft operations. Also described on the attached sheet are the types of aircraft that make up each of the forecast categories.

We have also assumed that 80 percent of the flights will take-off towards the south and the remaining 20 percent will land from the southerly direction. Of those taking-off to the south, we have assumed that controls/guidelines will be imposed to direct all aircraft to turn out over the ocean as soon as safely possible. Landings from the south, however, will require a longer, straight line approach.

II. Aircraft Operations Forecast

Year	Air Carrier	Air Taxi	General Aviation	Military	Total
1985	20,500	31,500	22,300	19,600	93,900
1995	25,500	40,000	37,500	20,000	123,000
2005	29,800	55,000	52,500	15,000	152,300

III. Air Carrier Forecast Breakdown

Year	DASH 7 YS-11	737 DC-9	DC-8	DC-10 L1011	747	Total
1985	7,000	11,900	1,600	--	--	20,500
1995	--	21,200	--	3,400	900	25,500
2005	--	21,400	--	7,200	1,200	29,800

IV. Description of Aircraft in Each Category

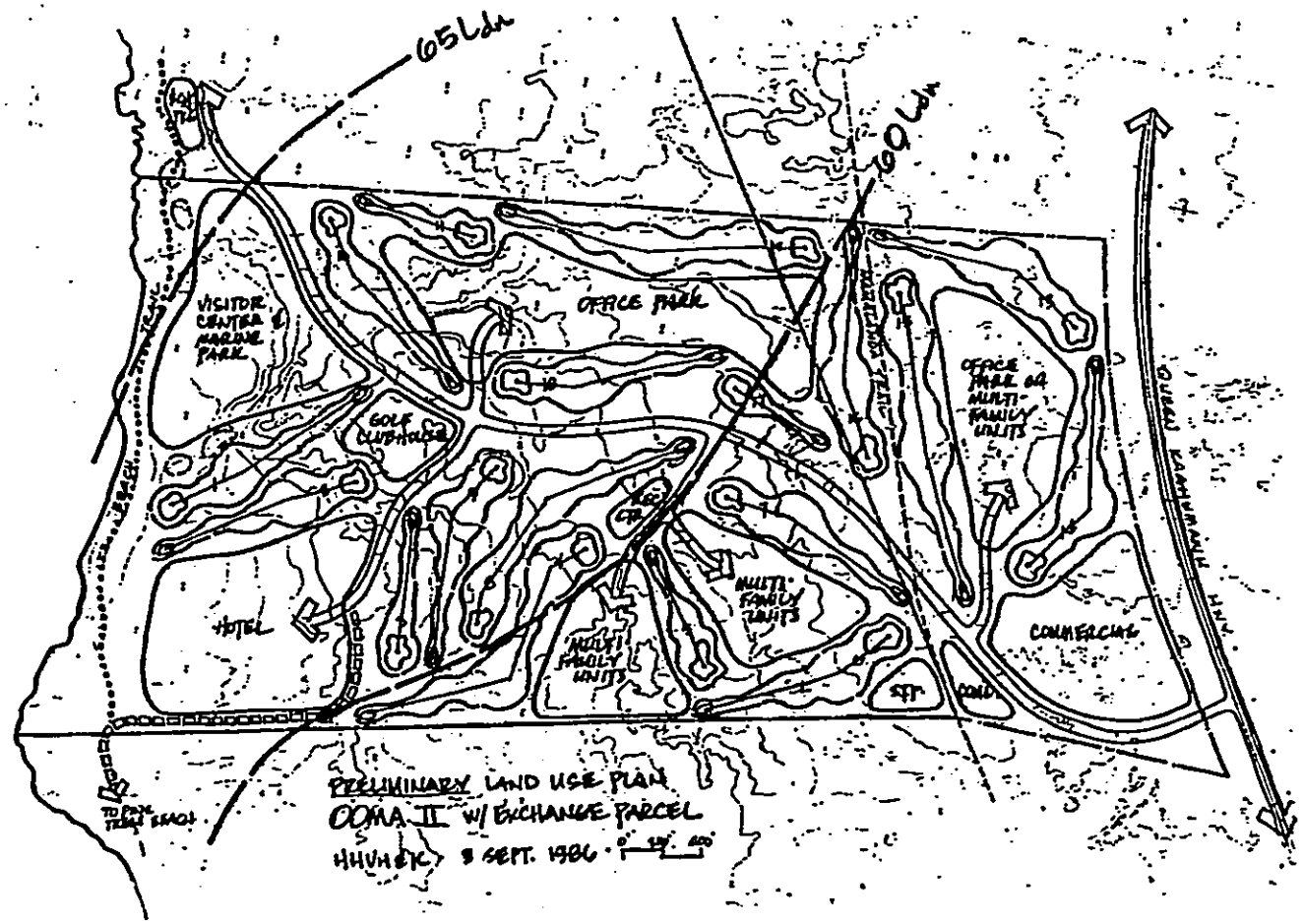
Air Carriers: Scheduled commercial airlines including interisland carriers (Aloha, Hawaiian, Mid-Pacific) and Mainland carriers (United and other future users). Aircraft include all those listed in table above.

Air Taxi: Commuter airlines, air tours and helicopter charters. Aircraft are generally twin engine Cessnas and Beachcrafts and Bell Ranger Helicopters.

General Aviation: Mainly single engine prop planes which are privately owned or used for pilot instruction.

Military: Mostly 4-engine turboprops (radar/surveillance planes) using field for touch-and-go training only.

HELBER, HASTERT, VAN HORN & KIMURA, Planners 19 July 1986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70 Ldn
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OFFICE PARK
GOLF CLUBHOUSE
OFFICE PARK & MULTI-FAMILY UNITS
HOTEL
MULTI-FAMILY UNITS
MULTI-FAMILY UNITS
COMMERCIAL
QUEEN KAAHUMANU HWY
PRELIMINARY LAND USE PLAN
OOMA II W/ EXCHANGE PARCEL
HHVH&C 8 SEPT. 1986