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DEPARTMENT OF LAND AND NATURAL RESOURCES

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OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

FILE NO.: HA-10/4/91-2531
DOC. NO.: 2013E

MEMORANDUM

TO: The Honorable Brian J. J. Choy, Director
Office of Environmental Quality Control

FROM: William W. Paty, Chairperson
Board of Land and Natural Resources

SUBJECT: Document for Publication in the OEQC Bulletin
Environmental Assessment for Conservation District Use
Application HA-2531 for Test Monitoring Wells at O'oma,
Hawaii
TMK: 7-3-009: 004

The above mentioned Chapter 343 document was reviewed and a negative declaration was declared based upon the environmental assessment provided with the CDUA.

Please feel free to call me or Ed Henry of our Office of Conservation and Environmental Affairs, at 587-0377, if you have any questions.

1991-12-08-HI-FEA -
O'oma Drilling Test
Monitoring Wells

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'O'OMA II

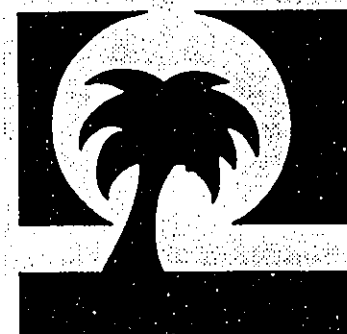
NORTH KONA, HAWAII

ENVIRONMENTAL ASSESSMENT

CONSERVATION DISTRICT USE PERMIT
APPLICATION (Temporary Variance)

October 1991

Prepared For: KAHALA CAPITAL CORPORATION
Prepared By: HELBER HASTERT & FEE PLANNERS
For Submittal To: DEPARTMENT OF LAND AND
NATURAL RESOURCES



'O'OMA II

NORTH KONA, HAWAII

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TABLE OF CONTENTS

I	INTRODUCTION AND SUMMARY	
1.1	Intended Use of this Document.....	1
1.2	Project Summary.....	1
1.3	Alternatives Considered.....	2
1.4	Background.....	2
1.5	Determination.....	3
1.6	Consulted Agencies.....	4
II	DESCRIPTION OF THE PROPOSED ACTION	
2.1	Location.....	4
2.2	Water Recreation Park.....	7
2.3	Proposed Project.....	11
III	DESCRIPTION OF THE AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATING MEASURES	
3.1	Environmental Setting.....	14
IV	REFERENCES.....	22

FIGURES

1	Project Location Map.....	5
2	Regional Location Map.....	6
3	'O'oma II Master Plan.....	8
4	Area of Proposed Test Monitoring Wells.....	12
5	Test Monitoring Well Cross Section.....	13

TABLES

1	Water Features Included in the Proposed 'O'oma II Lagoon Circulation System.....	9
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APPENDICES

A	Archaeological Survey Update (Paul H. Rosendahl, Ph.D., Inc.)	
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I INTRODUCTION AND SUMMARY

1.1 Intended Use of this Document

This environmental assessment has been prepared in support of an application to the State Board of Land and Natural Resources for a Conservation District Use Permit (CDUP) (temporary variance) to permit the drilling of approximately 20 test monitoring wells beneath a proposal seven-acre salt water lagoon on a 217.566-acre parcel of land on the west coast of the island of Hawaii, identified as Tax Map Key (TMK) 7-3-09:04 (Parcel 4). The parcel is within two subzones of the State Conservation District; the Resource and General subzones. The project area is located entirely within the Resource subzone.

This EA is intended to comply with Chapter 343, Hawaii Revised Statutes (HRS) and the EIS regulations promulgated by Chapter 200 of Title 11, Department of Health. The purposes of this document are to provide information to public officials and members of the community about the nature of the proposed action; to assess the existing environmental conditions of the property; to evaluate potential impacts of the proposed action and to present mitigating actions for those impacts, if necessary; and, to consider alternatives to the proposed action.

1.2 Project Summary

*Petitioner
Landowner:*

Kahala Capital Corporation
75-5751 Kuakini Highway Suite 201
Kailua-Kona, Hawaii 96740
(808) 326-1693

*Preparers of
Environmental Assessment:*

Helber Hastert & Fee, Planners
733 Bishop Street Suite 2590
Honolulu, Hawaii 96813
(808) 545-2055

Location:

North Kona Judicial District, County of Hawaii
'O'oma, 2nd Ahupua'a, South of the Keahole Airport and
Approximately seven miles north of Kailua-Kona

Tax Map Key:

Division 3, Zone 7, Section 3, Plot 09, Parcel 4 (217.566
acres)

Parcel Area:

217.566 Acres

<i>Existing State Land Use District:</i>	Conservation, (Subzones: Resource and General)
<i>County of Hawaii General Plan:</i>	Resort, Urban Expansion, Open
<i>County Zoning:</i>	Open
<i>Existing Uses:</i>	Vacant and unimproved. Existing land use is limited to recreational use of the coastal areas of the site.
<i>EA Approving Agency:</i>	Board of Land and Natural Resources
<i>Request:</i>	Conservation District Use Permit (Temporary Variance)

1.3 Alternatives Considered

One alternative to the proposed action was considered; "no action." The no action alternative would not allow the applicant to obtain necessary information concerning the composition of subsurface geology and the behavior of groundwater beneath project site, and would, therefor, prevent the applicant from designing an appropriate water circulation system to mitigate the effects of a seven-acre salt water lagoon on groundwater. On this basis, the no action alternative was rejected.

1.4 Background

On March 12, 1991, Kahala Capital Corporation, a Hawaii corporation, submitted a Petition for District Boundary Amendment to the Land Use Commission (LUC) (Docket No. A91-666), involving Parcel 4, known as 'O'oma II, located about one mile south of the Keahole Airport in support of a 300-acre master-planned development that includes the following elements: a 12-acre Ocean Science Center and 300 parking stalls; a Conference Center and 100 parking stalls; a 19-acre Water Recreation Park; a golf course and clubhouse, covering 176 acres, including a driving range; a Japanese style inn of 50 rooms; a 550-room hotel covering 22 acres; 70 Golf Course House Lots, at 10,000 square feet per lot; between 130 and 230 Golf Course Condominiums; about 35,000 square feet of retail commercial space; and, a 6-acre site devoted to maintenance and a wastewater treatment plant (WWTP).

An earlier EIS, accepted by the County of Hawaii in 1986 for an amendment to the Hawaii County General Plan, was prepared in support of the 1986 General Plan Amendment. However, the initial master plan has been revised, the project area has changed configuration and the LUC has ruled that the current master plan shall

require a supplemental EIS (SEIS) under the provisions of the Environmental Impact Statement Rules promulgated by Chapter 200 of Title 11, Department of Health.

A notice was subsequently published in the September 23, 1991 issue of the Office of Environmental Quality Commission (OEQC) Bulletin, advertising the availability of the Draft SEIS required by the LUC, which was prepared by Helber Hastert & Fee, Planners.

Section 1.7 of the Draft SEIS describes the unresolved issues that resulted from the preparation of the Draft SEIS. One of these unresolved issues is the composition of subsurface geology beneath the 'O'oma II site and the resultant behavior of groundwater seepage to the ocean. Specifically, as discussed below, one of the features of the 'O'oma II Master Plan is a 19-acre Water Recreation Park, which contains a seven-acre, unlined salt water lagoon, water slides, islands and a wave-generating machine. Analysis conducted by Tom Nance in a report prepared for Kahala Capital Corporation, Saltwater Ponds of the 'O'oma II Project: Recommended Circulation System and Analysis of Environmental Effects, demonstrated that the proposed seven-acre salt water lagoon may create a "mounding" effect on groundwater seepage into the ocean, which could cause groundwater to be diverted to the north and south of the proposed seven-acre lagoon, thus raising salinity and background nitrogen levels in groundwater within the project site and beneath property owned by the Natural Energy Laboratory of Hawaii Authority (NELHA) to the north and Kohanaiki to the south. The analysis which leads to these predictions is based on conservative assumptions about subsurface geology under the project site, in the absence of specific data. Although current analysis reveals no harmful effects to the nearshore marine environment (which is described in detail in Section 4.7 of the Draft SEIS), the applicant wishes to undertake subsurface testing to more accurately determine subsurface geology, which will allow more accurate analysis of impacts to groundwater and the nearshore environment.

1.5 Determination

Under the provisions of Chapter 200 of Title 11, Administrative Rules, prepared by the Department of Health, and based on the analysis contained herein, the proposed action will not have any substantial adverse environmental or ecological effect.

1.6 Consulted Agencies

The following agency was consulted in the preparation of this EA:

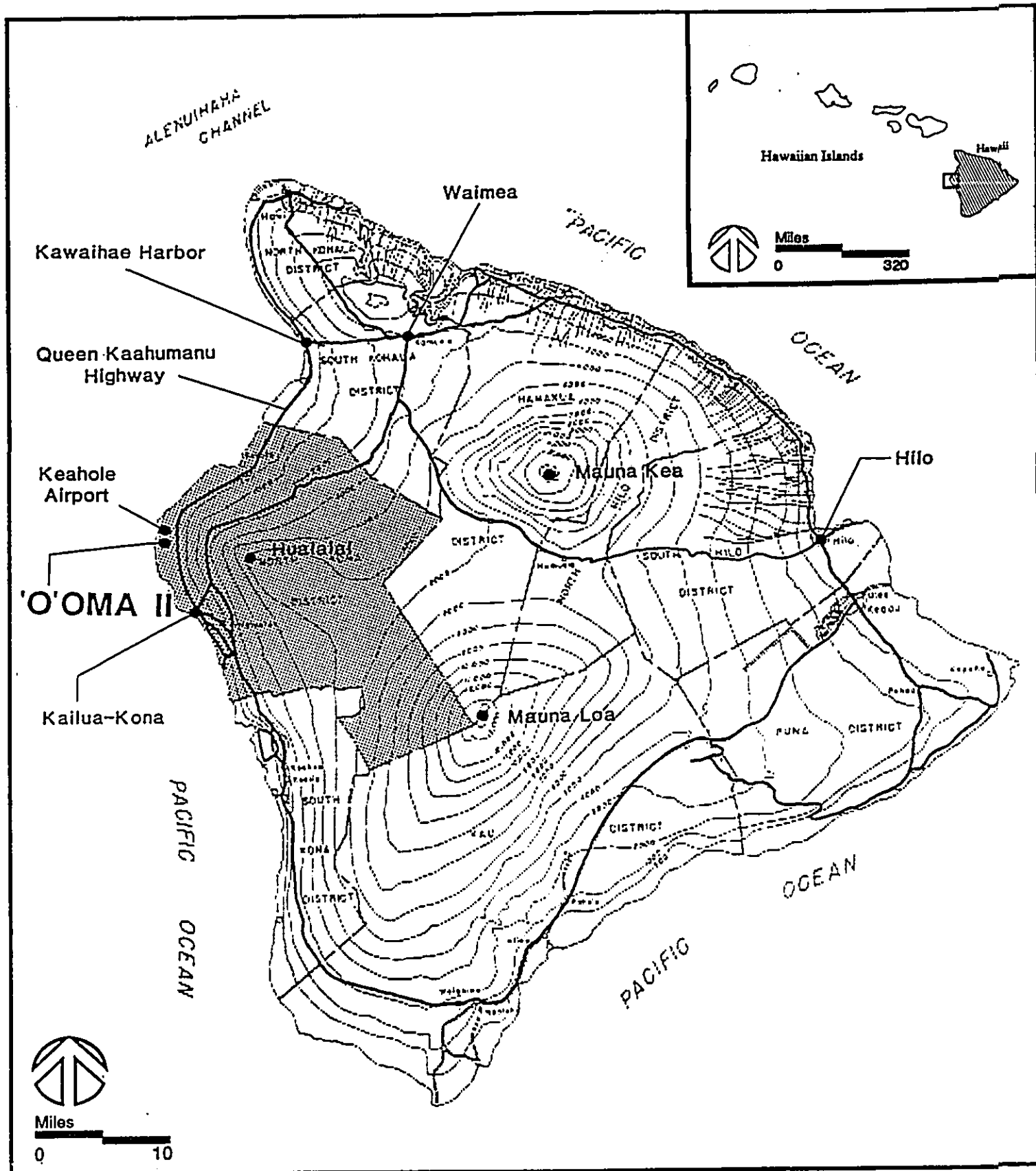
Department of Land and Natural Resources

II DESCRIPTION OF THE PROPOSED ACTION

2.1 Location

The project site lies within the 'O'oma II ahupua'a on the leeward coast of the island of Hawaii, about one mile south of the Keahole Airport and seven miles north of the town of Kailua-Kona (Figure 1). The project site is bounded by Queen Kaahumanu Highway to the east (mauka), the proposed Hawaii Ocean and Science Technology (HOST) Park to the north, the proposed Kohanaiki Resort to the south and by the Pacific Ocean to the west (makai) (Figure 2). Two named coastal features appear in the vicinity; Wawaloli Beach is northwest of the project site near the Natural Energy Laboratory of Hawaii (NELH) at Keahole Point, and, Puhili Point is located at the southwest corner of the project site. The major existing land use in the area is the State-owned Keahole Airport, located approximately one mile to the north. Adjacent to the southern boundary of the Keahole Airport lies the NELHA, a publicly-funded research facility. NELHA is involved in the research and commercial application of alternative energy systems, aquaculture and related fields, utilizing deep ocean water pumped ashore via offshore pipelines. Another publicly-subsidized facility, the Keahole Agricultural Park, is located north of the project site, mauka of Queen Kaahumanu Highway. This park is located on State-owned land and was developed by the State of Hawaii, although individual parcels are leased to commercial growers, primarily in the horticultural industry.

The Kohanaiki Resort is the site of a proposed 450-acre master planned resort owned by Nansay Hawaii, Inc. The proposed master plan for the Kohanaiki Resort includes: a multi-use resort development featuring two hotels totaling 1,050 rooms; an 18-hole championship golf course and clubhouse; 330 multi-family dwelling units; 380 single-family dwelling units; an athletic club; a child care center; an artisan's village; a beach club; public park and related public access improvements; resort maintenance facilities; and, other resort amenities.

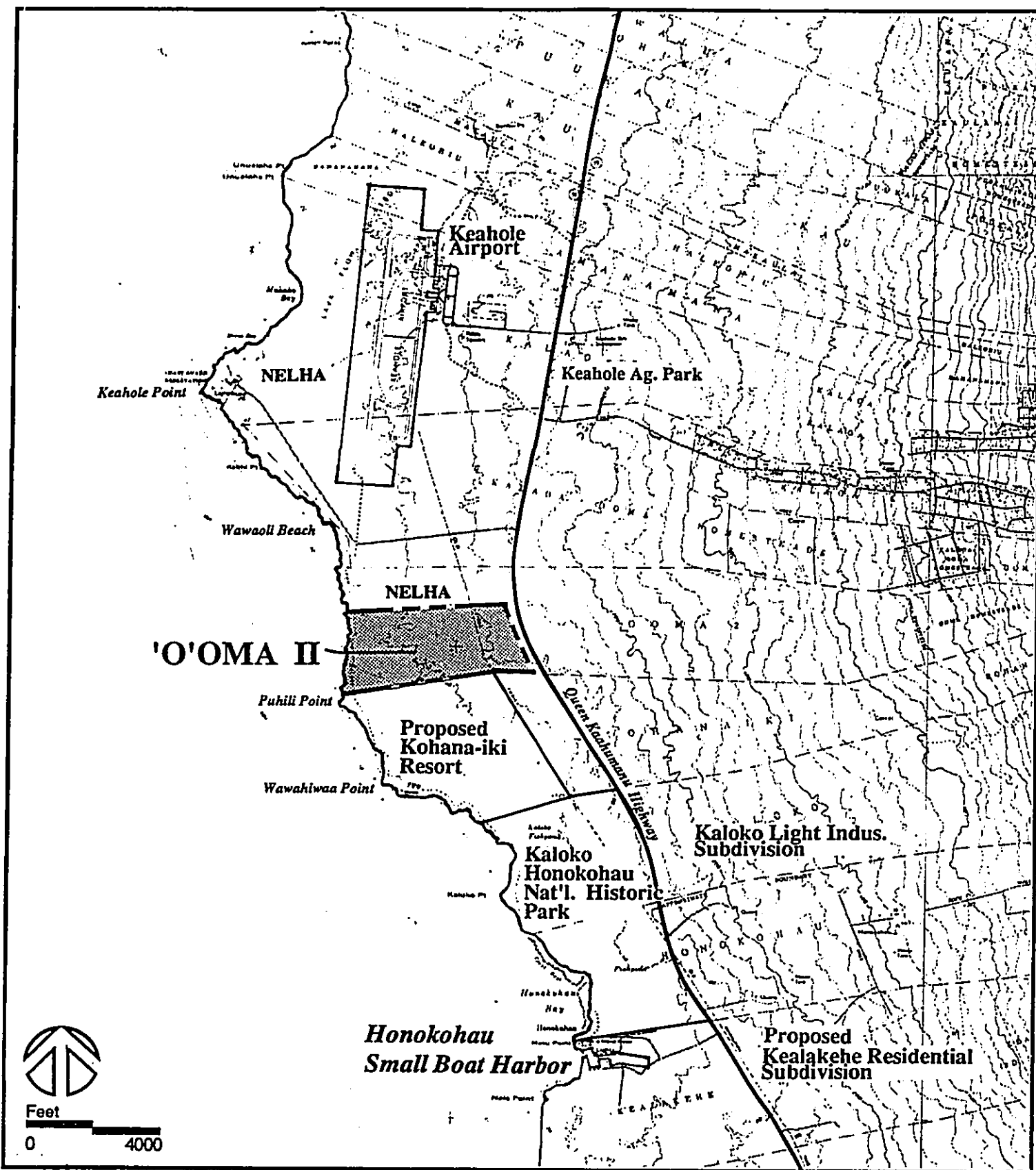


Project Location Map

'O'OMA II
Kahala Capital Corp.

Figure: 1

Helber Hastert & Fee, Planners



Regional Location Map

Figure: 2

'O'OMA II
Kahala Capital Corp.

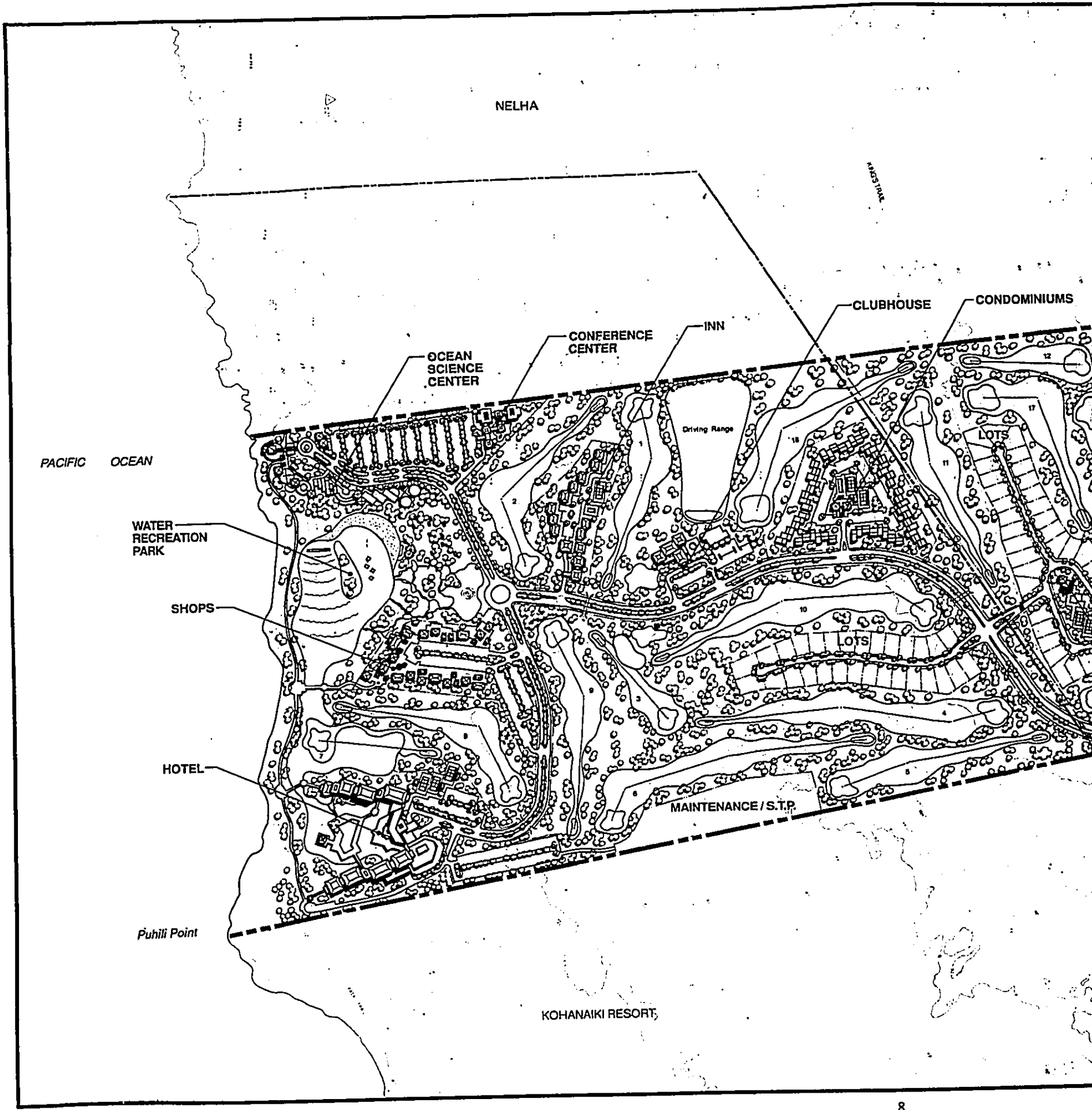
Helber Hastert & Fee, Planners

Immediately south of Kohanaiki is the Kaloko-Honokohau National Historical Park (NHP) being developed by the U.S. National Park Service. Mauka of the National Park is the Kaloko Industrial Park consisting of 194 fee simple, one-acre industrial lots. Beyond the NHP to the south lies the 245-slip Honokohau Small Boat Harbor operated by the State Department of Transportation, Harbors Division. South of the Harbor lies the State-owned Kealakehe tract. The County is now in the process of developing a regional wastewater treatment plant (WWTP) in the coastal area of Kealakehe. Above the Queen Kaahumanu Highway, about two miles south of the project site, lies the proposed Kealakehe Residential Community, a project that is managed by the State Housing Finance and Development Corporation (HFDC). HFDC is planning to develop a major new civic center and up to 5,000 residential units in this area.

2.2 Water Recreation Park

The applicant's proposed development at 'O'oma II is intended to provide a transition in land usage from the ocean science research and ocean-related industrial uses on the Natural Energy Laboratory of Hawaii Authority (NELHA) properties north of 'O'oma II (which include the Natural Energy Laboratory and the proposed HOST Park) to the more resort-related uses which have already received many land use approvals from the State and County at Kohanaiki. The applicant intends to accomplish this transition by locating the proposed Ocean Science Center and Conference Center near the 'O'oma II/NELH boundary; a shoreline park, water recreation park and golf course in the center of the 'O'oma II property; and, the proposed retail center and first class hotel near the 'O'oma II/Kohanaiki boundary (Figure 3).

The planned 19-acre Water Recreation Park would leave the beach and strand areas of 'O'oma II essentially in their natural condition. An existing coastal jeep trail would be incorporated into the Ala Kahakai project under the Na Ala Hele branch of the Department of Land and Natural Resources. Mauka of the strand, on what is now low-lying lava land, an approximately seven-acre salt water swimming lagoon will be created and includes; natural water slides, islands, and a wave generating machine. The water recreation park would be open to the general public for a fee. There would, of course, be no charge for use of the shoreline park and kama'aina rates would be offered for the water recreation park facilities.



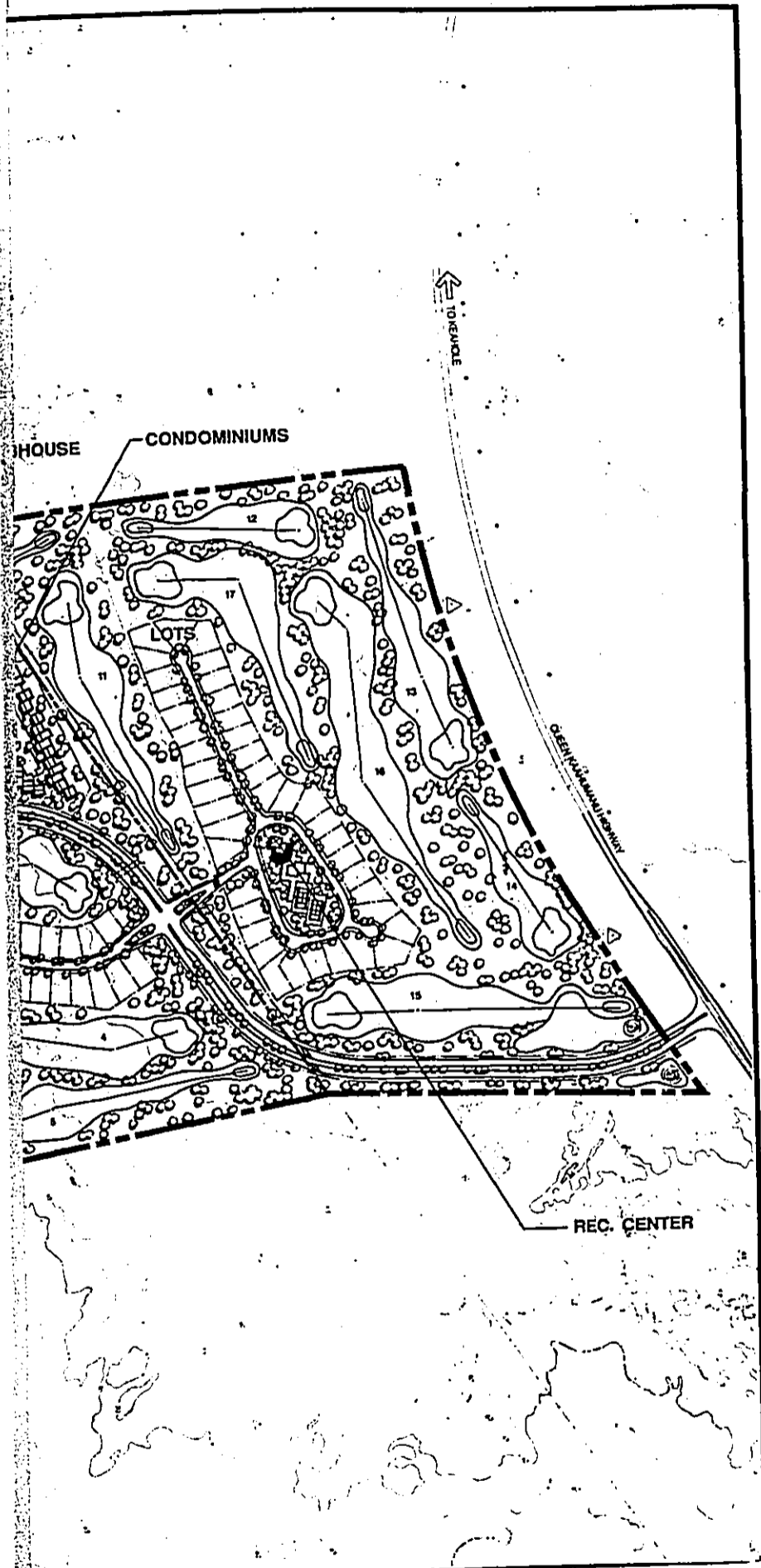


Figure: 3

'O'oma II Master Plan

'O'OMA II
Kahala Capital Corp.

Helber Hastert & Fee, Planners



Feet
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Although the water recreation park is the primary component of the lagoon system, the proposed master plan for 'O'oma II includes several other nearby water-related features. These include:

- o Two ponds proposed south of the water park; one would be a golf course amenity and the other would be a feature of the proposed hotel.
- o The ocean science center which would be on the north side of the water recreation park

Table 1 lists the sizes and volumes of each of the water features which would be included in the proposed master plan. The largest pond, the 7-acre salt water lagoon, is currently planned to have a natural (unlined) bottom. Beaches would be constructed around some of its perimeter and the lagoon would have an average depth of 4.5 feet at mean tide. Its water level would be elevated slightly above sea level and fluctuate with the ocean tide. A wave machine may also be installed in this lagoon. The water recreation park would also have a smaller, elevated pond directly inland of the larger one. Its water surface would be 30 to 40 feet above sea level and its bottom would have an impervious liner. Water would descend from this higher pond to the lower one through several slides or "rapids" (Nance, 1991).

The golf course water feature would have a lined bottom and a water surface about 10 feet above sea level. The water feature around and within the hotel would include fish and other aquatic animals. It would also be lined and have a water surface about 10 feet above sea level. These two ponds would be hydraulically connected to each other and to the 7-acre pond. The ocean science center, located on the north side of the water recreation park, would include a number of aquarium tanks, the largest of which would exhibit indigenous Hawaiian marine life (ibid).

Table 1
Water Features Included in the Proposed 'O'oma Lagoon Circulation System

Water Feature	Water Area (Acres)	Ave. Depth (Feet)*	Volume (million Gallons)	Construction
Water Recreation Park	7.0	4.5	10.3	Unlined Bottom
Water Recreation Park	1.0	2.5	0.8	Lined Pond
Golf Course Pond	3.0	2.5	2.4	Lined Pond
Hotel Water Feature	3.5	2.5	2.8	Lined Pond
Ocean Science Center	- -	Variable	0.2 to 0.3	Aquarium Tanks

* Water level will fluctuate with ocean tides; depth given above is at mean tide level
Source: Nance, 1991

In order to maintain water quality within the entire lagoon system, it will be necessary to design a circulation system that keeps water residence time within the lagoons to an acceptable minimum. The turnover rate necessary to achieve acceptable water clarity in a single-pass, flow through system (water passing through the system only once and then discharged) is largely a matter of judgement. Fortunately, operating experience has been gained from similar systems at several resorts located elsewhere along the Kona-Kohala coast. Consistent success has been achieved when the residence time from the well head through the lagoon system to disposal is 10 hours or less (For the 200,000-gallon aquarium tank, a flow-through rate of about 2,200 GPM is recommended to achieve a residence time of about 90 minutes, and the circulation system for this tank needs to be operated independently). For the proposed 'O'oma II lagoon system, achieving this turnover rate would require pumping at 25,000 gallons per minute (GPM) continuously. This would be equivalent to turning over 36 million gallons per day (MGD) (ibid).

A low nutrient source of water can be developed through construction of a field of nearshore drilled wells. These would be designed to draw water from wells below the overlying brackish lens, thereby producing saline groundwater which would be virtually identical to nearby surface seawater in all chemical respects. The exact number of wells needed to achieve this flowrate would be determined through actual drilling and pump testing. Experience has shown, however, that 3,000 to 5,000 GPM per well is a reasonable expectation. At this yield per well, the project would require five to eight wells. These would be arrayed around the pond perimeters for delivery into the respective ponds. Typical well depth is likely to be about 200 feet (ibid).

The anticipated impacts associated with the development of the proposed water recreation park are described in detail in Section 4.7 of the draft SEIS. In general, the presence of the seven-acre lagoon is expected to create a "mounding" effect which would create a barrier to the seepage of groundwater to the ocean, thereby forcing groundwater to seep around the lagoon to the north and south. The result of this diversion of groundwater would be to raise background salinity and nitrogen levels in the groundwater beneath the northern-makai portion of Kohanaiki and the southern-makai portion of the NELHA property. Although such increases would have insignificant impacts, the applicant desires to limit any such increases.

The analysis which leads to this description is based on conservative assumptions about the horizontal permeability of the substrata beneath the seven-acre lagoon, representing what is believed to be a "worst-case" scenario. While much is known

about regional subsurface geology, anticipating the specific effects of the salt water lagoon system on the basal lens beneath the project site requires specific geologic data.

2.3 Proposed Project

In order to obtain specific data about the behavior of groundwater beneath the project site, it is necessary to drill test monitoring wells to observe and record the movement of groundwater beneath the lagoon and its response to tidal signals.

Approximately 20 monitoring wells are proposed, with most of the wells to be located directly beneath the lagoon. Two monitoring wells may be drilled between the lagoon and the shoreline (Figure 4). No test monitoring well will be drilled within 200 feet of the shoreline. Each monitoring well will be about two to three inches in diameter and approximately 20 feet in depth (Figure 5). The wells will be drilled using an air-track driller utilizing compressed air. The air-track driller measures about eight feet wide and 12 feet long. The drilling assembly measures approximately 12-15 feet in height and is retractable. A portable air compressor will be transported to the site and parked near the existing coastal jeep trail. The air-track driller will be connected to the compressor via rubber tubing and will be rolled to each test well site. After the wells have been drilled, a Wesdata solid state logger and probe would be lowered into the well and suspended within the basal lens of groundwater that floats on seawater. The logger and probe would then be left in the well for about seven days to record the flow of groundwater toward the ocean. at which time they would be removed.

The drilling of each well through unweathered lava would result in about one cubic foot of spoil material (cuttings), which would be sand to gravel in size. These cuttings would be replaced in each monitoring well at the conclusion of the test. If necessary, additional material (probably gravel) would be placed within each test well to backfill the hole to its original grade. All test monitoring wells will be drilled on unvegetated land.

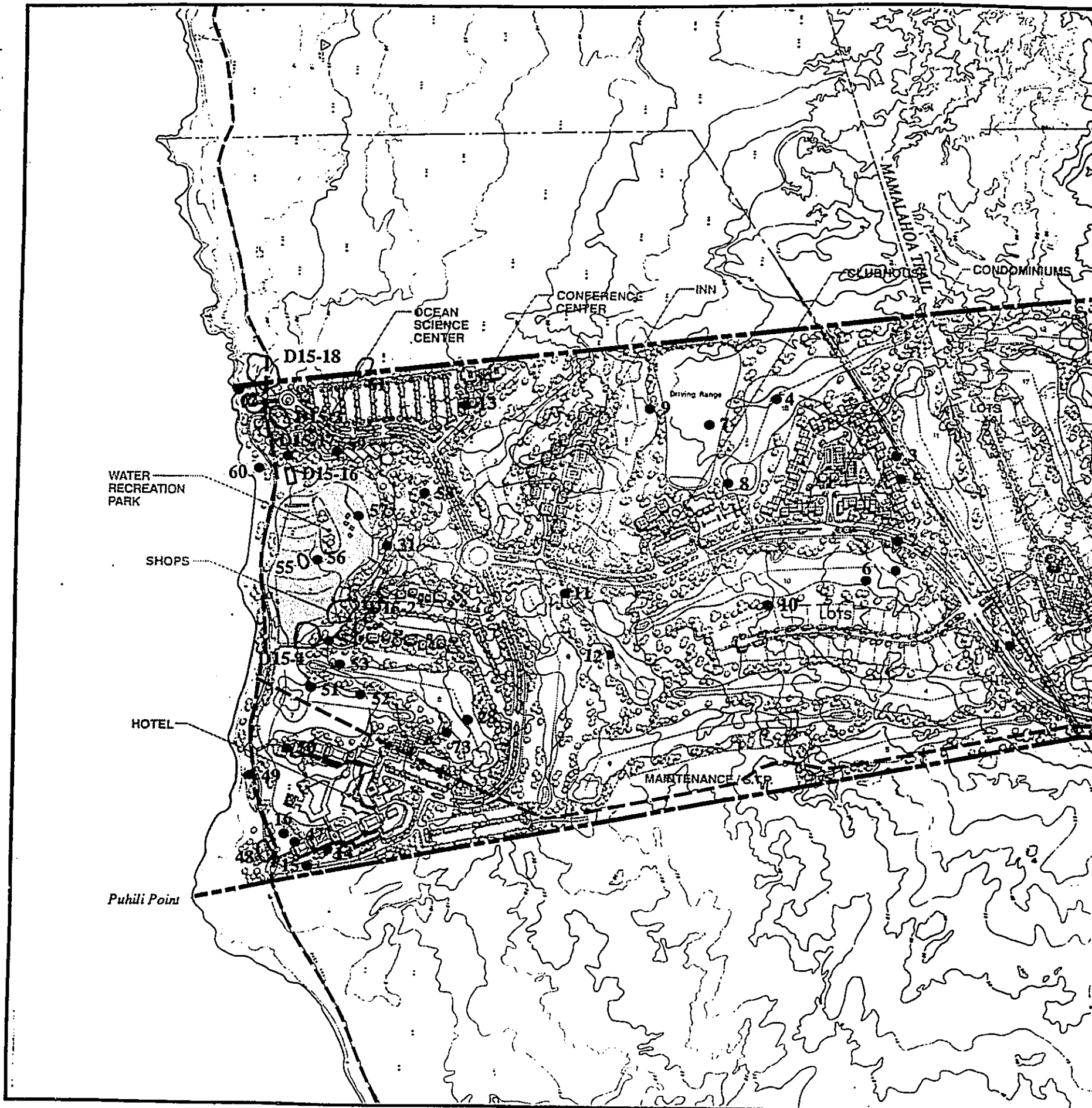





Figure: 4

Area Of Proposed
Test Monitoring Wells

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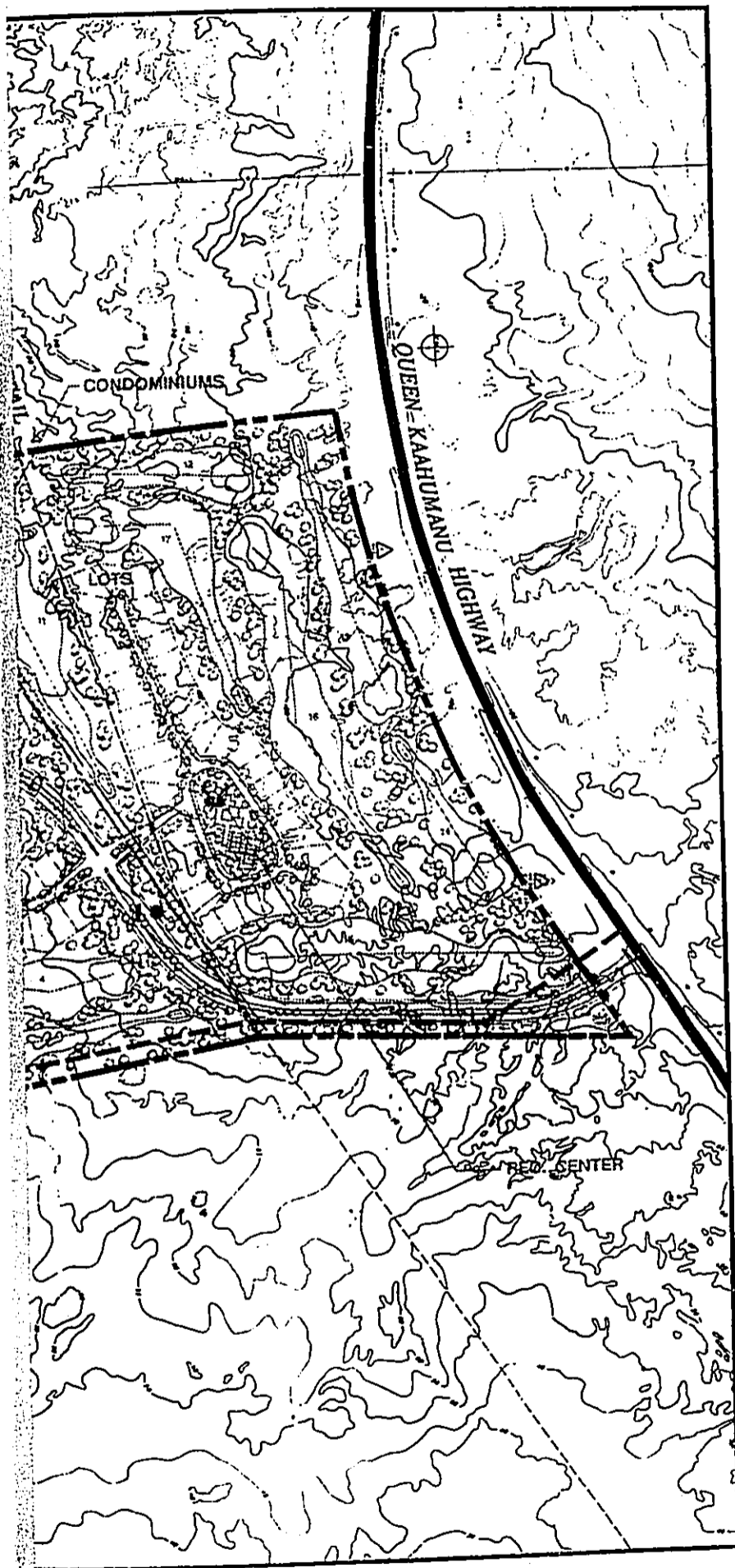
-  Historic Sites
-  Jeep Trail
-  Area Of Proposed Test Monitoring Wells

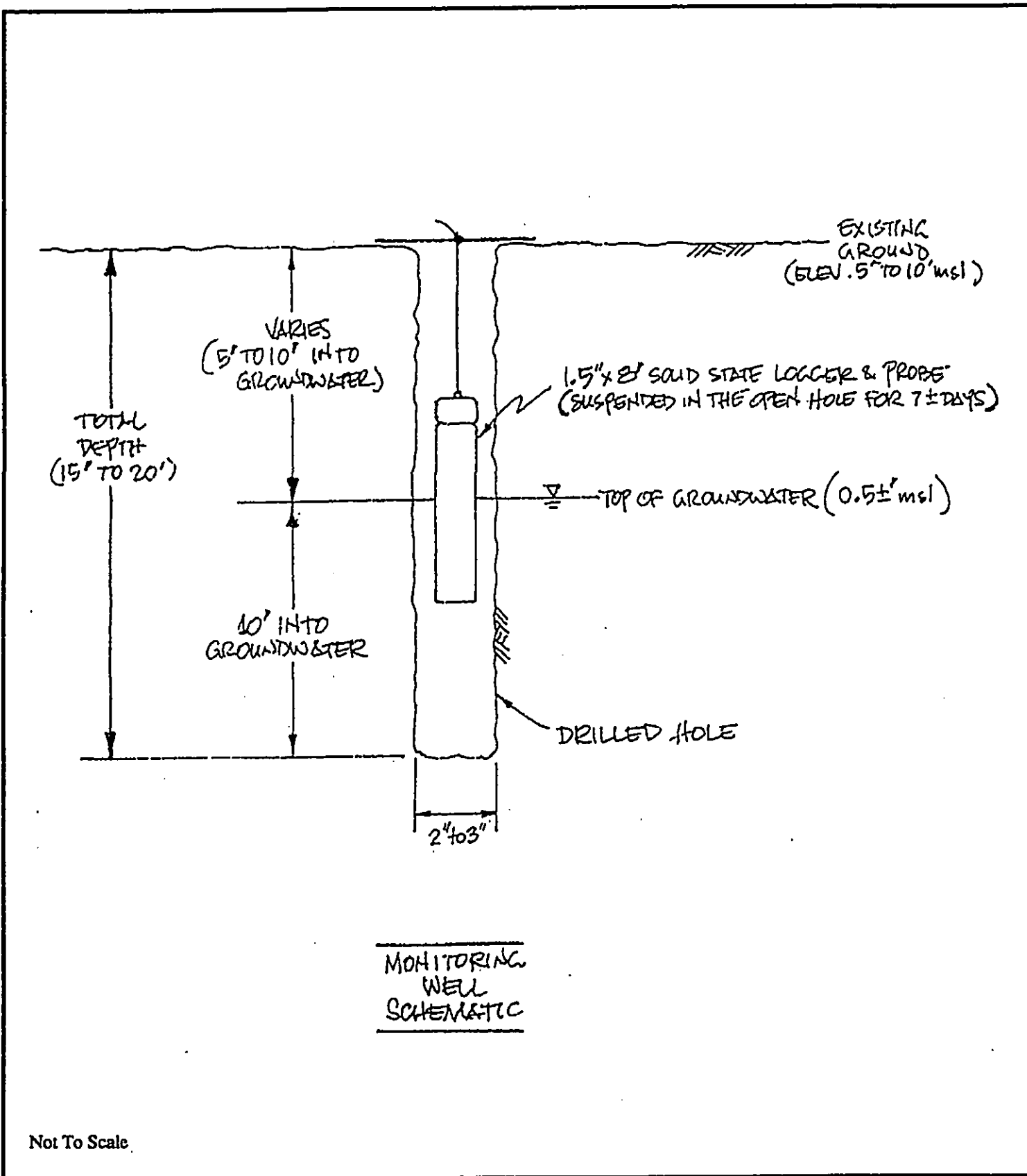
'O'OMA II
Kahala Capital Corp.

Helber Hastert & Fee, Planners



Feet
0 600





Test Monitoring Well Cross Section Figure: 5

'O'OMA II

Kahala Capital Corp. Helber Hastert & Fee, Planners

III DESCRIPTION OF THE AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATING MEASURES

3.1 Environmental Setting

Affected Environment

Climate. Coastal areas of North Kona have a semi-tropical, semi-arid climate. The average annual temperature is 75 degrees F, with an average high of 83 degrees F, and an average low of 67 degrees 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.

Geology and Topography. The project site 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 Parcel 4 ranges from sea level at the coastline to approximately 85 feet above msl at the southern-mauka boundary of the parcel. Elevation in the vicinity of the proposed seven-acre lagoon ranges between five and 10 feet above msl. In general, 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.

Solls. 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 Parcel 4: pahoehoe lava; a'a lava; and, beach areas. The predominant type, and the type which is in the vicinity of the seven-acre lagoon, 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 site 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 site are composed of coral and sea shells.

Flora and Fauna. In October 1990, Char & Associates conducted a botanical assessment on Parcel 4 to update an earlier survey conducted in 1986 (both of these reports are attached to the Draft SEIS as appendices). During the 1990 assessment, special emphasis was placed on the area occupied by strand vegetation, which occupies a narrow belt along the coast. Although this area is small compared to the overall size of Parcel 4, the largest number of native species is found in this vegetative zone.

During the May 1986 botanical survey, Char & Associates observed nine bird species. 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 feeding on insects along the coastal area during the evening and at night.

Two major faunal habitats are present in the area of Parcel 4. 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.

A flora survey conducted in May 1986 inventoried a total of 51 vascular plant species. Of these, 31 species (61 percent) are exotic (or introduced), 18 species (35 percent) are native and two species (four percent) are of Polynesian introduction. among the 18 native species, 10 are indigenous (occurring only in the Hawaiian islands and elsewhere) and eight are endemic (occurring only in the Hawaiian Islands). During the October 1990 survey a few more species were observed, although most of these were weedy annuals which appear after rainy periods.

Strand Vegetation. The coastal strand vegetation varies in width from 300 feet to as little as 50 feet. The substrate varies from unconsolidated corraline sand to coral rubble, and, occasionally, pahoehoe flows. In places where the strand is narrow, the pahoehoe flows are found close to the beach. Beach naupaka (Scaevola sericea) forms rather dense stands three to five feet high along the entire coast. Tree heliotrope (Tournefortia argentea), from eight to 12 feet high is also abundant, especially along the northern half of the project site. Native species common to occasional in this vegetation type include the native caper or maiapilo (Capparis sandwichiana), 'ilima (Fimbristylis cymosa), 'uhaloa (Waltheria indica), 'aki'aki or beach dropseed grass (Sporobolus virginicus), nohu (Tribulus cistoides), alena (Boerhavia glabrata), pa'u-o-Hi'i-aka (Jacquemontia ovalifolia).

Certain portions of the strand vegetation makai of the coastal jeep trail show some damage. In some areas, the sand has started to move and pile up along the seaward side of the road, forming small banks and covering the lowering branches of the naupaka shrubs. On the northern half of the project site, closer to the HOST Park property, the coastal area appears to be more actively used. This is where the sand and corraline beach is widest. Because of vehicular traffic, most of the ground cover plants, such as 'aki'aki, 'ilima, hinahina, etc., are found at the base of the naupaka and tree heliotrope plants where they are protected. Many of the tree heliotrope, usually a much-branched, bushy shrub, have been cut so that the lower branches have been removed.

Scrub Vegetation. With the exception of the narrow belt of strand vegetation along the coast, scrub vegetation covers almost 95 percent of Parcel 4, including the area in the vicinity of the proposed seven-acre salt water lagoon. This vegetation type is composed of various grass and shrub species on pahoehoe and 'a'a lava flows. Fountain grass (Pennisetum setaceum) is the most abundant species. However, pili grass (Heteropogon contortus) and Natal redbop (Rhynchyletrum repens) are locally common in places. Common throughout this scrubland are smaller shrubs (subshrubs) of 'uhaloa, 'ilima and indigo (Indigofera suffruticosa). Widely scattered throughout the site are taller plants of kiawe (Prosopis pallida), Christmas berry (Schinus terebinthifolius), a'ali'i (Dodonaea viscosa), the native caper of maiapilo and noni (Morinda citrifolia). The more scoriaceous 'a'a flows support some of the species previously mentioned, but in fewer numbers.

Noise. The major source of man-made noise affecting the project site originates from air traffic operations at the Keahole Airport, located approximately one mile to the north. Otherwise, most of the site is exposed to relatively low noise levels, with wind, surf and occasional distant traffic being the only noticeable sounds.

The most dominant aircraft noise is that from inter-island jets flying over the western section of the project site, after taking off from Runway 17 at Keahole Airport. The normal flight pattern is a right turn out to sea, shortly after takeoff. This flight pattern is followed by commercial flights to Honolulu and Kahului, the two predominant destinations for aircraft leaving Keahole Airport. Commercial air tours, general aviation aircraft and military training flights may continue in a southerly direction after takeoff, and by flying over the project site, have a greater impact.

Historic and Archaeological Resources. Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological survey and field testing for the 'O'oma II coastal area in 1986, in conjunction with the EIS that was accepted as part of the petition to amend the Hawaii County General Plan that was approved by the Hawaii County Council (Ordinance No. 87-68; effective date June 23, 1987). PHRI followed this work up in 1990 by reviewing the archaeological work conducted previously on the project site. PHRI's 1986 report and 1990 review report are summarized below, and the 1990 review report is attached as Appendix A.

Six archaeological surveys have been done in coastal 'O'oma II:

1. A brief reconnaissance by Reinecke (1930);

2. An inventory of several known sites by the Department of Land and Natural Resources (DLNR) staff (1971-72);
3. An intensive survey of larger sites by Cordy (1975, 1981);
4. A reconnaissance survey 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 vicinity of Keahole Point (the four Kalaloa and two 'O'oma ahupua'a):

(1) Coastal Zone

Elevation 0-20 feet
0-150 feet from the shore
Low pahoe-hoe with some sand beaches
Some shoreline vegetation

(2) Barren or transitional zone

Elevation 20-430 feet
150 feet-1.5 miles from shore
Pahoe-hoe 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 transitional from koa haole and Christmas berry to large forest trees

The proposed seven-acre lagoon 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 with elevations ranging from 20 to 30 feet.

Coastal Zone. The coastal concentration of sites at 'O'oma II extends inland into a small portion of the barren zone. Fifteen permanent habitation site complexes were identified within the coastal zone. 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 is one large solitary structure in the coastal zone on the northern border of the project area that has been interpreted as a heiau (Site D15-18, discussed below).

Barren Zone. From the 20-foot elevation contour inland, the site density is extremely low. Sites consist of a few mauka-makai 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 'O'oma II ahupua'a is 1430 A.D. (Cordy, 1985). 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.

One large structure bordering the project site (D15-18) may be a heiau which operated at the community level for local and national purposes. There is record of Puhili, a high priest for 'O'oma 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 'O'omas and Kohanaiki were performed at the 'O'oma 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 interpreted as men's houses. These often have upright basalts, coral, or other remains associated with religion.

Site Identification. A total of 109 archaeological features at 42 sites have been recorded to date within Parcel 4.

Site Significance Assessment. The significance of cultural remains can be defined in terms of potential scientific research, interpretive and/or cultural value. Thirteen sites have been identified as important for information content, with further data collection necessary: D15-2, D15-17, T-61, T-71, T-48, D15-3, T-14, T-62, T-15, D15-1, D15-18, T-13, T-31. Of these sites, only D15-1 and D15-2 are in the vicinity of the proposed seven-acre lagoon (Figure 4). For four sites, further data collection would be sufficient treatment and no continued preservation would be necessary. Preservation with some level of interpretive development is recommended for three of the 13 sites assessed as significant additionally as good examples of site types and/or for cultural values, including site D15-1, while preservation with protection only ("as is") is recommended for six of these sites.

One site within the project area, D15-18, has been identified as having high cultural value as a religious structure. Two sites, T-13 and T-31, have been provisionally designated as requiring further data collection, pending further testing for the presence/absence of skeletal remains.

No further work or preservation in any form is needed for the remaining 29 sites which were assessed as significant for information content only, and for which sufficient data collection has been completed, including three sites in the vicinity of the proposed seven-acre lagoon; T-55, T-56, and, T-57 (Figure 4).

Impacts

Climate/Topography/Soils. Because of the extremely limited nature of the proposed project, there will be no significant impacts to the macro (or regional climate) or the micro (or site specific) climate. As mentioned above, approximately one cubic foot of spoils material will be removed from each test monitoring well, for a total of about 22 cubic feet of spoils material for the entire project. All spoils material will be returned to the source monitoring well and each well will be backfilled to original grade (with imported gravel if spoils material do not completely fill the test monitoring well). It is not anticipated that the removal of this amount of material will adversely impact the topography, soils or drainage of the site.

Flora and Fauna. No endangered species were identified during two surveys (conducted in 1986 and 1990). As such it is anticipated that the proposed project will not have significant impacts to flora or fauna, particularly because the area of the project site is dominated by scrub vegetation and bare lava.

Noise. It is probable that the portable compressor that will be transported to the project site will generate noise above existing background noise levels. However, the duration of this noise is expected to last less than one working day. While birds and other animals in the immediate vicinity of the compressor may react negatively to this noise, it is anticipated that such reactions would be temporary in nature. Since there are no residences within several miles of the project site, it is anticipated that the noise from the portable compressors will not have any significant impacts on humans.

Historic and Archaeological Resources. As discussed above, there are five archaeological sites in the vicinity of the proposed test monitoring wells. Of these five sites, three sites require no further data collection and are not recommended for further mitigative measures. Two sites require further data collection (D15-1, D15-2), with one site recommended for preservation with interpretive development (D15-1). Because of the large area (seven acres) available to drill the monitoring wells, a sufficient number of wells can be drilled without infringing on any of the five sites.

Mitigation Measures

Historic and Archaeological Sites. In order to insure that the five sites within the vicinity of the proposed project, it is recommended that prior to the commencement of drilling, each of the sites be clearly identified by PHRI.

IV. REFERENCES

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- Rosendahl, Paul H., Ph.D., Inc. Preliminary Report upon Completion of Field Work: Archaeological Survey and Testing. Ooma II Resort Project Area. Theresa K. Donham, Supervisory Archaeologist. 1986.
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APPENDIX A

ARCHAEOLOGICAL SURVEY UPDATE

Paul H. Rosendahl, Ph.D., Inc.



PHRI**Paul H. Rosendahl, Ph.D., Inc.***Archaeological • Historical • Cultural Resource Management Studies & Services*305 Mohouli Street • Hilo, Hawaii 96720 • (808) 969-1763 • FAX (808) 961-6998
P.O. Box 12835 • Tamuning, Guam 96911 • (671) 649-3045 • FAX (671) 649-2611

893-092690

September 26, 1990

Kahala Capital Corporation
75-5751 Kuakini Highway, Suite 201
Kailua-Kona, Hawaii 96740Attention: Ms. Toni Fortin
Vice President and Director of Hawaii OperationsSubject: *Status of Historic Preservation Concerns
Ooma II Project Area
Land of Ooma 2nd, North Kona District
Island of Hawaii (TMK:3-7-3-09:4)*

Dear Ms. Fortin:

At your request, Paul H. Rosendahl, Ph.D., Inc. (PHRI) has reviewed the archaeological work conducted previously in connection with the above subject project to provide you with a summary of the current status of historic preservation concerns. Our review is based primarily upon the following: (a) the final report on archaeological survey and testing conducted by PHRI in 1986 (Donham 1987); (b) various letters contained within PHRI project files relating to agency consultations and review of PHRI's 1986 work; and (c) a recent status check with the Department of Land and Natural Resources-Historic Preservation Program/State Historic Preservation Office (DLNR-HPP/SHPO).

In July 1986, PHRI conducted a program of archaeological survey and testing within the c. 314 ac Ooma II project area situated between the shoreline and the Mamalahoa Trail in the Land of Ooma 2nd, North Kona District, Island of Hawaii (TMK:3-7-3-09:4). The scope of this program, which was formulated in consultation with and approved by the Department of Land and Natural Resources/State Historic Preservation Office (DLNR/SHPO), consisted of a high intensity pedestrian reconnaissance (inventory-level) survey of the immediate coastal zone (shoreline to 300 m inland), and intensive survey (detailed recording with test excavations or controlled surface collections) of ten previously identified sites situated within the inland portion of the project area. Twenty-seven sites with 130 component features were newly identified during the reconnaissance survey phase, and 54 new features were found at previously recorded sites. These new findings resulted in a cumulative total of 74 sites with 279 component features identified to date within the project area.

Fifteen permanent habitation site complexes were identified within the coastal zone. Nine of these sites had been previously tested and temporal and functional interpretations offered (Cordy 1981). Thirty-four temporary habitation sites were also identified within the project area, in addition to four footpath segments, six possible burial sites, two shrines, and a high-walled enclosure. Volcanic glass hydration rind age determinations from 15 sites (69 age determinations) indicate a temporal range of AD 1430-1855 for habitation of sites within the project area.

Based on the findings of the 1986 PHRI survey and testing, additional archaeological work in the form of further data collection was recommended for 24 sites assessed as significant for their information content. For nine sites, further data collection was considered sufficient treatment and no continued preservation would be necessary. Preservation with some level of interpretive development was recommended for five of the 24 sites assessed as significant additionally as good examples of site types and/or for cultural values, while preservation with protection only ("as is") was recommended for ten of these sites assessed as significant additionally as good examples of site types and/or for potential cultural values as possible burial and/or religious sites. No further work or preservation in any form was recommended for the remaining 50 sites which were assessed as significant for information content only and for which sufficient data collection had been completed.

The Department of Land and Natural Resources-Historic Preservation Program/State Historic Preservation Office (DLNR-HPP/SHPO) reviewed and concurred with the general significance assessments and general mitigation treatments recommended by PHRI and summarized here (letter of 19 September 1986 to A. Lyman, Hawaii County Planning Department). A recent check with DLNR-HPP/SHPO confirmed that the general significance assessments have not changed.

Subsequent to completion of the survey and testing within the Ooma II project area, the configuration of the project area was modified by a land exchange made with the State of Hawaii. A section of approximately 83 ac on the north side of the project area was exchanged for a similar sized section on the inland end of the project area (see Figure 1, at end). This exchange results in the deletion of 32 sites from consideration with regards to further development. Table 1 (at end) summarizes general significance assessments and recommended general mitigation treatments for the 42 sites affected by the revised project area.

Based on the revision to the project area, additional archaeological work in the form of further data collection is needed for 13 sites assessed as significant for their information content. For four sites, further data collection would be sufficient treatment and no continued preservation would be necessary. Preservation with some level of interpretive development is recommended for three of the 13 sites assessed as significant additionally as good examples of site types and/or for cultural values, while preservation with protection only ("as is") is recommended for six of these sites assessed as significant additionally as good examples of site types and/or for potential cultural values as possible burial and/or religious sites. No further work or preservation in any form is needed for the remaining 29 sites which were assessed as significant for information content only and for which sufficient data collection had been completed.

While the recent check with DLNR-HPP/SHPO confirmed that the general significance assessments had not changed, it should be noted that requirements for dealing with possible burial sites have changed, due to recent amendments to State Historic Preservation law (Chapter 6E). Current DLNR-HPP/SHPO procedures now require consultation with the Hawaii Island Burial Council to determine treatment of any sites and features containing human burial remains. In-place preservation of confirmed burial sites and features is the treatment preferred by the Burial Council. Any proposed development involving the disinterment and reinterment of human burials would involve close negotiations with the Burial Council, which would be facilitated by having accomplished in advance (a) determination of the confirmed presence of any human burial remains at specific sites and features, and (b) a search for any individuals claiming to be direct lineal descendants of any such identified remains.

Based on the above, we would recommend that the feasibility of in-place preservation of all features potentially containing human burial remains be strongly considered. If appropriate, further archaeological testing to determine the definite presence or absence of human burial remains could be conducted to facilitate decisions regarding preservation or disinterment. Site and feature-specific mitigation treatments would then be modified as needed.

Please note that no further work needs to be done prior to a petition to the State Land Use Commission for a land use boundary amendment to change the portion of the revised project area presently designated as conservation lands. However, any supporting documentation submitted with such a petition would have to reflect the revised general significance assessments and recommended general mitigation treatments summarized in Table 1 (at end).

I hope this review of archaeological work conducted previously in connection with the subject project provides you with a summary of the current status of historic preservation concerns sufficient for your immediate needs. Should you have any questions or comments, please contact me at our main Hilo office (808/969-1763).

Sincerely yours,

Paul H. Rosendahl, Ph.D.
President and Principal Archaeologist

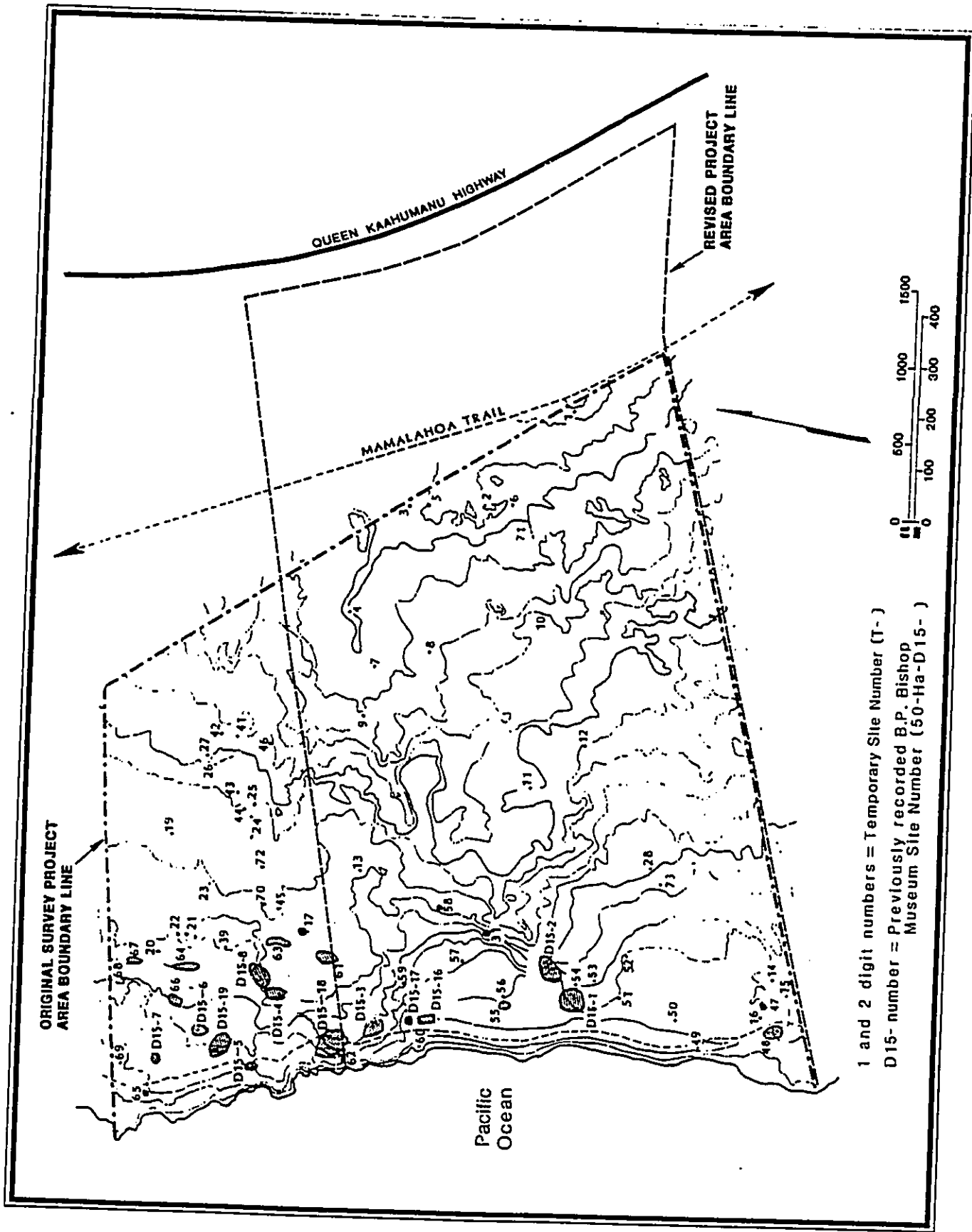
References Cited

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- 1981 A Study of Prehistoric Social Change: The Development of Complex Societies in the Hawaiian Islands. New York: Academic Press. (Virtually identical to author's 1978 Ph.D. dissertation [Anthropology, University of Hawaii], with addition of an epilogue.)

Donham, T.K.

- 1987 Archaeological Survey and Testing, Ooma II Resort Project Area, Land of Ooma II, North Kona, Island of Hawaii (TMK:3-7-3-09:4). PHRI Report 254-081286. Prepared for Helber, Hastert, Van Horn & Kimura (Honolulu). (April)



1 and 2 digit numbers = Temporary Site Number (T-)
D15- number = Previously recorded B.P. Bishop
Museum Site Number (50-Ha-D15-)

Figure 1. SITE LOCATION MAP - REVISED OOMA II PROJECT AREA

CORRECTION

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

References Cited

Cordy, R.H.

- 1981 A Study of Prehistoric Social Change: The Development of Complex Societies in the Hawaiian Islands. New York: Academic Press. (Virtually identical to author's 1978 Ph.D. dissertation [Anthropology, University of Hawaii], with addition of an epilogue.)

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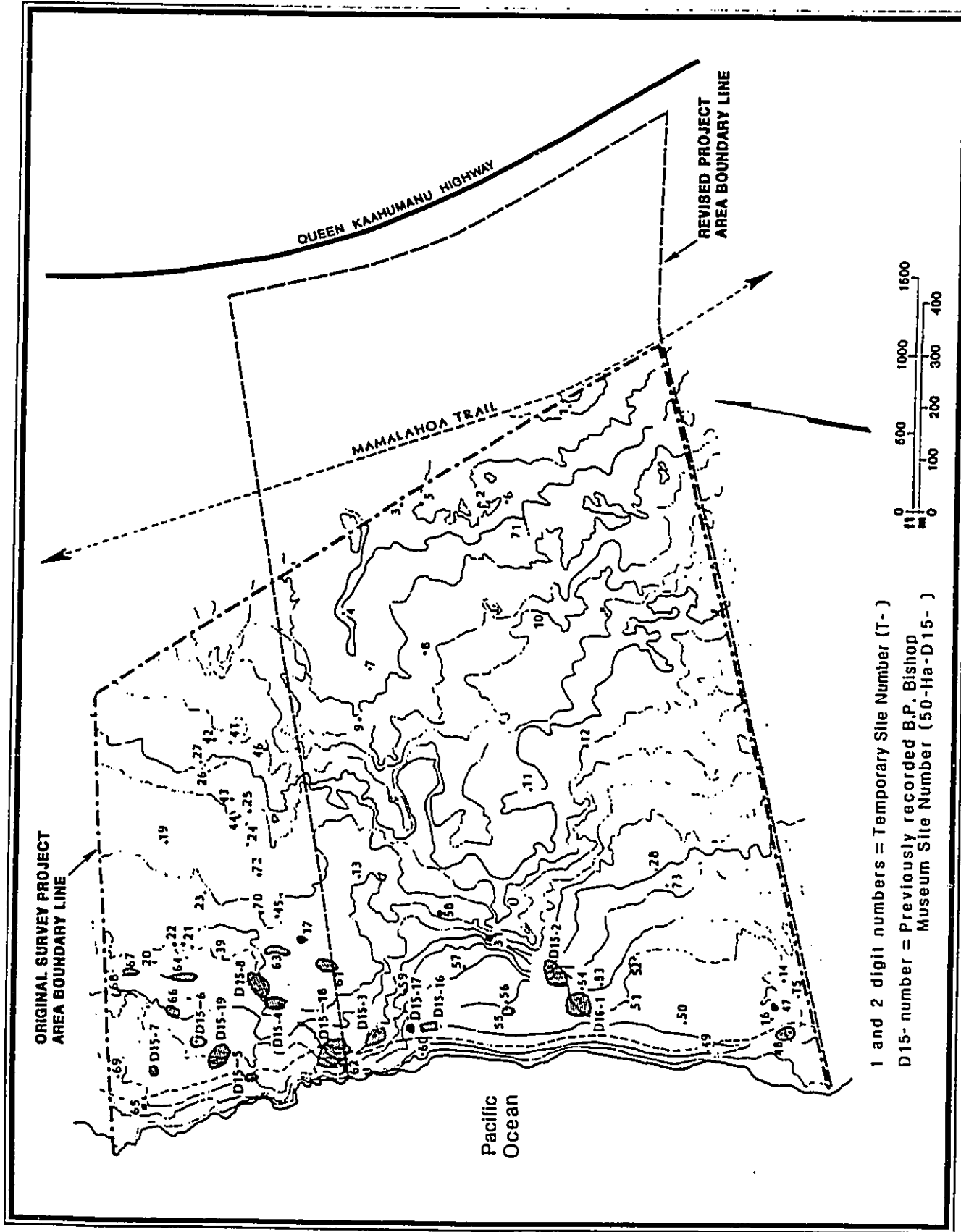


Figure 1. SITE LOCATION MAP - REVISED OOMA II PROJECT AREA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Table 1.

**SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS
AND RECOMMENDED GENERAL TREATMENTS
REVISED OOMA II PROJECT AREA**

Site/Fea. Number	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
D15-2	+	-	-	-	+	-	-	-
D15-17	+	-	-	-	+	-	-	-
T-61	+	-	-	-	+	-	-	-
T-71	+	-	-	-	+	-	-	-
Subtotal: 4	4	0	0	0	4	0	0	0
T-48	+	-	-	*	+	-	-	*
D15-3	+	-	-	*	+	-	-	*
T-14	+	-	-	*	+	-	-	*
T-62	+	-	-	*	+	-	-	*
Subtotal: 4	4	0	0	4	4	0	0	4
T-15	+	-	+	-	+	-	+	-
Subtotal: 1	1	0	1	0	1	0	1	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); and
- C = Culturally significant (PHRI=cultural value).

Recommended General Treatments:

- FDC = Further data collection necessary (further 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;
- 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.

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

Table 1. (cont.)

Site/Fea. Number	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NFW	PID	PAI
D15-1	+	-	+	+	+	-	+	-
D15-18	+	-	+	+	+	-	+	-
Subtotal: 2	4	0	2	2	2	0	2	0
T-13	+	-	-	+	*	-	-	+
T-31	+	-	-	+	*	-	-	+
Subtotal: 2	2	0	0	2	2	0	0	2
All others	-	+	-	-	-	+	-	-
Subtotal: 29	0	29	0	0	0	29	0	0
Total: 42	13	29	3	10	13	29	3	6