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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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Mr. Gary Gill, Director
Office of Environmental Quality Control
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

JUN 28 1995

Dear Mr. Gill,

Subject: Negative Declaration for the Mitchell Single Family Residence at Kiholo Bay, Hawaii

The Office of Conservation and Environmental Affairs has reviewed the comments received during the 30-day public comment period which began on May 8, 1995. The Office has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the next OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

Please contact Don Horiuchi at 587-0381 if there are any questions.

Very truly yours,

Roger C. Evans

Enc.

1995-07-08-HI-FEA- Mitchell Residence

JUL 8 1995

ENVIRONMENTAL ASSESSMENT

MITCHELL RESIDENCE

Accepting Agency:

Board of Land and Natural Resources
Department of Land and Natural Resources
State of Hawaii

June 1995

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ENVIRONMENTAL ASSESSMENT:
MITCHELL RESIDENCE

Project Location:	Kiholo, North Kona, Hawaii TMK: 7-1-02: 4 and 7
Accepting Agency:	Board of Land and Natural Resources Dept. of Land and Natural Resources State of Hawaii

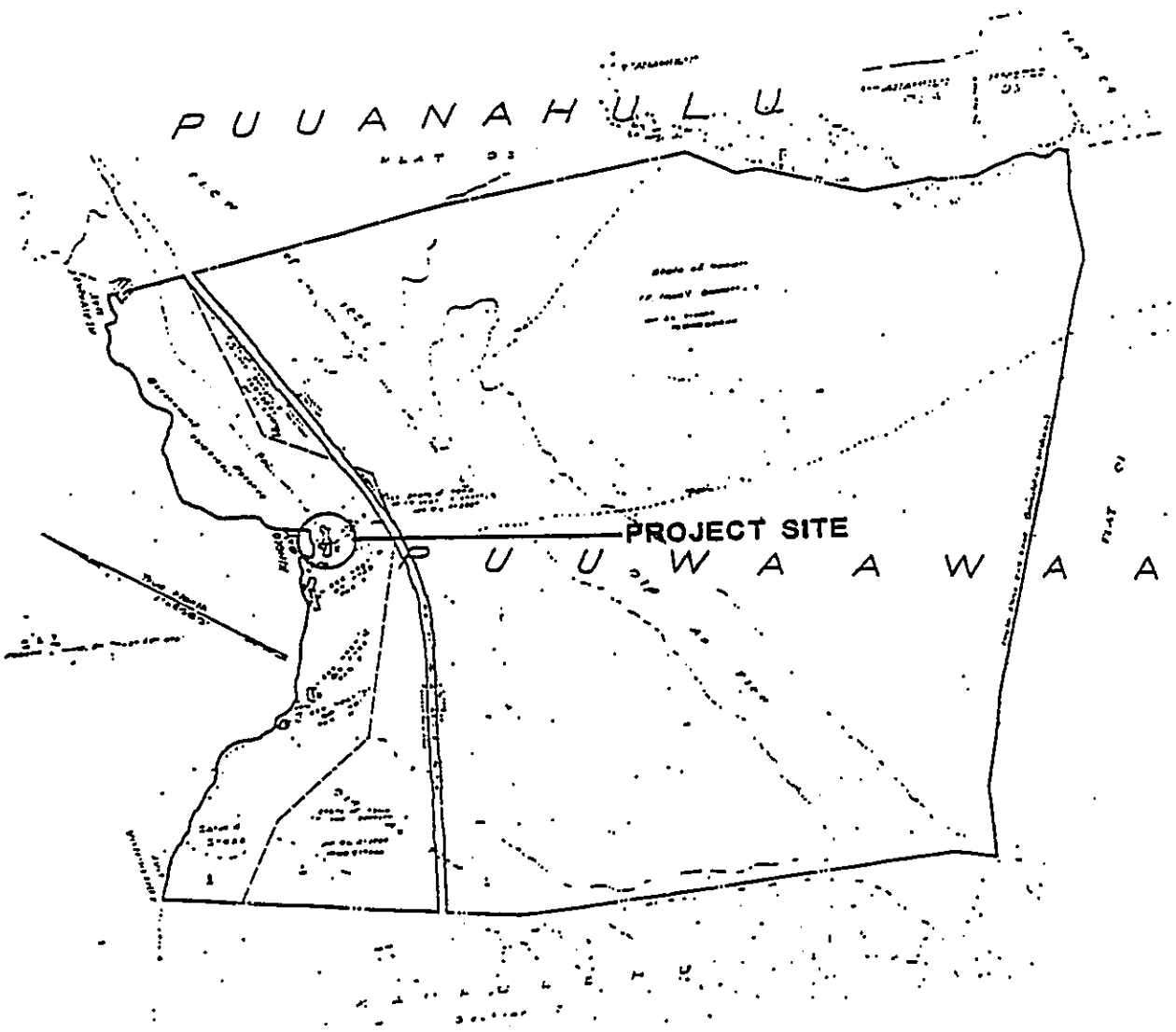

FIGURE 1 Location Map

ENVIRONMENTAL ASSESSMENT:
MITCHELL RESIDENCE

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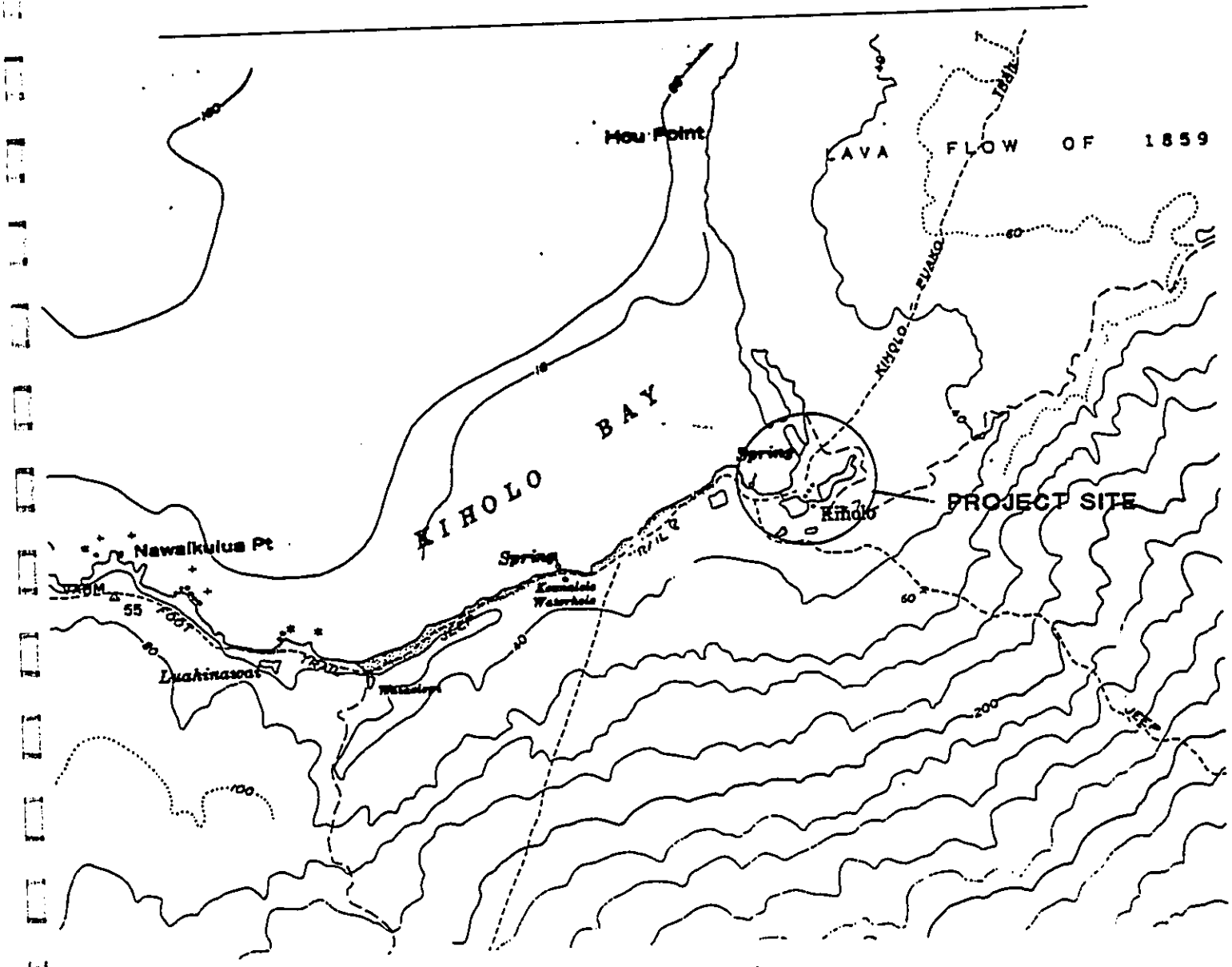

FIGURE 2 Project Location

I. INTRODUCTION AND PURPOSE

The Estate of the late Paul Mitchell proposes to construct a single family residence on lands at Kiholo Bay, North Kona on the island of Hawaii. The site as indicated in Figure 1, is comprised of TMK 7-1-02: 4 and 7 in the ahupua'a of Puuwaawaa, North Kona, Hawaii.

A Conservation District Use Application to permit use of Conservation lands owned by the Estate of the late Paul Mitchell is being sought.

Use of the lands will be for residential purposes. A single family residence is to be built for private use by Mr. Mitchell's son, Angus Mitchell. The residence will not be used for rental purposes. Year-round use is not contemplated at this time as Mr. Angus Mitchell's primary residence is on Oahu. The owner stands ready to accept by restrictable covenant the conditions imposed by the Board of Land and Natural Resources.

II. DESCRIPTION OF EXISTING CONDITIONS AND THE PROPOSED PROJECT

The site is located approximately 1/2-mile west of the Queen Kaahumanu Highway, in an area that is surrounded by lava fields. It is approximately ten miles north, and a 15-minute drive from the Keahole Airport.

Several private landholdings and residences are located in the immediate Kiholo Bay area. Access to the site is via an unpaved roadway leading directly from Queen Kaahumanu Highway. A system of locked gates separate access to the project site and other private parcels along the shoreline.

The proposed action will involve both parcels which are entirely within the Conservation District. A bungalow-style residence that incorporates a wood frame with post on concrete piers is proposed. The roof structure will be an open beam 2 x 6 cedar decking with possible solar resistant, waterproofing membrane to which Hardi shakes will be applied. The residence will be constructed on-site by local construction industry workers.

The residence will include a kitchen, living and toilet facilities, bedrooms and sitting room. The layout of the structure is as noted on accompanying plans. The plans also indicate locations of equipment that will be incorporated into the living system. Ceiling fans and energy efficient fluorescent lighting and appliances are proposed for this project. An electric generator will provide power to the lighting system and refrigerator. Solar energy will be used to provide a backup power supply for some of the electrical systems. A solar energy system will require a photovoltaic unit, rechargeable battery bank, and inverter for AC current. Solar paneling will be located on the roof of the residential structure.

Electrical power, solar energy, water catchment and spring water, and waste recycling techniques will supply the essential water, power and waste disposal requirements for habitation of the residence. The late Mr. Paul Mitchell is internationally known for his pioneering efforts in the development and use of solar power. His Team Mana La (Racing with the Sun) has competed with much success in an all-solar powered vehicle race in Australia.

The water supply system will consist of either a site water distillation/rain catchment system or an imported water system. For a site water distillation/rain catchment system, fresh spring water will be collected and processed through a solar powered distiller for drinking. The spring water will be filtered for shower and washing purposes. An imported water system will receive water that is trucked in from off-site. All water disposed will be processed through a gray-water system utilizing solar evaporating tray units. All gray-water disposal systems will be made in compliance to the Department of Health standards.

The wastewater system will be an aerobic system that has received State Regulatory approval. An aerobic system consists of three components: an aerobic treatment unit, a disinfection unit, and a disposal system. Disinfection of the effluents will be accomplished by either the manual application of chlorination tablets or the utilization of an ultraviolet unit and holding tank. Sewage disposal systems will be made in compliance to the Department of Health standards.

Self-contained composting toilets which utilize no water, chemicals or leaching are also proposed to be utilized for this project.

No site grading is proposed to be accomplished for the project. All existing pond areas and grounds will be unaltered by the proposed construction. The ponds will be left in a natural pristine state. Some scrub vegetation will be removed for the siting of the residence.

III. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The environment of the relatively remote site consists of kiawe thicket, pahoehoe outcroppings, coconut groves and two (2) large brackish water ponds.

A. Site - The site comprises two distinct parcels of land (TMK 7-1-02: 4 and 7) totalling 6.7 acres makai of the Queen Kaahumanu Highway in North Kona, Hawaii. It is located away from the shoreline of Kiholo Bay. The majority of the site, approximately 80%, consists of two large spring-fed brackish water ponds.

The site was previously a residential site with six to eight individual structures. The site is presently vacant with the exception of a single remaining structure and concrete housepads from the previous residential structures. Two foot-bridges span pond channels and provide the only access to the seaward portions of the site. These bridges will remain as the sole access to the makai portions of the site.

B. Topography - The site is generally flat with a few outcroppings of pahoehoe lava. The large brackish water ponds are at sea level with surrounding ground at slightly higher elevations. The highest elevations of the site are at the southern portion where pahoehoe outcroppings occur at 5.6 to 7.6 feet above mean sea level.

C. Existing Utilities - No water, sewer, electricity or drainage facilities exist for the immediate area of the project site.

D. Existing Flora - Site flora consists of the following exotic plant species:

Beach Heliotrope (*Messerschidia argentea*)
Ironwood (*Casuarina equisetifolia*)
Coconut Palm (*Cocos nucifera*)
Milo (*Thespesia populnea*)
Hau (*Hibiscus tiliaceus*)
Naupaka-kahakai (*Scaevola sericea*)
'aki'aki (*Sporobolus virginicus*)
Indian pluchea (*Pluchea odorata*)
Kiawe (*Prosopis pallida*)

The following aquatic species may be found in and around the ponds:

Turf Algae (*Cyanophytes*)
Widgeon Grass (*Ruppia maritima*)
Bullrush (*Scirpus validus*)
Sedge (*Cyperus*)

No endangered species of flora are known to exist on the site.

E. Existing Fauna - No birds were sighted during field surveys conducted on 9 February 1989 and 28 October 1994. However, it is reasonable to assume that at some time any of the bird species common to the island may visit the site. Such species would include mynah (*Acidotheras tristis*), house sparrow (*Passer domesticus*), house finch (*Cardodacus mexicanus frontalis*), cardinal (*Cardinalis cardinalis*), Japanese white-eye, (*Zosterops iaponica japonica*), barred dove (*Geopilia striata striata*) and lace-necked dove (*Streptopelia chinensis*).

Mammals such as mongoose (*Herpestes auropunctatis*), mice (*Mus musculus*), and rats (*Rattus rattus*, *R. norvegicus*, and *R. exulans*) although not observed, probably visit the site.

Three adult green sea turtles (*Chelonia mydas*) were observed during a marine biology survey in February 1989. The project biologist theorized that these animals may be permanent pond residents. Other coastal pond fauna are identified in Table 5 of the *Baseline Marine and Coastal Pond Surveys, Kiholo Bay, South Kohala, Island of Hawaii* which is included as Appendix A.

F. Archaeological/Historical Sites - It has been determined that the seaward boundary of the private property is well away from the Ala Kahakai Trail System and the "Kiholo-Puako Trail" which is on Hawaii's Register of Historic Places. Na Ala Hele has requested that the Historic Preservation Program be notified should remains of the portion of the Kiholo-Puako Trail which extends from Kiholo Bay to Huehue Ranch be located as clearing and grubbing work proceeds at the project site. No other sites of archaeological or historical significance are known to exist on the subject property. However, as noted in the archaeological report, the potential for archaeological recovery of subsurface materials is good (see Appendix B). Present plans do not indicate disturbance of the subsurface through construction activity.

IV. RELATIONSHIP OF THE PROPOSED PROJECT TO LAND USE PLANS, POLICIES AND CONTROLS FOR THE AREA

State Land Use District

The property is within the State Land Use Conservation District, Resource Subzone H-6, Kiholo, Hawaii. The objective of this subzone is to properly manage areas of development to ensure the sustained use of natural resources in those areas.

Hawaii County General Plan and Zoning

The County of Hawaii Zone Map designates the project site as "open district" (O). The *General Plan Land Use Pattern Allocation Guide Map (and Revision, April 1987)* designates the site as "open."

The proposed residence is generally consistent with all land use plans, policies and controls for the area. Residential use within the State Conservation District will be a conditional use as defined by Title 13, Chapter 2 of the Administrative Rules of the Department of Land and Natural Resources, State of Hawaii.

V. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATIVE MEASURES

As a function of this Environmental Assessment report, the potential environmental impacts on the site by the proposed improvements were evaluated. A key factor in the evaluation process was the character and ultimate form of the proposed development. Firstly, the single residence will ultimately stand on a combined site where six to eight residences once existed. Secondly, the development proposes to be almost totally self-contained, thereby requiring little or no power and water from outside sources, and discharging no sewerage or wastewater into the ground.

The following paragraphs identify the potential environmental impacts associated with the proposed project.

A. Noise - The introduction of noise on the site is attributed to short-term construction activities, and to long-term and permanent functions of residential use. Construction related noise is typically predictable and related to equipment, building and site work. While the County of Hawaii has no noise control ordinance, construction noise is typically tolerable due to its short duration, and is usually easily mitigated through control of construction activity and limitation of work to daytime hours.

   The anticipated level of noise is further mitigated by the nature of the proposed construction. For the single family residence, no heavy construction equipment is expected to be used. To mitigate potential construction noise sources, construction equipment and machinery will be equipped with proper noise attenuating devices such as mufflers. In addition, equipment and machinery will be properly maintained to minimize noise levels at the site. Occasional occupation of the single family residence is not expected to require noise abatement.

B. Traffic - The effect of traffic on the site and the immediately surrounding environment is expected to be minimal. Construction activities are expected to generate traffic on roadways leading to the site and at the site on a temporary basis during the construction period. Use of the residence is expected to be periodic and not on a constant basis; therefore, the level of traffic generated by occupation of the residence will be intermittent and light. Traffic to the site will consist of private vehicles only.

C. Physical Geography - The natural topography of the site will not be altered. Consequently, no mitigative measures are warranted. On-site drainage will follow a natural course.

D. Flora and Fauna - No endangered flora or fauna species are believed to exist on the site. Localized fauna such as birds are not expected to be affected by the proposed improvements.

   Some landscaping at the site will probably be accomplished. A direct impact of this will be an increase in the flora diversity and wildlife habitats at the site.

E. Air Quality - No significant impacts to air quality are expected to result from the proposed use of the site. Residential uses at the site are not expected to generate significant levels of fugitive dust or pollutant air emissions. Although construction equipment has the potential to generate pollutant emissions, the impacts are not considered to be significant due to the temporary nature of construction. In addition, bare earth areas on the site are pahoehoe lava or stony coral material; therefore, there is little potential for the generation of fugitive dust.

F. Socio-economic - No significantly adverse socio-economic impacts are expected to result from the construction of one single family residence.

G. Visual - The immediate visual impact of the improvements would be the appearance of new development. The construction of a new residence and landscaping at the site will be an improvement over the existing appearance of deteriorating structures on the site. Furthermore, the single family structure currently proposed is modest in size compared to other residences constructed on adjacent properties.

H. Services and Facilities - No adverse impacts to the demand for public services and facilities are anticipated to occur as a result of the proposed improvements. No public services and facilities will be required for the proposed project.

VI. ALTERNATIVES TO THE PROPOSED ACTION

No alternative use other than residential use has been contemplated by Mr. Angus Mitchell for the site. Mr. Angus Mitchell does not propose to use the residence for rental or commercial uses.

Alternatives to the proposed improvements were those relating to the construction of additional units. However, Mr. Angus Mitchell no longer wants to construct the type of structures initially proposed by the late Mr. Paul Mitchell. In this regard, the current proposal is for a more modest development by comparison.

VII. FINDINGS

The nature and type of uses proposed by the applicant pose only minor impacts. The benign use of the site represents a significant chapter in environmentally conscious residential construction. Consequently, this Environmental Impact Assessment notes the absence of significant adverse impacts.

It the finding of this Environmental Assessment, that an Environmental Impact Statement (ElS) for the proposed action is not necessary.

VIII. LIST OF AGENCIES CONSULTED

Federal Agencies

U.S. Department of the Interior, Fish & Wildlife Service
U.S. Environmental Protection Agency, Region IX
Western Pacific Regional Fishery Management Council
National Marine Fisheries Service

State Agencies

Department of Business, Economic Development & Tourism
Department of Health, Clean Air Branch
Department of Health, Clean Water Branch
Department of Health, Noise & Radiation Branch
Department of Land & Natural Resources
Department of Land & Natural Resources, Division of Aquatic Resources
Department of Land & Natural Resources, Conservation & Resources Enforcement
Department of Land & Natural Resources, Division of Forestry & Wildlife
Department of Land & Natural Resources, Historic Preservation Division
Department of Land & Natural Resources, Land Management
Department of Land & Natural Resources, State Parks
Department of Land & Natural Resources, Water Resource Management
Department of Transportation
Office of State Planning, Coastal Zone Management Program

County Agencies

County of Hawaii, Planning Department

App A. Marine

APPENDIX A

Baseline Marine and Coastal Pond Surveys

Brewer/Brandman Associates

Environmental Research • Planning and Processing • Resources Management

BASELINE MARINE AND COASTAL POND SURVEYS
KIHOLO BAY, SOUTH KOHALA
ISLAND OF HAWAII

prepared for

Wil Chee - Planning
Ala Moana Pacific Center, Suite 830
1585 Kapiolani Blvd.
Honolulu, Hawaii

May 1989

CONTENTS

FIGURES AND TABLES

SECTION 1.0
INTRODUCTION

1.1 Scope of Services

The scope of services for the proposed project was developed to provide a baseline assessment of water quality parameters, and marine and coastal pond biological resources associated with the development of a private residence at Kiholo Bay, Island of Hawaii (Figure 1). The specific scope of services included the following:

- Qualitative underwater biological surveys encompassing nearshore marine waters and coastal ponds environments occurring within the project site;
- Assessment of represented coral, algae, fish and macroinvertebrates;
- Qualitative surveys of intertidal flora and fauna at representative coastal locations;
- Physical-chemical characterization of coastal pond and nearshore environments (temperature, salinity, dissolved oxygen); and,
- Preparation of a baseline environmental survey report including an impact assessment, recommendations and conclusion section.

1.2 Site Description

Kiholo Bay is located in the South Kohala District, roughly half way between Keahole Point and Kawaihae Harbor (Figure 1). The Kona or west coast of Hawaii Island extends from the district of South Kohala in the north to Ka'u in the south. Between South Kohala and Keahole Point, the coastline fringes a shallow bight. This bight is underlain by a narrow shelf sloping from the coastline to depths of more than 100 meters within a short distance from shore. Four principal open ocean bays, Puako, Waiulua, 'Anaeho'omalu, and Kiholo, are located within this bight. The coastline consists of a series of open ocean bays dissected from, and lying between, relatively recent basaltic lava flows of the Mauna Loa series.

Dominant wave direction is from the north, but the coast is variously exposed to the effects of wave energy, ranging from minimal exposure on the north at Puako to maximal exposure on the south at Kiholo (Kay, *et al*, 1977). The varying exposure of the

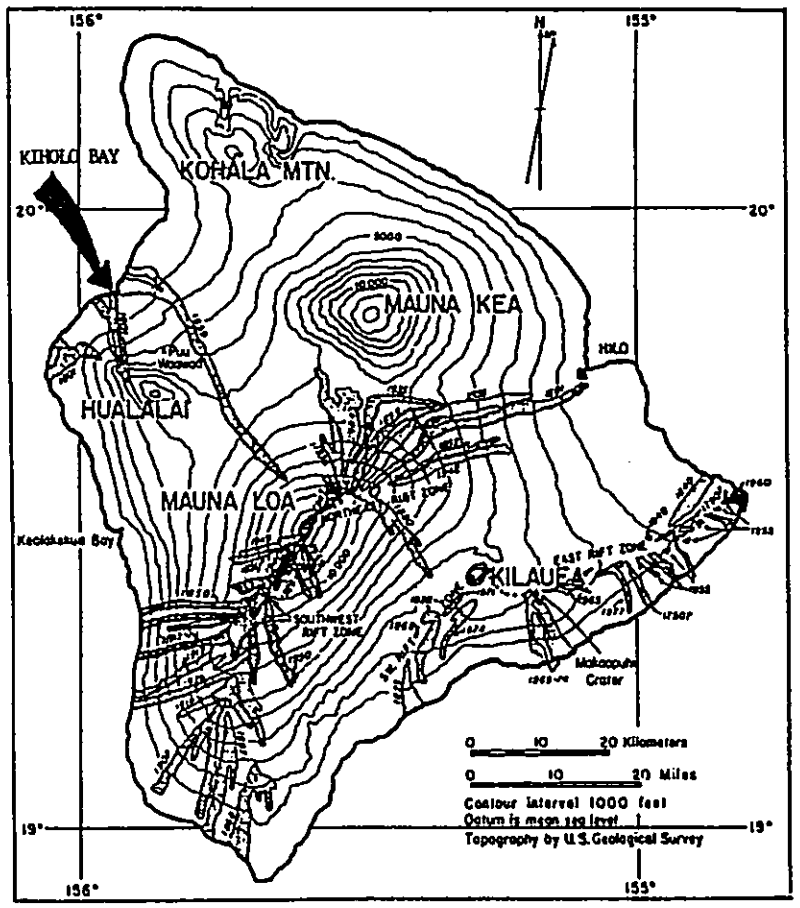

Figure 1. Location of Kiholo Bay on Hawaii

coastline greatly contributes to its topographical diversity. The leeward coast of Hawaii is protected from Hawaii's dominant northeast trade winds by high mountains and, at the same time, has been subject to the often catastrophic effects of lava flows and tsunamis. The Kona coast's mauka regions are generally barren and are crossed by lava flows dating from prehistoric times to those formed by the eruption of Mauna Loa in 1950. Rainfall is less than 30 cm (12 inches) a year. There are no surface streams on the Kona coast, though substantial groundwater flows express themselves as ponds and springs along the shoreline.

SECTION 2.0

METHODS

2.1 Physical-Chemical Measurements

Salinity and temperature measurements were made with a Yellow Springs Instrument Company (YSI) S-C-T meter equipped with a YSI Model 3300 nickel-platinum conductivity and temperature probe. Except for offshore sampling, all measurements were based on *in situ* readings from the shoreline or from an inflatable boat. Offshore samples were collected in a 500 milliliter (ml) Nalgene bottle and transported immediately to shore for analysis. Based on manufacturer-supplied data, worst-case possible instrument and probe (combined) error for temperature and salinity are ±0.7 degrees Centigrade (°C) and ±0.2 parts per thousand (ppt), respectively. Owing to the efflux of brackish groundwater in the nearshore zone, readings were made by *averaging* meter oscillations at some stations.

Dissolved oxygen measurements were obtained using a YSI Model 51B dissolved oxygen meter equipped with a YSI Model 5739 pressure-compensated, polarographic sensor. The instrument was calibrated according to factory guidelines in a water vapor saturated chamber. Measurements were based on *in situ* readings, except for offshore samples which were collected in 500 ml Nalgene bottles and returned immediately to shore for analysis. This method of sample collection may have influenced offshore dissolved oxygen readings to some degree. Comparison of intertidal *in situ* versus intertidal *in vitro* readings did not disclose any significant differences other than that attributable to brackish groundwater discharges. Manufacturer's data indicate a probable error accumulation (maximum worst-case situation) of ±0.52 parts per million (ppm).

Water quality sampling stations were established by use of aerial photographs, preliminary field surveys, and logistical considerations (wave action). These stations were selected to reflect representative nearshore, intertidal, and coastal pond environments (Figure 2).

2.2 Biological Surveys

2.2.1 Nearshore Marine Environment

Biological surveys with mask and snorkel apparatus were used to assess qualitatively the major physiographic features, biological zonations patterns, and benthic assemblages occurring throughout the study area. Underwater surveys were limited to a depth of approximately 2 meters, which was the maximum depth recorded in nearshore waters of Kiholo Bay. No attempt was made

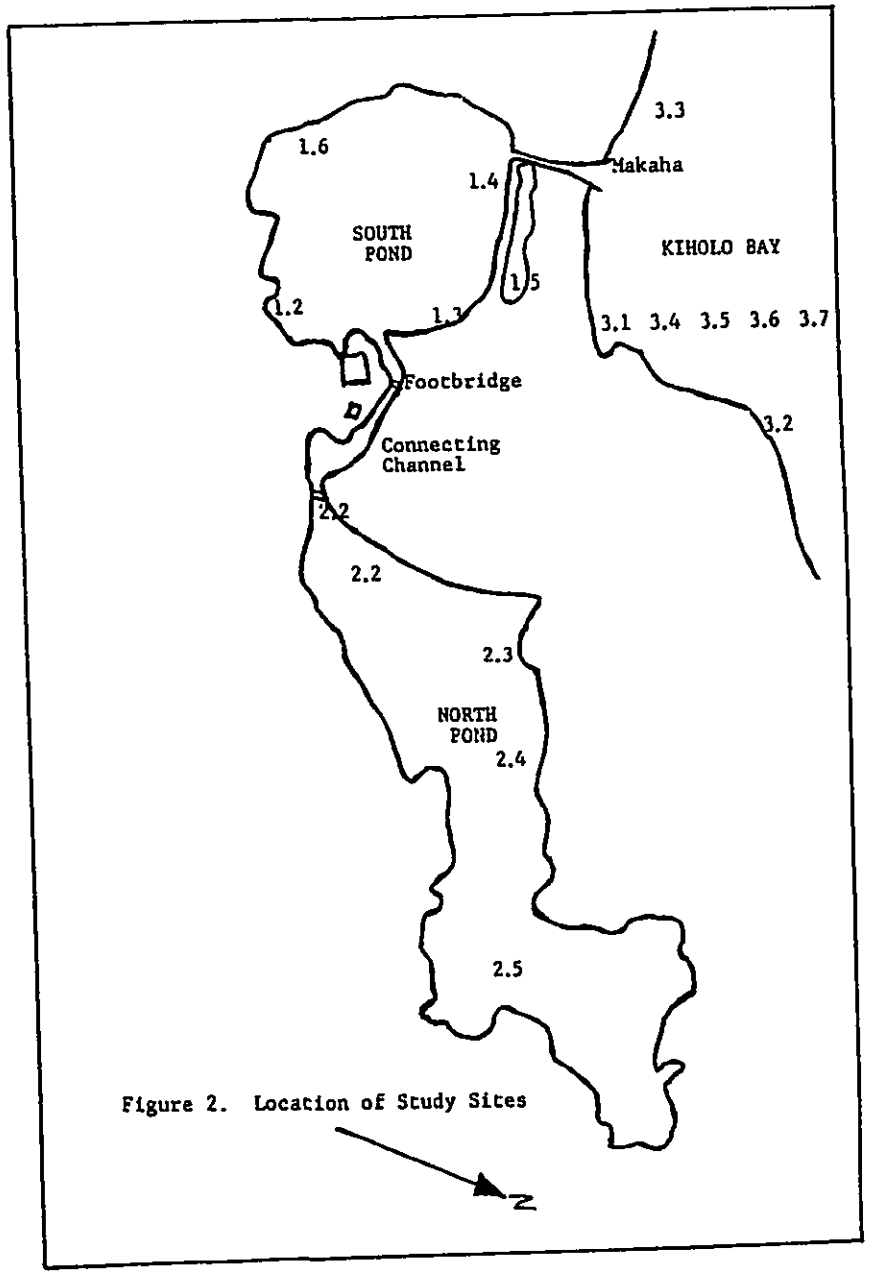

Figure 2. Location of Study Sites

to identify or enumerate cryptic species dwelling within the reef. All observations were recorded on waterproof Polypaper sheets and supplemented by underwater photographs utilizing a Nikonos II underwater camera. About 2.5 hours were spent in underwater surveys within Kiholo Bay.

Tides ranged from 0 to +1.2 feet during the diurnal surveys, which occurred between February 21 and 22, 1989. Surveys conducted during extreme high tide periods and at night would likely have accounted for additional species.

Macrothallic algae and coral coverage was determined by visual estimates of abundance or percent coverage.

Identification and enumeration of benthic macroinvertebrates were limited to individuals exceeding 2.0 centimeters (cm) in body length. Certain especially numerous, albeit smaller, invertebrates were occasionally recorded. Counts or population density estimates of certain benthic invertebrates were made with either a stainless steel grid of 0.25 square meter (m^2) or an aluminum meter stick which was used to lay out crude 0.25 or 1 m^2-quadrants. Rocks were turned over occasionally in an effort to identify cryptic species.

Fish identification and abundance estimates were made by the diver recording all species sighted during the underwater surveys. Rough counts of fishes were tabulated on Polypaper sheets, upon which a listing of the more common nearshore reef fishes expected to occur in the area had been previously typed. This permitted more time for observations and less time for data recording.

Semi-quantitative estimates of fish abundance were made using the following criteria for numbers of individuals sighted in a 30-minute period:

- Abundant = more than 50 individuals sighted;
- Common = 10 to 20 individuals sighted;
- Few = 2 to 9 individuals sighted; and,
- Rare = only 1 individual sighted.

This census method is based upon the premise that more abundant species will be encountered first and more frequently during a specified time interval. Fish assemblages were censused at several depths, which reflected different habitat types.

The sampling stations within Kiholo Bay were all influenced by low-salinity groundwater discharges. These cool, slightly brackish waters float atop and mix with the denser nearshore water, creating a schlieren effect which significantly restricted underwater visibility in most areas. This factor posed a visual impediment in all areas surveyed and likely accounted for some species being omitted from the data record. Similarly, prevailing wave action curtailed surveys in some areas and

prevented a complete reconnaissance of the more wave-exposed inshore areas bordering the project site. However, sufficient data were collected to determine the major physical and biological features of the nearshore environment.

The intertidal zone on all prominent rocky headlands and beach areas was censused on foot during a single low-tide period. Macroscopic organisms were identified in the field and rough estimates of population sizes were noted.

2.2.2 Coastal Pond Environments

The two ponds occurring within the project site were surveyed qualitatively using mask and snorkel apparatus. Representative cross-sections of each pond were selected for detailed benthic invertebrate analysis.

Invertebrate surveys were limited generally to pond shorelines characterized by consolidated benthic sediments and exposed rock strata. The bottom surface area of both ponds was dominated by a deep, unconsolidated organic substratum. The bottom would not support the weight of the investigator, was subject to zero-visibility conditions upon slight disturbance, and could not be adequately censused. However, given the prevailing anoxic conditions associated with such areas, the invertebrate fauna is not likely to be significant. The presence of sea turtles in both ponds also posed a problem. They tended to swim ahead of the diver, producing zero-visibility conditions.

Representative biota were recorded on waterproof Polypaper sheets. When conditions permitted, written records were supplemented by underwater photographs.

SECTION 3.0

RESULTS

3.1 Water Quality Surveys

The results of water quality analyses suggested that both the North and South Ponds are density and temperature stratified euryhaline coastal ponds (Tables 1, 2 and 3).

3.1.1 North Pond

North Pond demonstrated a nearly transparent, cool (21.6 to 22.6 °C), slightly brackish (1.5 to 3.1 ppt) surface lens about 25 centimeters (cm) thick. As noted in Table 1, the surface layer throughout the pond was characterized by a salinity of 1.5 to 1.6 ppt, with slight mixing occurring in a shallow area near the discharge channel leading into South Pond (Table 1, Station 2.2). Dissolved oxygen values ranged between 7.42 and 8.18 ppm (86.3 to 95.1 percent of saturation).

A pronounced density and temperature boundary layer separates the brackish surface layer from the underlying higher salinity waters. The deeper waters are distinguished by higher temperatures (24.5 to 25.7 °C) and salinities (10.2 to 14.9 ppt) and demonstrated a pronounced translucent quality as contrasted with the transparency of the surface layer. Midwater samples had a dissolved oxygen range of 4.64 to 6.88 ppm. These midwaters reflect the higher density bottom water and the influence of an anaerobic benthic substratum. An unconsolidated benthic organic substratum dominates most of the pond's benthic surface area. Within the top few centimeters of the benthic mat, dissolved oxygen levels are low to anoxic (0 to 1.1 ppm). All samples within deeper portions of this organic substratum were anoxic.

No distinct point-source fresh or brackish water discharge was evident, with incoming groundwaters apparently of a diffuse, non-point character. Pond depths averaged about 1.0 meter, except near the exit to South Pond. As with most coastal and anchialine ponds, water depths varied as a function of the tidal period. A range of approximately 16 cm was observed during the field surveys.

Water efflux averaged 12.9 cubic feet/second (cfs) (range, 11.4 to 13.9 cfs) at a site roughly midway between North Pond and South Pond (site of an existing foot bridge).

Table 1. Water Quality Parameters, North Pond. Temperature, salinity and dissolved oxygen levels were measured for surface, mid-water and just off the bottom for five locations.

Station #	Date	Time	Depth (m)	Temp. (°C)	Sal. (ppt)	Dis. Oxy. (ppm)
2.1	2/21/89	1418	0.05	21.8	1.5	7.42
	"	1418	1.0	24.5	12.0	5.95
	"	1418	1.3	25.1	14.0	0.00
2.2	"	1423	0.05	22.6	3.1	7.45
	"	1423	0.90	25.5	14.5	4.64
	"	1423	1.2	25.5	14.0	1.10
2.3	"	1430	0.05	21.7	1.6	8.18
	"	1430	0.80	25.5	11.0	6.88
	"	1430	1.2	25.6	14.9	0.05
2.4	"	1435	0.05	22.5	1.6	7.43
	"	1435	0.60	25.3	10.2	6.27
2.5	"	1443	0.05	21.6	1.5	7.45
	"	1443	0.70	25.5	12.4	6.31
	"	1443	1.10	25.7	13.8	0.0

3.1.2 South Pond

South Pond demonstrated similar physical characteristics to North Pond, but prevailing salinities were higher, ranging from 3.1 to 5.0 ppt (Table 2, Stations 1.2, 1.3, 1.4, 1.6). Surface temperatures ranged from 21.3 to 23.9 °C as a function of sampling time, with slightly higher temperatures evident during afternoon sampling periods. Dissolved oxygen values in the surface layer ranged from 5.8 to 7.82 ppm, with a slightly higher value (8.05 ppm) recorded within a narrow, shallow, finger-like embayment off the main pond (Station 1.5). These dissolved oxygen values correspond to 67, 91 and 93.6 percent of saturation, respectively.

Salinities were higher beneath the shallow, low-salinity surface layer than in North Pond, with a range of 12.0 to 19.6 ppt recorded between morning low tide and afternoon high tide periods. This may reflect the closer proximity of South Pond to the shoreline of Kiholo Bay and the presence of a drainage canal,

Table 2. Water Quality Parameters, South Pond. Temperature, salinity and dissolved oxygen levels were measured for surface, mid-water and just off the bottom for six locations.

Station #	Date	Time	Depth (m)	Temp. (°C)	Sal. (ppt)	Dis. Oxy (ppm)
1.1	2/21/89	1012	0.05	22.0	4.3	7.82
		1012	0.60	24.2	18.5	5.65
		1013	1.20	25.0	19.6	0.72
		1013	1.40	25.1	19.9	0.00
		1453	0.05	23.7	3.1	5.80
		1453	0.50	26.0	12.0	9.05
1.2	"	1020	0.10	21.3	5.0	5.36
		1020	0.50	24.3	18.0	4.31
		1020	0.80	25.1	19.2	0.00
1.3	"	1035	0.10	21.5	3.6	7.43
		1035	0.60	22.9	19.6	7.98
1.4	"	1045	0.10	21.6	4.2	7.60
	"	1045	0.50	21.9	4.9	7.95
	"	1530	0.05	23.9	3.5	7.65
	"	1530	0.30	24.0	5.8	7.75
1.5	"	1103	0.05	25.8	7.4	8.05
1.6	"	1108	0.35	23.0	4.0	6.95

which leads directly from South Pond to the ocean. During high tide periods nearshore waters would likely enter the pond (though ocean to pond drainage was not observed during the study period).

A large portion of South Pond, like North Pond, is dominated by very deep, soft, unconsolidated, organic bottom deposits. Dissolved oxygen values within this material were zero throughout the pond.

Water quality associated with the narrow, rock-lined channel which connects the two ponds, showed less surface to bottom variability than either North or South Ponds. The channel waters reflect the mixing associated gradient between the two ponds. However, subsurface groundwater discharged within the channel contributed to a small, but discernible surface to bottom density and temperature gradient (Table 3). Temperatures ranged

Table 3. Water Quality Parameters, Bridge Crossing. Temperature, salinity and dissolved oxygen levels were measured for surface, mid-water and just off the bottom for the Channel connecting North Pond and South Pond from mid-morning until mid-afternoon.

Station #	Date	Time	Depth (m)	Temp. (°C)	Sal. (ppt)	Dis. Oxy. (ppm)
Bridge	2/21/89	0940	0.10	21.5	3.9	8.05
	"	0940	0.40	21.5	3.9	8.05
	"	1125	0.10	22.0	4.2	6.95
	"	1124	0.40	22.4	4.5	6.95
	"	1207	0.10	22.2	4.0	7.40
	"	1207	0.40	23.1	4.3	6.90
	"	1403	0.10	22.5	3.5	8.05
	"	1403	0.40	23.9	4.5	8.65
	"	1600	0.10	22.5	3.6	7.95
	"	1600	0.40	23.9	4.0	8.40

from 21.5 to 23.9 °C as a function of depth and sampling period. Afternoon temperatures averaged about 1.0 °C higher than morning temperatures. Salinities ranged from 3.9 to 4.5 ppt. Unlike the adjacent pond environments, this narrow, well flushed channel had a compacted sand and gravel substratum.

Water efflux from South Pond averaged about 39.0 cfs (range, 36.3 to 41.2 cfs) in the vicinity of the makaha, outlet to the ocean.

No detectable water currents were associated with either pond during early morning (windless) periods. A small but discernible wind-driven west to east surface fetch was detectable in more open areas of South Pond during the afternoons of February 21st and 22nd. Improvised surface drogues demonstrated current velocities ranging from near zero to no more than 1.2 cm/second.

3.1.3 Kiholo Bay

Nearshore waters of Kiholo Bay are influenced heavily by basal groundwater discharges. Prevailing temperatures are, therefore, cool (mean, 23.9 °C) in relation to adjacent offshore waters and salinities are low (mean, 18.2 ppt); roughly half that of truly oceanic waters in Hawaii (Table 4).

There was a discernible pattern of increasing temperature and salinity moving from inshore to offshore stations, though all stations demonstrated the influence of brackish groundwater discharges. The effect of groundwater discharges on nearshore water quality parameters is best exemplified in the salinity data (Table 4). Salinity values ranged from 15.5 to 22.0 ppt as a function of distance from shore and correspond to about 44 to 65 percent, respectively, of normal ocean water, which seasonally averages about 34 ppt in offshore Hawaiian waters.

Dissolved oxygen values were indicative of ample mixing associated with moderate inshore wave action and ranged from 7.2 to 7.7 ppm, or between 94 and 100 percent of saturation.

Table 4. Water Quality Parameters, Kiholo Bay. Temperature, salinity and dissolved oxygen levels were measured for seven nearshore locations of varying depth.

Station #	Date	Time	Depth (m)	Temp. (°C)	Sal. (ppt)	Dis. Oxy. (ppm)
3.1	2/22/89	0930	0.8	23.8	15.5	7.6
3.2	"	0945	0.5	23.8	16.3	7.7
3.3	"	0952	1.2	23.9	17.7	7.6
3.4	"	0959	1.5	23.9	16.6	7.6
3.5	"	1005	1.4	23.8	18.1	7.4
3.6	"	1018	1.6	24.0	21.0	7.2
3.7	"	1029	1.3	24.0	22.0	7.6

3.2 Biological Surveys

3.2.1 North Pond

The flora and fauna of North Pond can be characterized as one of low biological diversity, and with few exceptions, low population density, a feature characteristic of most anchialine and open coastal ponds on Hawaii's west coast. Contributing to the low diversity and density is the extensive anaerobic organic substratum which characterizes the North Pond.

3.2.1.1 Flora

Aquatic algae were sparse, being limited to areas of exposed rock and consolidated bottom sediments. Two species of unidentified blue-green turf algae (cyanophytes) were found on submerged rocks.

Well cropped stands of the brackish water monocotyledon *Ruppia maritima* (widgeon grass) were common along the extreme south side of the pond where firm, consolidated bottom sediments occur. These stands appeared to be feeding areas for three adult green sea turtles which occur in the pond. Sea turtles may be responsible for the cropped appearance of this plant.

Emergent vegetation had a patchy distribution around the pond perimeter and was composed of dense stands of the bulrush *Scirpus validus* and occasional pockets of *Cyperus* (a sedge).

Riparian vegetation was dominated by a mixed assortment of terrestrial exotic and native coastal strand species including: kiawe (*Prosopis pallida*); Indian pluchea (*Pluchea odorata*); 'aki'aki (*Sporobolus virginicus*); naupaka-kahakai (*Scaevola sericea*); milo (*Thespesia populnea*); hau (*Hibiscus tiliaceus*); coconut palm (*Cocos nucifera*); and, ironwood (*Casuarina equisetifolia*).

3.2.1.2 Fauna

Three adult green sea turtles (*Chelonia mydas*) were observed over a three day period and may represent permanent pond residents. The number of turtles and their size was surprising, given the limited forage that is available.

The ichthyofauna was comprised of six (6) species, including: barracuda (*Sphyraena barracuda*); mullet (*Mugil cephalus*); papio (*Caranx* sp.); goatfish (*Mulloides flavolineatus*); aholehole (*Kuhlia sandvicensis*); and, an unidentified burrowing goby ('o'opu) (Table 5). Aholehole and 'o'opu were the most common species; the latter occurring in densities of 4 to 11/m^2 in areas characterized by soft bottom sediments. Aholehole were common around the perimeter of the pond, where overhanging terrestrial vegetation and emergent plants provided protective habitat.

Table 5. Coastal Pond Flora and Fauna, Kiholo Bay.

DIVISION GENUS/SPECIES	COMMON NAME	NORTH POND	SOUTH POND	CHANNEL
CYANOPHYTA (BLUE-GREEN ALGAE)		X	X	X
unident. blue-green	-	-	X	X
MONOCOTYLEDON		-	-	X
Ruppia maritima	widgeon grass			
		X	X	X
REPTILIA (REPTILES)		X	X	X
Chelonia mydas	green sea turtle	X	X	X
OSTEICHTHYES (FISHES)				
Sphyraena barracuda	barracuda	-	X	X
Caranx sp.	papio	X	X	X
Mugil cephalus	mullet	X	X	X
Acanthurus triostegus	manini	-	X	-
Kuhlia sandvicensis	aholehole	X	X	X
Mulloides flavolineatus	goatfish	-	X	X
unident. burrowing goby	oopu	-	X	X
CRUSTACEA (CRABS/SHRIMP)				
Palaemon debilis	opae huna	-	X	X
Metopograpsus thukuhar				
Grapsus grapsus				
		-	X	X
MOLLUSCA (MOLLUSKS)				
Theodoxus cariosa				
Melania sp.		-	X	X
Neritilia hawaiiensis				

Barracuda are the top trophic level predators within the pond; three of which were observed repeatedly over a two day period. These specimens ranged from about 16 to 40 cm in body length. Small (16 cm) papio comprised the other group of top level carnivores. Often two schools of three to five specimens each were observed. Juvenile (4 to 6 cm) and adult (35 to 40 cm) mullet were observed, occasionally, though their numbers were low. Juvenile goatfish were noted occasionally in shallow water near the pond outlet.

Mollusks dominated the macroinvertebrate fauna. The

diminutive (1 to 2 mm) black endemic snail *Neritilia hawaiiensis* was found in densities of up to 400/m^2 on solid substrates such as rock and decaying terrestrial plant material. The snail *Melania*, one of the most ubiquitous animals of Kona coast ponds, had a patchy distribution and was limited to areas of consolidated sediments. About fifty dead specimens were encountered for every live specimen observed. Shells of the limpet-like neritid snail *Theodoxus cariosa* were numerous in and adjacent to submerged rock outcrops, though no live specimens were observed. The ecotype occurring in the Kiholo ponds exhibits extensive lateral, wing-like shell development.

The crustacean fauna was comprised of three species: the shore crab *Grapsus grapsus*; the blackish, usually estuarine, crab *Metopograpsus thukuhar*, which occurred intertidally and subtidally along rocky shores; and, the glass shrimp *Palaemon debilis* (opae huna) which was restricted to shallow inshore areas with a solid substratum. Population densities of opae huna ranged from 2 to 15/m^2 in areas of suitable inshore habitat. They were most numerous in the channel connecting North and South Ponds.

3.2.2 South Pond

The flora and fauna of South Pond was, like North Pond, one of low diversity and low population density.

3.2.2.1 Flora

The flora of South Pond was dominated by extensive stands of the aquatic plant *R. maritima*, which covered about 15 to 20 percent of the total pond area. Unidentified mat-forming cyanophytes were conspicuous as a part of the epilithon community on submerged rock outcrops and on other solid substrates.

3.2.2.2 Fauna

A single specimen of the federally listed threatened green sea turtle (*C. mydas*) was the largest and most conspicuous species occurring in the pond. It was routinely observed in deeper water along the eastern (mauka) side of the pond.

Vegetated sections around the pond perimeter and deeper waters associated with the outlet (makaha) area hosted the highest diversity and density of fishes, with seven (7) species recorded (Table 5). Open water areas were dominated by several small barracuda and unidentified burrowing gobies ('o'opu). *Acanthurus triostegus* (manini) was the only species observed in South Pond that was not observed in North Pond. Its range within the pond was restricted to the well-mixed waters adjacent to the makaha outlet and in the narrow channel between the makaha and the ocean.

In contrast to North Pond, South Pond harbored numerous large schools of 100+ juvenile mullet. Aholehole were less common than in North Pond, reflecting the shallow waters and limited amount of shoreline emergent vegetation which occurs in South Pond. This vegetation presumably provides protective habitat from roving barracuda. Burrowing 'o'opu dominated all areas characterized by deep, unconsolidated, benthic organic deposits with densities averaging about 8/m^2.

The tiny *N. hawaiiensis* was the most abundant invertebrate with densities ranging from less than 200 to over 1,000/m^2. Highest concentrations were generally associated with submerged terrestrial and aquatic vegetation. *Melania* sp. was second in abundance but with a generally patchy distribution and was found in well-flushed, sandy substrates near the outlet area. Live snails were outnumbered by dead specimens. The neritid snail *T. carlosa* was not observed in South Pond, despite its downstream location from North Pond where shells of this species were observed near the pond outlet.

The crustacean fauna of South Pond was limited to estuarine crabs (*Metopograpsus thukuhar*), which were found along all rocky shorelines, *Grapsus grapsus*, and opae huna (*P. debilis*) which was restricted in distribution to sandy, inshore areas.

Adult dragonflies and dragonfly naiads (nymphs) were the only terrestrial insect fauna associated with South Pond. Eleven aquatic naiads were counted adjacent to an elongate mid-pond rock outcrop. They were not observed elsewhere in the pond.

3.2.3 Kiholo Bay Nearshore Waters

Kiholo Bay is characterized by a turbid subtidal zone with strong freshwater influence occurring over geologically young lava rock. As a result of the low saline water and prevailing high turbidities, corals and other common inshore and intertidal invertebrates and fishes normally associated with West Hawaii waters were absent or present in exceptionally low numbers. The physiography of Kiholo Bay is one of flat to undulating lava, broad expanses of lava rocks and boulders and occasional small sandy patches. There is very little vertical relief apparent within the bay. Water depths throughout the area surveyed ranged from less than 1 to no more than 2 meters in depth.

The intertidal zone was dominated by an assortment of nerites (*Nerita picea*), littorines (*Littorina pintado* and *L. scabra*), limpets (*Siphonaria normalis*), and two species of intertidal crabs (*Grapsus grapsus* and *G. tenuicrustatus*), though overall densities were low in comparison to other similar Kona coast settings (Table 6). The rock or estuarine mussel, *Brachidontes cerebristriatus*, often an indicator of low salinity waters, was especially common. Other than a greenish mat of *Enteromorpha* (and other unidentifiable turf algae) and an occasional growth of *Ulva fasciata*, the general environment was one of low biological diversity.

Table 6. Checklist of Macroinvertebrates, Kiholo Bay.

PHYLUM/CLASS GENUS/SPECIES	ZONE*
SCLERACTINIAN (HARD CORALS)	
PORITIDAE	
Porites lobata	st
POCILLOPORIDAE	
Pocillopora meandrina	st
PORIFERA (SPONGES)	
Demospongiae sp. (red)	st
CRUSTACEA (CRUSTACEANS)	
Grapsus grapsus	it
Grapsus tenuicrustatus	it
MOLLUSCA (HOLLUSKS)	
Nerita picea	it
Cypraea caputserpentis	it
Littorina pintado	it
Littorina scabra	it
Brachidontes cerebristriatus	it
Siphonaria normalis	it
ECHINODERMATA (ECHINODERMS)	
ECHINOIDEA (SEA URCHINS)	
Echinometra mathaei	it,st
Diadema paucispinum	st
OPHIUROIDEA (BRITTLE STARS)	
Ophiocoma pica	st

* Legend: it = intertidal; st = subtidal

Corals were exceptionally low in numbers and distribution with only two species recorded; *Porites lobata* and a few widely scattered colonies of *Pocillopora meandrina*. Although small vegetative growth forms (resulting from storm-wave fracture) of *P. lobata* were observed within 100 meters of the shore, significant coral habitat was uncommon to at least 200 meters seaward of the shore.

Table 7. Checklist of Marine Algae, Kiholo Bay.

DIVISION/GENUS/SPECIES	ZONE*
CHLOROPHYTA (GREEN ALGAE)	
Enteromorpha sp. ('ele'ele)	it, st
Ulva fasciata (palahalaha)	it
RHODOPHYTA (RED ALGAE)	
Hydrolithon breviclavium	st
Hydrolithon reinboldii	st
Lithophyllum kotschyanum	st
Neogoniolithon fruticescens	st
Porolithon gardineri	st
Porolithon onkodes	st
Sporolithon erythraeum	st

* Legend: it = intertidal; st = subtidal

These colonies showed evidence of major storm damage. As a result of the limited coral coverage, reef fish populations were correspondingly low to nearly non-existent.

Fleshy macroalgae were uncommon, with only occasional small patches of *Ulva fasciata* noticeable. Red coralline algae were well represented with seven species recorded, but consisted mainly of small fragments and vegetative growth forms, having broken loose apparently by storm wave action from deepwater areas on the outer reef (Table 7).

Subtidal macroinvertebrates were few and consisted of the burrowing sea urchin *Echinometra mathaei* and an occasional specimen of the black urchin, *Diadema paucispinum*. In contrast to other Kona coast locations, *E. mathaei* densities were exceptionally low in most areas, rarely exceeding more than 2 to 4/m^2. *E. mathaei* is normally not tolerant of low saline water.

The fish checklist accounted for a total of fifteen species (Table 8). Representative of eight families and eleven genera were recorded during the surveys. Small schools of juvenile manini (*Acanthurus triostegus*) and aholehole (*Kuhlia sandvicensis*) collectively accounted for approximately 90 percent of all fishes observed. The absence of appropriate coral reef habitat and the influence of freshwater undoubtedly accounted for the paucity of fishes that was recorded. The prevailing poor visibility combined with the schlieren effect created by the

Table 8. Checklist of Fishes, Kiholo Bay

FAMILY/GENUS/SPECIES	ABUNDANCE RATING
ACANTHURIDAE (SURGEONFISHES)	
Acanthurus triostegus (manini)	A
Acanthurus dussumieri (palani)	F
Acanthurus olivaceus (na'ena'e)	F
Zebrasoma flavescens (lau'i-pala)	F
AULOSTOMIDAE (TRUMPETFISHES)	
Aulostomus chinensis	R
BLENNIDAE (BLENNIES)	
Cirrepectes variolosus	R
unident. blenny	R
CHAETODONTIDAE (BUTTERFLYFISHES)	
Chaetodon lunula (kikakapu)	R
Chaetodon quadrimaculatus (lau-hau)	F
KUHLIIDAE (FLAGTAILS)	
Kuhlia sandvicensis (aholehole)	C
LABRIDAE (WRASSES)	
Thalassoma duperrey (hinalea lau-wili)	R
Anampses sp.	R
POMACENTRIDAE (DAMSELFISHES)	
Abudefduf abdominalis (mamo)	F
Chromis sp. (juveniles)	R
ZANCLIDAE (MOORISH IDOL)	
Zanclus cornutus (kihikihi)	F
TOTAL FAMILIES =	8
TOTAL GENERA =	11
TOTAL SPECIES =	15

See Methods section for symbol notation

mixing of water masses of differing densities also greatly reduced underwater visibility making it difficult for the investigator to census accurately these populations.

3.2.4 Avifauna and Feral Mammals

A total of ten species of birds were identified within the proposed project site incidental to other field survey efforts. Only one indigenous species, the Great Frigatebird, was observed; the remaining birds all being exotic species (Table 9). An additional species, an unidentified scolopacid (wading bird), was observed during one low tide period within the shoreline intertidal zone.

The Nutmeg Mannikin (*Lonchura punctulata*) was the most abundant species, occurring in flocks of an estimated 40+ individuals. The Zebra Dove (*Geopelia striata*) and Common Myna (*Acridotheres tristis*) were second in abundance. Three adult Francolins were observed within the study area. A solitary feral Mallard (*Anas platyrhynchos*) is an apparently permanent resident of South Pond.

Table 9. Avifauna Checklist, Kiholo Bay.

SCIENTIFIC NAME	COMMON NAME
Lonchura punctulata	Nutmeg Mannikin
Cardinalis cardinalis	Northern Cardinal
Paroaria capitata	Yellow-billed Cardinal
Geopelia striata	Zebra Dove
Streptopelia chinensis	Spotted Dove
Francolinus pondicerianus	Gray Francolin
Acridotheres tristis	Common Myna
Anas platyrhynchos	Mallard
Fregata minor	Great Frigatebird
Zosterops japonica	Japanese White-eye
unident. scolopacids	

SECTION 4.0

DISCUSSION

4.1 Kiholo Bay

Other investigators (Brock & Brock, 1974; Dollar, 1977) have reported that the nearshore environment within Kiholo Bay is neither significantly different in species diversity, nor in abundance from other areas surveyed off the Kona and Kohala coasts. While checklists of various locations differ in represented species, coral zonation patterns and associated fish and invertebrate populations are a relatively uniform feature of the entire West Hawaii shoreline.

In contrast, our February 1989 marine surveys indicated an extremely low diversity of algae, fish, corals and other invertebrates within the shallow, inshore reaches of Kiholo Bay. Evidence of recent coral destruction indicates that the bay has been subject to major storm-wave attack. According to local informants, destructive North Pacific storm waves adversely affected the entire Kona Coast during February 22 to 25, 1986 (Daniel, 1988). Also evidence of long-term wave surge and storm wave exposure is inferred by the limited distribution and abundance of epiphytic algae and encrusting invertebrates throughout the bay. Storm wave damage associated with the February 1986 storm waves and perhaps, later storm events may explain the abbreviated checklist compiled in our February 1989 surveys versus earlier (pre-1986) surveys.

Physical disturbance from storms is the most significant factor determining the structure and composition of Hawaiian coral reef communities (Dollar, 1981). The frequency and severity of both short-term and long-term storm wave events significantly influence coral reef structure and organization. Dollar (1977) cites the influence of short-term, moderate, wave events in shaping the zonation patterns of Hawaiian reef environments. In the long term, these events promote ecological stability by maintaining well defined reef zones through differential mortality, fragmentation and transport. By contrast, severe or long-term storm wave action often returns a reef area to an earlier successional stage and recovery from such intense events is generally much slower. As such, many of the reef communities on the island of Hawaii have been described as *physically dominated* environments where reef communities reflect the severity of disturbance.

Our February 1989 surveys suggest that the nearshore environment of Kiholo Bay is a *physically dominated* coastal environment. This conclusion is based upon the prevailing low coral diversity and density, and the obviously recent storm wave action, which fragmented much of the inshore coral community.. The absence of

pioneer coral species like *Pocillopora meandrina* is further evidence of recent and intensive storm wave impact.

In estimating the impacts of any development on the marine environment, the task is to distinguish or superimpose both direct and indirect development effects upon natural effects. Such is the case at Kiholo. Man is rarely able to compete with nature when it comes to catastrophic changes, which can be wrought by short-term physical disturbances.

Natural groundwater discharges throughout the intertidal and subtidal zones of Kiholo Bay also influence the structure and composition of biological communities (Brock and Brock, 1974). Although algae were poorly represented in our February 1989 surveys, *Ulva fasciata*, often an indicator of elevated nutrient levels associated with groundwater discharges, was occasionally found in intertidal and subtidal areas subject to groundwater influence.

The effects of groundwater discharges and storm waves on the marine biota of the Kona Coast are so significant that researchers have classified four South Kohala and North Kona bays (Puako, Waiulua, 'Anaeho'omalu, and Kiholo) on the basis of groundwater intrusion and wave energy (Kay, *et al*, 1977). Dollar (1977) described the composition and distribution of coral communities in three open North Kona and South Kohala bays as being a function of wave energy, available light energy, sedimentation, available solid substrate, and interspecific competition between corals. The absence of pioneer coral species as *P. meandrina* from areas surveyed in February 1989 within Kiholo Bay attests to the probable impact of storm wave activity.

At Kiholo Bay, other researchers have identified 6 species of coral, 68 macroinvertebrates, and 52 species of fish as occurring within three distinct habitats (tidepools, subtidal waters that receive freshwater runoff, and true marine subtidal areas) to the 30 foot contour. This contrasts with a total of 163 species of invertebrates (including corals) and 137 species of fish which were recorded at 6 to as many as 14 sampling stations between Mahukona (to the north) and Waialua (to the south) during the summer of 1972 (Brock and Brock, 1974). Expressed as a percentage of total species, Kiholo Bay waters harbored approximately 42 percent of all Kona Coast invertebrates and 38 percent of all Kona Coast fishes censused by Brock and Brock (1974). Because of the differences in sampling techniques, survey methods, and survey personnel, comparisons between the various survey stations are not directly comparable. In general terms, Kiholo Bay appeared to harbor more invertebrates (range, 6 to 74, including corals; n=14), but fewer fish (range, 36 to 113; n=6) than other Kona coast locations sampled during the summer of 1972. This study indicated that the subtidal zone with freshwater influence occurring over geologically young lava rock is unique to the island. Associated with these environments is a discrete group of fishes and invertebrates, which characterize this habitat. They also found that the greatest

species diversities were associated with truly marine areas. Salinity data reported herein suggests that no *truly marine area* was censused during our February 1989 surveys.

Short-term surveys within similar coastal settings at Kukio Bay, Makalawena, O'oma II (immediately south of Keahole Point) and Kohana-iki provided checklists of 62, 41, 74, and 53 species of fish, respectively (PBR, 1986b; PBR, 1986a; Dollar, 1986 in Helber, Hastert and Kimura, 1986; Nolan and Cheney, 1981). Both Kukio and Makalawena survey areas were influenced by groundwater discharges and recent storm wave activity, though not to the degree demonstrated at Kiholo Bay. Salinities were such that the bay could be described as more estuarine than oceanic in character.

Nolan and Cheney (1981) listed a total of 84 species of fish as occurring in Kiholo Bay, based on a cumulative checklist citing their data collection efforts and the results of other surveys. Nolan and Cheney also describe the destructive impact of a 1980 storm on the reef platform in the central section of Kiholo Bay.

4.2 Coastal and Anchialine Ponds

Anchialine and coastal ponds are situated in areas dominated by lavas of recent origin and are generally within 500 meters of the shoreline. Anchialine ponds have been described as:

> *– generally small (less than 100 square meters), shallow (less than 1 meter deep) and having rocky basins. These basins are too porous to support ponded water above sea level and are filled with mixohaline water (average salinity 7 ppt), indicating an inland extension of the oceanic water table diluted by the outflow of subsurface freshwater. Consequently, the ponds are restricted to depressions in lava flows that extend downward into the water table.* (Maciolek and Brock, 1974).

Anchialine ponds are also characterized by an absence of surface connections with the sea, but contain saline water and undergo tidal fluctuations (Maciolek & Brock, 1974). They also harbor a distinctive biota. Given the aforementioned definition, the Kiholo Bay ponds encompassed within the scope of our February 1989 surveys are not presently anchialine in character, but may have been so historically.

The Hawaiian anchialine pond ecosystem is dominated by a characteristic assemblage of organisms, including various crustaceans, fishes, mollusks, a hydroid, polychaetes, sponges, tunicates, aquatic insects, algae and aquatic macrophytes. The red, herbivorous caridean shrimp, *Halocaridina rubra*, and the red, carnivorous shrimp, *Metabetaeus lohena*, are perhaps the most widespread and striking components of most undisturbed anchialine ponds (Brock, 1985). Neither *H. rubra* or *M. lohena* were found in ponds surveyed in February 1989.

Naturally occurring anchialine ponds are restricted generally to porous substrates, such as recent lavas or limestone adjacent to the sea. Anchialine habitats are widely distributed, having been reported from the Sinai Peninsula, Entedebir near the Southern Red Sea, Aldabra in the West Indian Ocean, Solomon Islands, Okinawa, Philippines, Funafuti Atoll in the Western Pacific, Fiji, and the Ryukyu Islands (Brock, 1985).

In the Hawaiian Islands, coastal and anchialine ponds are found along the west and southwest shoreline of Hawaii, southwest Maui, and Oahu (Brock, 1985; Wong, 1975). These ponds once figured prominently in Hawaiian culture but have lost this prominence with the decline of the culture (Brock, 1977). Five classes of anchialine ponds have been proposed, based on differences in human use and degree of isolation from the sea (Brock, 1977). Holthuis (1973) was the first to describe the shrimp fauna occurring in coastal ponds and proposed the term *anchialine* (from Greek *anchialos*, meaning *near the sea*) to describe these ponds.

The most complete description of coastal and anchialine ponds on Hawaii, encompassing some 318 surveyed ponds, is found in the *Aquatic Survey of the Kona Coast Ponds, Hawaii Island* (Maciolek and Brock, 1974). Brock (1985) also provides an excellent overview on the status and future of anchialine ponds in the Hawaiian Islands. A detailed treatment of coastal and anchialine pond ecosystems is also found in the *Final Environmental Impact Statement, Waikoloa Beach Resort, Waikoloa, South Kohala District, Island of Hawaii* (Corps of Engineers, 1985). A number of other recent environmental impact statements also provide an analysis of anchialine and coastal pond flora and fauna associated with proposed resort hotel complexes at Kukio Bay, Makalawena, Kohanai-iki, *etc.* (PBR, 1986a; PBR, 1986b; Helber, Hastart & Kimura, 1986).

Conservative estimates have placed the number of anchialine and coastal ponds on the Island of Hawaii at between 600 and 650 (Brock, 1985). The majority (approximately 420, less those recently filled at Waikoloa) occur along the coast from Kawaihae to Ka Lae (South Point). Based on the fact that recent surveys at Makalawena more than doubled the number of ponds thought to exist in the area (PBR, 1986b), the actual number of anchialine ponds on the island is likely to be considerably higher than recent estimates suggest. Approximately 235 (75%) of the 318 coastal and anchialine ponds inventoried by Maciolek and Brock (1974) occur in the North Kona district.

In 1985, the U.S. Fish and Wildlife Service classified several anchialine pond organisms as *Category* 2 species under the Endangered Species Act. These include three shrimp (*Metabetaeus lohena, Procaris hawaiana* and *Palaemonella burnsi*); a hydroid (*Ostrocoutvis horii*); and a snail (*Neritilla hawaiensis*). Category 2 indicates that the organisms probably should be listed as endangered or threatened, but insufficient data prevents an assessment of their status for listing on the Federal List of Threatened and Endangered Species.

These organisms are considered rare, but are not listed on the aforementioned list and are not currently proposed as candidates for listing.

N. hawaiensis was the only Category 2 species observed during our February 1989 surveys of the coastal ponds at Kiholo. *N. hawaiensis*, a diminutive (1.0 to 1.5 mm) snail was known formerly only from anchialine ponds at Makalawena (Brock, 1985). However, recent information suggests that this species is more widespread than originally believed but, because of its extremely small size, probably has been overlooked by researchers (Brock, 1986; personal communication). *N. hawaiensis* occurred in densities exceeding 1,000/m^2 on solid substrates within the Kiholo coastal ponds during our February 1989 surveys.

Another phenomenon of anchialine ponds is the occurrence of morphological variants (ecotypes) within a species caused by environmental differences. Chace (1972) has described variations in the shrimp *Palaemon debilis* associated with locale; ecotypes have been reported in other crustaceans (*Macrobrachium grandimanus*) and mollusks (*T. carlosa*) (Holthuis, 1973; Maciolek and Brock, 1974). *T. carlosa* was numerous in certain sections of each Kiholo pond though dead specimens significantly outnumbered living specimens during our February 1989 surveys. Ecotypes of this species were not found at Kiholo; the prevailing ecotype having lateral, wing-like shell development.

Maciolek and Brock (1974) identified and ranked a number of Kona Coast ponds and pond complexes on the basis of their importance as natural anchialine and coastal pond ecosystems. The ranking of the ponds was based on two criteria:

Class A: Pond sites of exceptional natural value based on physical structure, diversity, represented aquatic community, and new or endemic species.

Class B: Pond sites of significant aquatic natural value whose importance is increased because of their anthropological or waterbird habitat values.

The nearby Luahinewai Pond (north and offsite of the proposed project site) was recommended as a Class A pond on the basis of it being an example of

> *... a basin retained by a sand beach bar and is notable for its depth and strong vertical salinity stratificaton. It has a diversity of crustaceans. The most luxuriant growth of Ruppia maritima was encountered here during the survey.* (Maciolek and Brock, 1974).

The nearby Wainanali'i lagoon (also to the north and offsite of the study area) is an open coastal pond (connected to the ocean) and represents an intermediary stage between closed

(anchialine) ponds and inshore marine waters. Although sharing many physical features of an anchialine pond, Wainanali'i is more estuarine in character with respect to salinity and represented species (Maciolek & Brock, 1974).

Both of the coastal ponds surveyed in February 1989 at Kiholo Bay remain in a pristine state, inasmuch as exotic species were not found within either pond. Aside from direct physical destruction by filling, exotic species are known to exert pronounced adverse effects on coastal and anchialine pond ecosystems, leading to their gradual demise. Brock (1985) hypothesized that exotic fishes introduced into an anchialine pond can initiate a change in ecological succession. The recent introduction of exotic fishes into the Kukio Bay anchialine pond complex resulted in a dramatic decline in pond crustacean densities and a buildup of pond sediments in less than three years, with discernible changes evident within a period of 23 months (Brewer and Brock, 1987).

SECTION 5.0

CONCLUSIONS AND RECOMMENDATIONS

Implementation of the proposed project would involve minor grading, vegetation removal, new construction and other minor, changes to approximately 0.25 acres of land. There are no plans to alter the ponds or the adjacent shoreline.

Based on the physical-chemical water quality and biological data acquired in the baseline surveys it is possible to predict what impacts, if any, might be expected to occur as a result of the proposed action.

Environmental disturbances to the coastal pond and marine environments at Kiholo Bay could potentially include:

- Structural modifications to ponds;
- Sedimentation of ponds and nearshore waters;
- Impacts on groundwater quality and quantity;
- Changes in groundwater and surface runoff patterns;
- Pollutants associated with heavy equipment operations and servicing;
- Landscaping in the vicinity of costal ponds; and
- Increased human use of the region.

Each of these real or potential adverse impacts and proposed mitigation measures, if appropriate, are discussed below.

5.1 Structural Modifications to Coastal Ponds

Unlike other extensive pond complexes associated with coastal regions of North Kona or South Kohala Coast (*e.g.* Waikoloa, Kukio, Makalawena, *etc.*), only two discrete ponds occur on the proposed project site. Based on preliminary design plans, heavy equipment mobilization and land clearing operations would not take place closer than about ten feet from the closest pond (South Pond). This distance is sufficient to prevent any direct or indirect impact on the physical structure of the ponds. However, to insure that heavy equipment operations do not encroach accidently upon this habitat it is recommended that a buffer zone be established and demarcated with fluorescent (surveyors) tape prior to initiating heavy equipment operations. This requirement should be stipulated in the construction bid documents and construction contract.

5.2 Sedimentation of Coastal Ponds and Nearshore Waters

Sedimentation resulting from upland earthmoving activities is unlikely to pose a threat to physical or biological character

of the Kiholo Bay ponds or the nearshore marine environment because the prevailing ground cover to be graded is lava and has little soil cover. Additionally, the climate of the Kona Coast is one of the driest in the Hawaiian Islands; therefore, the chance for heavy, sustained rainfall during ths construction period is rather remote. The existing grade between the proposed construction site and the ponds is low and existing depressions would serve as natural containment basins for any fine sedimentary materials suspended in runoff waters. The extremely porous nature of the lava and associated coralline soils would minimize the opportunity of transport of sedimentary materials to the ponds or nearshore waters should an unusually heavy rainfall event occur during the construction phase of the project.

Although wind-blown material could be carried seaward or landward by the prevailing winds, it is unlikely that the small quantities involved could pose any type of risk to either the water or biological quality of the ponds or nearshore waters. Any wind-blown materials reaching the nearshore environment would be in the silt-clay size range, would likely remain in suspension for some time, and would be diluted by prevailing water currents. It would be unlikely, therefore, that any local deposition could take place in nearshore waters that could stress corals or other benthic invertebrates.

Similarly, the Kiholo ponds can be characterized as highly silted as a result of natural processes. Thus, any small or incremental additions of silt or particulate organic matter to the ponds are unlikely to produce any adverse affect on pond biota.

5.3 Impacts on Groundwater Quality and Quantity

Minor, though probably undetectable perturbations to groundwater quality could be expected in the form of dissolved nutrients from sanitary wastewaters (grey waters) and septic tank discharges. However, conceptual engineering design criteria have specified a no-discharge solar evaporation wastewater treatment system. Such a system would not result in any water quality perturbation.

Fertilization of landscape vegetation could produce small quantities of nutrients or other pollutants which potentially could contaminate groundwaters. Any nutrients associated with such discharges would be subject to massive dilution upon entering the brackish water lens and in the downslope gradient to the ocean. Calculated efflux of basal waters into the Kiholo Bay region demonstrated a range between 3.2 to 11.8 million gallons/day (mgd) per mile of coastline (Kay, *et al*, 1977). Water quality studies in the vicinity of Kiholo Bay have indicated that the average concentration of Waiulua Bay spring water is over 400 percent higher in nitrogen than that of adjacent coastal waters. Phosphorus levels average approximately 100 percent higher in the

groundwater than in coastal waters (Kay, *et al*, 1977). These data indicate that groundwater discharges supply an important and sustained source of nitrogen and phosphorus for nearshore coastal waters. These same surveys, however, reported no discernible effect of these nutrients on the biota of either Waialua or Kiholo Bays where concentrated groundwater discharge takes place. Kiawe and haole koa trees, both nitrogen-fixers, are presumably responsible for much of the natural nitrogen enrichment. The calculated efflux of Kiholo pond waters during our February 1989 surveys suggest that the dilution potential associated with pollutants originating from landscape irrigation and fertilization would be enormous.

Nutrient input into the groundwater by golf course irrigation with treated wastewaters around anchialine ponds was found to increase nutrient concentrations in the ponds, but rapid pond water turnover rates produced no detectable change in pond biota or any evidence of eutrophication (Oceanic Institute, 1984). Negative impacts have not been observed in anchialine ponds surrounded by the Mauna Lani Resort golf course and condominium development (Brock, 1985). Nitrogen concentrations in shoreline water samples from Kaunaoa Bay showed that nitrogen applied to the Mauna Kea Resort for about 23 years had not enriched the groundwater or shoreline waters in areas where brackish water discharges to the ocean. This study concluded that there was

> *— even less likelihood of pesticide contamination of shoreline waters from pesticides applied to the development.* (Murdoch and Green, 1987).

Considering the vast scale of fertilizer applications for the above golf courses, as contrasted with the proposed project, it is unreasonable to expect any significant perturbations in water quality resulting from project-generated additions of dissolved nutrients to the groundwaters, coastal ponds, or nearshore waters of Kiholo Bay. It is noted, however, that golf course grasses and soils *process* a large portion of the nutrients added by secondary sewage, thus a direct comparison between golf courses and the project site conditions may not be appropriate. Dollar (1986) also suggests that other chemical processes, including cation exchange, fixation (in vegetation), adsorption and leaching would also decrease the nutrient load that potentially could reach the marine environment.

Withdrawal of small quantities of groundwater or pondwater for bathing, sanitary requirements and irrigation would have no significant affect on local groundwater resources or pond water levels, given the aforementioned daily efflux of basal waters in the Kiholo Bay area.

5.4 Changes in Groundwater and Surface Runoff Patterns

Surface runoff in the Kona Coast region occurs only rarely and only under conditions of intense rainfall. There is no evidence of any surface runoff areas in vicinity of the project site, except for the existing pond makaha-outlet channel to the ocean.

The proposed site plan allows for drainage from roofs and paved areas to either be collected for drinking purposes or to flow directly into natural depressions where it would percolate rapidly into the ground. Given the relatively small developed area involved and relatively small water volumes, no significant adverse affects on groundwater or pond water quality or biota are anticipated. Coastal and anchialine pond flora and fauna are euryhaline and have been recorded in salinities ranging from 0.5 to 30.0 ppt. Such organisms would not be adversely affected by a temporary reduction in pond salinity (Maciolek and Brock, 1974).

5.5 Pollutants Associated with Heavy Equipment Operations and Servicing

Oil and fuels associated with heavy equipment operations and servicing pose as a potential threat to groundwater quality and marine and coastal pond biota. Brock (1985) cites the destruction of one anchialine pond adjacent to Honokohau Harbor as a result of oil.

It is recommended that all fueling of heavy equipment take place offsite and that no servicing of equipment, which involves the addition or replacement of lubricants, be permitted on the project site.

5.6 Landscaping in the Vicinity of Coastal Ponds

Landscaping poses a potential threat to the maintenance of the certain types of anchialine ponds, but would not affect the Kiholo ponds inasmuch as they now are surrounded by a dense, circumferential stand of both indigenous and introduced trees, shrubs and vines.

The effect of organic materials from terrestrial, riparian, and aquatic vegetation has been shown in other surveys to be responsible for enhanced ecological succession processes in anchialine ponds at Kukio Bay and Makalawena (Brock and Brewer, 1987; Brewer, 1986a in PBR, 1986a; Brewer, 1986b in PBR, 1986b). The rate of pond aging or senescence appears to be determined by the deposition rate of organic materials from indigenous and exogenous sources, as well as, silt and sediment. It has been hypothesized that any increase in the deposition rate of leaf materials could lead to a corresponding increase in pond senescence rates in anchialine ponds of recent lava flows. However, no landscaping in the immediate vicinity of the Kiholo Bay coastal ponds has been proposed.

5.7 Increased Human Use of Kiholo Bay

Increased human use of the area may be expected to result in increased harvesting and utilization of coastal pond and marine resources. Construction workers should be advised that the green sea turtle is a threatened species and severe federal penalties can be imposed for harvesting Kiholo's turtle resources.

Perhaps the greatest environmental threat resulting from increased use of the area is the greater opportunity for the purposeful or accidental introduction of exotic fishes into the coastal ponds for baiting or aesthetic reasons. The ponds presently demonstrate a pristine character, as evidenced by the absence of exotic fishes, and every effort should be made to maintain this pristine quality.

It is recommended that signs be placed adjacent to ponds to caution fishermen, visitors and guests not to place any fish or other organism into the ponds for any reason.

SECTION 6.0

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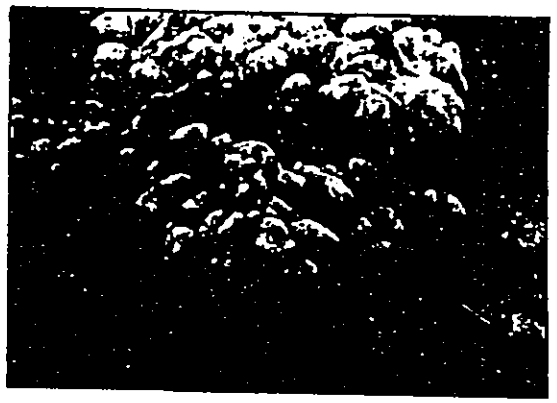
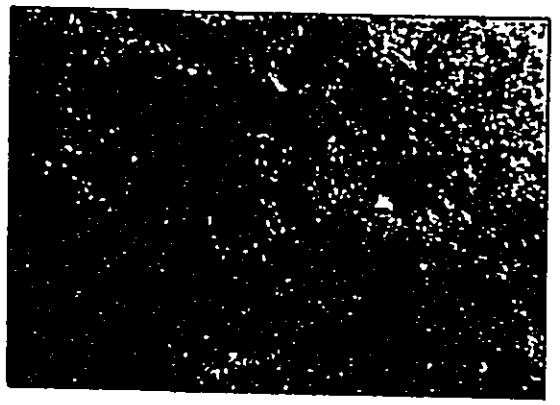
Photograph 1. Kiholo Bay Shoreline (North to South Perspective).

Photograph 2. Kiholo Bay Underwater Topography.



Photograph 3. Storm Damaged *Porites* Coral Colony.

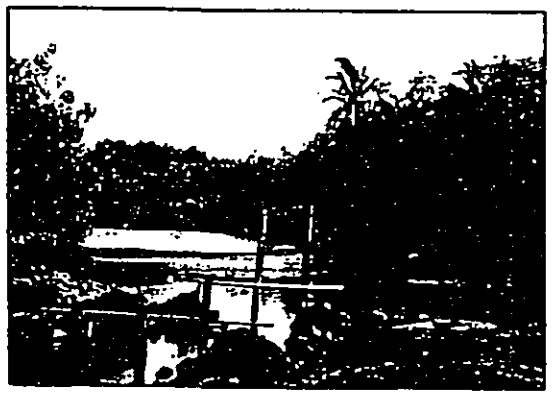


Photograph 4. Rock-boring Echinoderms in Kiholo Bay.

Photograph 5. North Pond, Kiholo Bay.

Photograph 6. Channel Connecting North and South Ponds.

Photograph 7. South Pond, Kiholo Bay.



Photograph 8. Makaha Outlet at South Pond.

Photograph 9. School of Aholehole in Connecting Channel.

Photograph 10. Green Sea Turtle in North Pond (note transparency of surface water layer versus turbidity of denser subsurface layer).

APPENDIX B

Archaeological Survey Report

ARCHAEOLOGICAL CONSULTANTS
of
HAWAII

59-624 Pupukea Rd.
Haleiwa, Hawaii 96712
(808) 638-7442

JOSEPH KENNEDY
Archaeologist

Mr Will Chee
Planner
1585 Kapiolani Blvd.
Honolulu, Hawaii

April 20, 1989

Dear Mr Chee:

RE: Preliminary Archaeological Survey at a Portion of Kiholo Bay, TMK: 7-1-02:4, Island of Hawaii.

SUMMARY

In February of this year the author and one assistant conducted a surface reconnaissance at the above location. This inspection covered the entire property; no cultural features were encountered.

I would like to present our survey findings at the above location in brief, letter form based on the exceptional circumstances related to the unique nature of the proposed development that is to take place at this site. We realize that this is a departure from the standard archaeological report format but present it on consideration of the following information.

Under normal conditions, impacts to cultural materials are unavoidable due to necessary, below grade changes that are a part of most all modern land change; I have in mind sewer or cesspool excavation, foundation work or a variety of other modifications. In this instance however, I have been told that the dwelling units planned for this site, and their attendant structures, will not be a significant factor relating to potential archaeological subsurface recovery at this site because no part of them will drop below grade.

Our reasons for this interpretation are as follows:

1) Survey results demonstrate that there is a total absence of surface features on the subject property.

2) The majority of the property consists of brackish ponds, and unless these ponds demonstrate signs of human modification (which they do not), they are not considered cultural resources under present CRM interpretations.

3) The land owner, (Mr Paul Mitchell) has indicated his desire to sustain occasional dwellings on this property by employing alternative (albeit not completely tested) energy sources, e.g. solar waste reduction systems, etc.- therefore no sewer lines, cesspools. Let it be known that he has achieved some degree of progressive success in this general area through substantial efforts relating to solar powered autos.

On the other hand, while the data presented above is accurate to the best of our knowledge, this brief report cannot be submitted without the following information presented.

There can be no doubt that this special area of Kakaha on Hawaii Island must be considered special both in terms of its geographical location as well as its association with the mythological and cultural history of the Hawaiian people. Kiholo was, without a doubt, a sure locus of significant precontact activity for at least 1000 years!

Paradoxically, while the above assumptions are most likely correct, previous archaeological activity in this area (e.g. Ching (1971), Rosendahl (1982), has produced very modest results.

This work notwithstanding, it remains (in our opinion) that significant archaeological subsurface potentials are present on the subject property.

In sum, while we believe that these resources are most likely alive on the subject property, we do not believe that Mr Mitchell's proposed plans will impact these potentials, for this proposed work will not extend below existing grade.

If there are any questions regarding this brief report, please feel free to contact me.

Aloha,

Joseph Kennedy
Consulting Archaeologist

RECEIVED 5/25/95 CT

ARCHAEOLOGICAL CONSULTANTS of HAWAII

59-624 Pupukea Rd.
Haleiwa, Hawaii 96712
(808) 638-7442

JOSEPH KENNEDY
Archaeologist

Ms. Claire Tom
Wil Chee Planning
Ala Moana Pacific Center
1518 Kapiolani Blvd. Suite 816
Honolulu, Hawaii 96814

May 23, 1995

Dear Ms. Tom:

Thank you for bringing to my attention an error of omission in a very brief document I prepared back in April of 1989.

That short letter report had to do with a preliminary archaeological examination I conducted of property then owned by Mr. Paul Mitchell at Kiholo Bay, island of Hawaii. The TMK number given at the top of my report was 7-1-02:4; this should have been expressed as TMK:7-1-02:4 and 7.

I regret any inconvenience this may have caused your office or the estate of Mr. Mitchell.

Sincerely,

Joseph Kennedy
Consulting Archaeologist

APPENDIX C

Agency Comments and Responses

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813

5/5/95

GARY GILL
DIRECTOR

May 2, 1995

Mr. Michael D. Wilson, Director
Department of Land and Natural Resources
Office of Conservation & Environmental Affairs
P.O. Box 621
Honolulu, Hawaii 96809

Attention: Don Horiuchi

Dear Mr. Wilson:

Subject: Draft Environmental Assessment for Single Family Residence , Kiholo Bay, North Kona, TMK9-4-3: 14 (Paul Mitchell Estate)

After a careful review of the subject project, we recommend that you include the following in the final environmental assessment:

1. Consultation with the Army Corps of Engineers and with Aquatic Resources Division of the Department of Land and Natural Resources regarding water resources.

2. An archeological survey of parcel 7.

3. Consultation with the Hawaii County Planning Department regarding possible permits for activity within the Special Management Area and the Shoreline Setback.

If you have any questions, please call Nancy Heinrich at 586-4185.

Sincerely,

GARY GILL
Director

GG/NH:kk

c: Claire Tom, Wil Chee Planning
Patrick Fujieki, Trustee, Paul Mitchell Trust

17 May 1995

Mr. Gary Gill, Director
Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, HI 96813

RE: Draft Environmental Assessment (EA) for a Proposed Single Family Residence
Paul Mitchell Trust, Kiholo Bay, North Kona, TMK 7-1-02: 4 and 7

Dear Mr. Gill:

Thank you for your comments on the draft environmental assessment (EA). Please note that the Department of Land and Natural Resources, Water Resources Management Division was contacted during the pre-assessment phase of the project. Wil Chee - Planning, Inc. (WCP) has also consulted with the Hawaii County Planning Department regarding permits for activity within the subject area. The U.S. Army Corps of Engineers is being contacted at this time so that any comments can be incorporated into the final EA.

With respect to item #2, the archaeological survey that was performed by Archaeological Consultants of Hawaii in February 1989 did cover the entire property, including parcel 7. Documentation to this effect will be included in the final EA.

Sincerely,
Claire Tom
Claire Tom

WIL CHEE - PLANNING, INC.
Land Use Planners and
Environmental Consultants

Ala Moana Pacific Center
1585 Kapiolani Boulevard
Suite # 818
Honolulu, Hawaii 96814
Phone 808-955-8808
Fax 808-942-1851

RECEIVED
95 MAY 22 A8:23

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Norman Olesen
Deputy Director

4 Apr 95

County of Hawaii

PLANNING DEPARTMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8615

March 28, 1995

Ms. Claire Tom
Wil Chee - Planning, Inc.
Ala Moana Pacific Center
1585 Kapiolani Blvd., Suite 818
Honolulu, HI 96814

Dear Ms. Tom:

Special Management Area (SMA) Use Permit Assessment
Application (SMAA 95-12)
Applicant: Patrick T. Fujieki for Paul Mitchell Trust
Proposed Construction of a Single-Family Residence
TMK: 7-1-2:4 & 7; Kiholo Bay, North Kona, Hawaii

We have received your SMA Assessment Application for the construction of a proposed single-family residence on parcel 4 at Kiholo Bay. Upon reviewing your application, we have determined that your proposal is exempt from the definition of "development" established by Planning Commission Rule 9, SMA Rules and Regulations. According to these rules, development does not include "construction of a single-family residence that is not part of a larger development." Therefore, your proposal is exempt from further SMA review but subject to requirements of the County Building Code.

As you are aware the subject parcel is situated within the State Land Use Conservation District. As such, any development on the property is subject to review by the State Department of Land and Natural Resources.

Should you have any further questions, please feel free to contact Alice Kawaha of this office at 961-8288.

Sincerely,

VIRGINIA GOLDSTEIN
Planning Director

AK:dmo
ltom.agk

cc: Mr. Patrick T. Fujieki, Trustee
West Hawaii Office
SMA Section

NA ALA HELE
Hawai'i Trail & Access System

January 9, 1995

RECEIVED
1-11-95

Ms. Dona Evans
Wil Chee - Planning, Inc.
1585 Kapiolani Blvd., Suite #818
Honolulu, HI 96814

Dear Ms. Evans:

Subject: Pre-Assessment Consultation for Environmental Assessment, TMK: 7-1-02: 4 & 7, Kiholo

Thank you for this opportunity to comment on the proposed development.

In addition to the Ala Loa and Ala Kahakai trails which join just north of the project area and pass south within the shoreline setback on the makai edge of the property, there are at least two and possibly three trails which approach the subject property from the northeast, east, and southeast. See map.

Number one is the old Kiholo access road, identified as site 1319, historic cart trail, in the Archaeological Salvage Report for the Queen Kaahumanu Highway, DU 624.A1 B47 No. 73-3.

Number two is a pre-historic foot trail which approaches from the northeast along the edge of the 1859 lava flow, identified as site 1220 in the source noted above.

Number three is shown in TMK: 7-1-02: 8 approaching from Puu Anahulu, identified only as a trail.

Na Ala Hele staff has explored portions of the first two, but did not determine where or if they cross or enter the subject property. The third trail has not yet been located on the ground.

It is possible that one or more of these trails crosses TMK: 7-1-02: 4 & 7 to access the shoreline or join the Ala Loa/Ala Kahakai. It would be prudent to determine this prior to constructing a dwelling across a traditional easement.

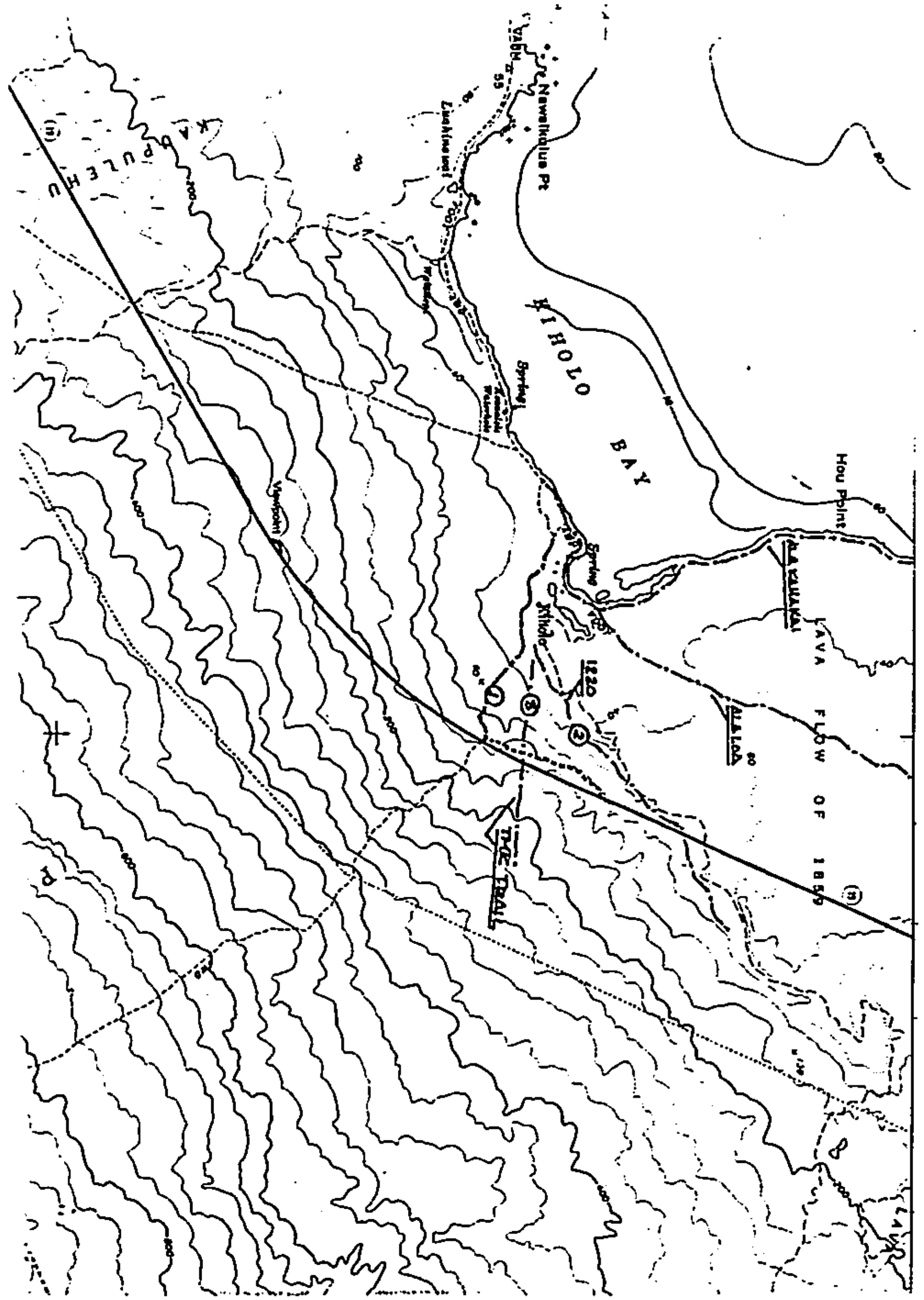
Division of Forestry & Wildlife • Dept of Land & Natural Resources • P.O. Box 4849 • Hilo, Hawaii 96720-0849

If you have any questions or require assistance in accurately locating these trails, please contact Patrick Thiele of the Hawaii District Trails and Access Program at 933-4221.

Very truly yours,

Howard H. Horiuchi

HOWARD H. HORIUCHI
Acting Forestry and Wildlife Manager



27 June 1995

Mr. Howard A. Horiuchi, Acting Forestry & Wildlife Manager
Division of Forestry & Wildlife
Department of Land & Natural Resources
P.O. Box 4849
Hilo, HI 96720-0849

SUBJECT: Environmental Assessment (EA) for a Proposed Single-Family Residence Paul Mitchell Trust, Kiholo Bay, North Kona, TMK: 7 - 1 - 02: 4 and 7

Dear Mr. Horiuchi:

Thank you for your comments during the pre-assessment phase of the proposed action. Please note that the applicant has cooperated with Na Ala Hele staff in the identification of the traditional public access route used to traverse the coast adjacent to the subject property. Additionally, the EA acknowledges a previous request from Na Ala Hele that the Historic Preservation Program be notified should remains of the trails be located as work proceeds at the project site. It should also be noted that the applicant proposes to utilize an existing building site for the location of the single-family residence.

A copy of the Final EA for the proposed action is available from the Department of Land and Natural Resources, Office of Conservation and Environmental Affairs, P.O. Box 621, Honolulu, Hawaii, 96809 (ATTN: Mr. Don Horiuchi). If you have any questions or comments with respect to the proposed action, please contact Claire Tom (955-6088). Thank you very much for your cooperation.

Sincerely,

Claire Tom

Claire Tom

WIL CHEE - PLANNING, INC.
Land Use Planners and Environmental Consultants

Ala Moana Pacific Center
1585 Kapiolani Boulevard
Suite # 818
Honolulu, Hawaii 96814
Phone 808-955-6088
Fax 808-942-1851

NA ALA HELE
Hawaii Trail & Access System

RECEIVED
1-11-95

January 3, 1995

Wil Chee - Planning, Inc.
ATTN: Dona Evans
1585 Kapiolani Blvd, Suite #818
Honolulu, Hawaii 96814

Dear Ms Evans:

Subject: Pre-Assessment Consultation for Environmental Assessment, TMK: 7-1-02:4 & 7, Kiholo

Thank you for this opportunity to comment on the proposed development.

In addition to the Ala Loa and Ala Kahakai trails which join just north of the project area and pass south within the shoreline setback on the makai edge of the property, there are at least two, and possibly three, trails which approach the subject property from the NE, E, and SE. See map.

Number one is the old Kiholo access road, identified as site 1319, historic cart trail, in the Archaeological Salvage Report for the Queen Kaahumanu Highway, DU 624.A1 B47 No. 73-3.

Number two is a pre-historic foot trail which approaches from the NE along the edge of the 1859 lava flow, identified as site 1220 in the source noted above.

Number three is shown in TMK: 7-1-02:8 approaching from Puuanahulu, identified only as a trail.

Na Ala Hele staff have explored portions of the first two, but did not determine where or if they cross or enter the subject property. The third trail has not yet been located on the ground.

It is possible that one or more of these trails crosses TMK: 7-1-02:4 & 7 to access the shoreline or join the Ala Loa/Ala Kahakai. It would be prudent to determine this prior to constructing a dwelling across a traditional easement.

If you have any questions or require assistance in accurately locating these trails please contact me, at the Hawaii District Trails and Access Program, 933-4221.

Very truly yours,

Patrick A. Thiele

PATRICK A. THIELE
Forestry & Wildlife Tech
Na Ala Hele Program

Division of Forestry & Wildlife • Dept. of Land & Natural Resources • P.O. Box 4849 • Hilo, Hawaii 96720-0849

27 June 1995

Mr. Patrick A. Thiele, Forestry & Wildlife Tech
Division of Forestry & Wildlife
Department of Land & Natural Resources
P.O. Box 4849
Hilo, HI 96720-0849

SUBJECT: Environmental Assessment (EA) for a Proposed Single-Family Residence
Paul Mitchell Trust, Kiholo Bay, North Kona, TMK: 7 - 1 - 02: 4 and 7

Dear Mr. Thiele:

Thank you for your comments during the pre-assessment phase of the proposed action. Please note that the applicant has cooperated with Na Ala Hele staff in the identification of the traditional public access route used to traverse the coast adjacent to the subject property. Additionally, the EA acknowledges a previous request from Na Ala Hele that the Historic Preservation Program be notified should remains of the trails be located as work proceeds at the project site. It should also be noted that the applicant proposes to utilize an existing building site for the location of the single-family residence.

A copy of the Final EA for the proposed action is available from the Department of Land and Natural Resources, Office of Conservation and Environmental Affairs, P.O. Box 621, Honolulu, Hawaii, 96809 (ATTN: Mr. Don Horiuchi). If you have any questions or comments with respect to the proposed action, please contact Claire Tom (955-6088). Thank you very much for your cooperation.

Sincerely,

Claire Tom

Claire Tom

WIL CHEE - PLANNING, INC.
Land Use Planners and
Environmental Consultants

Ala Moana Pacific Center
1585 Kapiolani Boulevard
Suite # 818
Honolulu, Hawaii 96814
Phone 808-955-6088
Fax 808-942-1851

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY

JOHN P. KEPPELER II

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

LOG NO: 13491
DOC NO: 9412PM19

December 23, 1994

RECEIVED

Ms. Dona Evans
Wil Chee Planning, Inc.
1585 Kapiolani Boulevard, Suite 818
Honolulu, Hawaii 96814

Dear Ms. Evans:

SUBJECT: Pre-Assessment Consultation for Environmental Assessment:
Construction of a Single Family Residence
Kiholo, North Kona, Island of Hawaii
TMK: 7-1-02: 4, 7

Thank you for your letter of December 5, 1994 and the opportunity to comment on the proposed action to construct a single family residence in the State Conservation District at Kiholo.

Joe Kennedy of Archaeological Consultants of Hawaii undertook a reconnaissance survey of parcel 4 in 1989. In a letter report submitted to Will Chee on April 20, 1989, Kennedy noted an absence of historic sites on this property. For reasons that are not made clear, it was Kennedy's opinion that, even though no significant historic sites were found on the surface, there was still a potential of finding subsurface remains.

To our knowledge no archaeological survey has ever been conducted of parcel 7. At this point in time we would recommend an archaeological inventory survey of parcel 7 and check of parcel 4 to evaluate Kennedy's earlier survey results and speculation regarding buried sites or cultural deposits.

If you have any questions please contact Pat McCoy (587-0006).

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:amk

27 June 1995

Mr. Don Hibbard, Administrator
State of Hawaii, Dept. of Land & Natural Resources
33 South King Street, 6th Floor
Honolulu, HI 96813

SUBJECT: Environmental Assessment (EA) for a Proposed Single-Family Residence
Paul Mitchell Trust, Kiholo Bay, North Kona, TMK: 7 - 1 - 02: 4 and 7

Dear Mr. Hibbard:

Thank you for your comments during the pre-assessment phase of the proposed action. Please note that the archaeological survey that was performed by Archaeological Consultants of Hawaii in February 1989 did cover the entire property, including parcel 7 (see enclosure). It should also be noted that no cultural features were encountered on the site and survey results demonstrated a total absence of surface features on the subject property. These findings and the nature of the project which proposes to be entirely above existing grade with reuse of an existing building site should pose no modification to existing ponds or disturbance to any possible buried sites or cultural deposits.

A copy of the Final EA for the proposed action is available from the Department of Land and Natural Resources, Office of Conservation and Environmental Affairs, P.O. Box 621, Honolulu, Hawaii, 96809 (ATTN:-Mr. Don Horiuchi). If you have any questions or comments with respect to the proposed action, please contact Claire Tom (955-6088). Thank you very much for your cooperation.

Sincerely,
Claire Tom
Claire Tom

encl.

WIL CHEE - PLANNING, INC.
Land Use Planners and Environmental Consultants

Ala Moana Pacific Center
1585 Kapiolani Boulevard
Suite # 818
Honolulu, Hawaii 96814
Phone 808-955-6088
Fax 808-942-1851

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

PETER A. SYBINSKY, Ph.D
DIRECTOR OF HEALTH

In reply, please refer to:
EMD/

December 21, 1994

P12143KA

Ms. Dona Evans
Wil Chee - Planning, Inc.
1585 Kapiolani Boulevard
Suite #818
Honolulu, HI 96814

Dear Ms. Evans:

Subject: State Conservation District, Subzone H-6
TMK: 7-1-02:4 and 7
Kiholo, North Kona, Hawaii

The Department of Health, Clean Water Branch acknowledges the receipt of your letter dated December 5, 1994 and has the following comments:

1. The applicant should contact the Army Corps of Engineers to identify whether a Federal permit (including a Department of Army permit) is required for this project. A Section 401 Water Quality Certification is required for "Any applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...," pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act (CWA)").

2. If the project involves the following activities with discharges into State waters, a National Pollutant Discharge Elimination System permit is required for each activity:

   a. Discharge of storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area;

   b. Construction dewatering effluent;

   c. Non-contact cooling water;

   d. Hydrotesting water; and

   e. Treated contaminated groundwater from underground storage tank remedial activity.

Should you have any questions regarding this matter, please contact Ms. Kris Aruga, Engineering Section of the Clean Water Branch, at 586-4309.

Sincerely,

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

KA:sa

27 June 1995

Mr. Denis R. Lau, P.E., Chief, Clean Water Branch
State of Hawaii, Department of Health
P.O. Box 3378
Honolulu, HI 96801

SUBJECT: Environmental Assessment (EA) for a Proposed Single-Family Residence
Paul Mitchell Trust, Kiholo Bay, North Kona, TMK: 7 - 1 - 02: 4 and 7

Dear Mr. Lau:

Thank you for your comments during the pre-assessment phase of the proposed action. The Army Corps of Engineers has been contacted and given the opportunity to comment on the subject project. It should be noted that the applicant proposes to incorporate an evaporative system for gray-water disposal and an aerobic wastewater disposal system. In addition, no site grading or excavation is anticipated and the area of proposed use encompasses less than 1.0 acre.

A copy of the Final EA for the proposed action is available from the Department of Land and Natural Resources, Office of Conservation and Environmental Affairs, P.O. Box 621, Honolulu, Hawaii, 96809 (ATTN: Mr. Don Horiuchi). If you have any questions or comments with respect to the proposed action, please contact Claire Tom (955-6088). Thank you very much for your cooperation.

Sincerely,

Claire Tom

Claire Tom

WIL CHEE - PLANNING, INC.
Land Use Planners and Environmental Consultants

Ala Moana Pacific Center
1585 Kapiolani Boulevard
Suite # 818
Honolulu, Hawaii 96814
Phone 808-955-6088
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BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3822

ESTHER UEDA
EXECUTIVE OFFICER

JOHN WAIHEE
GOVERNOR

RECEIVED
12-22-94

December 20, 1994

Ms. Dona Evans
Wil Chee - Planning, Inc.
1585 Kapiolani Boulevard, Suite 818
Honolulu, Hawaii 96814

Dear Ms. Evans:

Subject: Pre-Assessment Consultation for Environmental Assessment (EA), TMK No.: 7-1-02: 4 and 7, Kiholo, North Kona, Hawaii

We have received your letter of December 14, 1994 requesting our comments during the pre-assessment consultation phase for the subject EA, and confirm that the subject parcals are located within the State Land Use Conservation District. We suggest that the draft EA include a map showing the project site in relation to the State Land Use Districts.

We have no other comments to offer at this time. We appreciate the opportunity to comment on this matter.

Should you have any questions, please feel free to call me or Bert Saruwatari of our office at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

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

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
KANANI HOLT
GLENN M. OKIMOTO
JOYCE T. OMINE
CALVIN M. TSUDA

IN REPLY REFER TO:

STP 8.6516

December 21, 1994

Ms. Dona Evans
Wil Chee - Planning, Inc.
Ala Moana Pacific Center
1585 Kapiolani Boulevard, Suite #818
Honolulu, Hawaii 96814

RECEIVED

Dear Ms. Evans:

Subject: Pre-Assessment Consultation for Environmental Assessment - Construction and Occupation of One Single-Family Private Residence, Kiholo, North Kona, Hawaii TMK: 7-1-02: 4 and 7

The proposed construction of a single-family private residence at Kiholo, North Kona, Hawaii, will not have a significant impact on our transportation facilities.

We appreciate the opportunity to provide comments.

Sincerely,

Glenn M. Okimoto
Acting Director of Transportation