



HAWAII DEPT OF AGR

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EXECUTIVE CHAMBERS
HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

December 13, 1977

MEMORANDUM

TO: Honorable John Farias, Chairman
Department of Agriculture

SUBJECT: Environmental Impact Statement for Ke-ahole Agricultural Park,
Ke-ahole, North Kona, Hawaii

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the subject document as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes, and the Executive Order of August 23, 1971. This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should or should not be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws, and does not constitute an endorsement of the proposed action.

When you make your decision regarding the proposed action itself, I hope you will weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by reviewers, will provide you with a useful analysis of alternatives to the proposed action.


George R. Ariyoshi

REVISED
ENVIRONMENTAL IMPACT STATEMENT
FOR
KE-AHOLE AGRICULTURAL PARK

Prepared for:
Department of Agriculture
State of Hawaii

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Office of the Governor
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November 1977

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DEPARTMENT OF AGRICULTURE
STATE OF HAWAII

REVISED
ENVIRONMENTAL IMPACT STATEMENT
FOR
KE-AHOLE AGRICULTURAL PARK
ISLAND OF HAWAII
ADMINISTRATIVE ACTION

This statement was developed in accordance with
the Environmental Impact Statement Regulations,
State of Hawaii, and is submitted pursuant to:
Chapter 343
Hawaii Revised Statutes

11/28/77
Date

Yukio Kitagawa
for John Farias, Jr.
Chairman, Board of Agriculture

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KE-AHOLE AGRICULTURAL PARK

SUMMARY

PROJECT DESCRIPTION

The State Department of Agriculture proposes to construct in two phases an approximately 209-acre agricultural park at Ke-ahole, Island of Hawaii. The project will be constructed within a 2,608-acre parcel of state-owned land. The area is approximately six miles north of Kailua, Kona, and one mile mauka of the Ke-ahole Airport.

The objective of the agricultural park, as set forth in Chapter 171, Part V, Hawaii Revised Statutes, is to strengthen diversified agriculture in Hawaii by a plan that "...combines and concentrates in a common location agriculture activities for the purpose of production and distribution economies." The Ke-ahole Agricultural Park is in consonance with state policy and will complement the existing rural environment, provide employment, and stimulate the agricultural economy in the area. The area will be incrementally divided into 5- to 15-acre leasehold plots for the cultivation of decorative plants, foliage, and other crops primarily in shade houses. Residences for the farmers may be constructed on each plot or, in phase II only, on individual 10,000-square foot lots at a village center. Additional land will be set aside for a processing and distribution center and research work.

The development of the agricultural park will be phased according to the availability of water. Phase I will include an area of 66 total acres, of which 52 acres will be cultivated. This area can be irrigated with the estimated 200,000 gallons per day that will be available in 1979. Phase II will be developed when the water transmission line is improved. Roads, electrical, communication, and sewer systems will be constructed to service the agricultural park. These systems will be provided in phase I and will be extended in phase II.

ENVIRONMENTAL SETTING

The climate of the Ke-ahole area is warm and semi-tropical. Seasonal changes are mild. The area, which is located on the slopes of Hualalai, has an extremely rocky and porous surface. The basal lens underlying the area is brackish, with a chloride content of 1,000 to 2,000 ppm.

PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

The anticipated impacts during the construction period will be the emission of noise and dust. There may also be some traffic disruption on the Kona Palisade Access Road. These impacts, however, can be controlled.

The principal post-construction impact will be visual. About 209 acres of uninhabited and barren lava field will be transformed into productive farms in shade houses and a living community of farmers. The agricultural

park will appear like a green spot and will offer a more dynamic scenery to motorists than will the present lava fields.

The anticipated increase in the use of electrical power and communication can be met by the existing facilities. In terms of water needs, the agricultural park will be developed according to the capacity of the existing and proposed improvements of the supply and distribution system.

The chemical sprays used to control insects and crop diseases will not have any significant adverse effect. Also, these sprays are not anticipated to have a discernible impact on the groundwater.

The construction of the agricultural park will not have a significant impact on the natural vegetation and wildlife of the area. The general project area has few native plants, and most of these are found near the southern border of the overall land parcel, away from the proposed phase I and II development. It is likely, however, that any wildlife displaced by the development will be lost.

Archaeological studies have located several sites that indicate the area has historical and research value. The archaeological significance of the site has been acknowledged and a program of mitigative action will be implemented by the state.

The development of an agricultural park will help expand the social and economic base of the community and broaden the diversification of agriculture in North Kona.

RELATIONSHIP OF THE PROPOSED ACTION TO LAND-USE PLANS, POLICIES AND CONTROLS FOR THE AFFECTED AREA

The proposed construction of the agricultural park at Ke-ahole will involve lands within the state land use classification of "conservation" and "agriculture." The county of Hawaii currently zones the area as "unplanned" and "open." The agricultural park activity meets the state and county criteria set for these classifications.

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The most significant adverse effects include (1) visual impact, (2) noise, dust, and emissions from construction activities, (3) minimal impact on groundwater from sewage, fertilizer, and pesticides, (4) minor effects on the air quality from the pesticides, and (5) removal of the present sparse vegetation in the areas to be developed.

ALTERNATIVES TO THE PROPOSED ACTION

Several alternative sites were considered but were eventually eliminated. The extension of utility services and the construction of access roads to these more remote alternatives would increase the cost of development. Alternative state lands with soil are available at higher elevations in Kona for agricultural production. For the production of decorative

plants, foliage, and other crops in shade houses, however, a contiguous soil cover would not be necessary. The alternative of no action would not fulfill the agricultural needs of the state.

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

The development of Ke-ahole Agricultural Park will incur temporary short-term losses and will generally result in long-term gains.

Short-term losses are primarily disruptions directly related to the construction activities.

Construction of the agricultural park will commit little-used lava lands to long-term, highly productive agricultural use. The completed project will also add long-term economic benefits to the community.

MITIGATION MEASURES PROPOSED TO MINIMIZE IMPACT

Several mitigative measures will be implemented for the adverse impacts. They are identified below:

<u>Impact</u>	<u>Mitigation Measure</u>
Noise and air pollution during construction	All applicable governmental regulations will be followed
Sewage disposal	Disposal measures will comply with state and federal requirements
Traffic disruption	Flagmen will be provided to coordinate traffic flow during construction hours
Visual impact	All applicable subdivision rules and regulations of Hawaii County will be followed and all utilities will be placed underground
Archaeological sites	Locating, studying, and, where necessary, salvaging archaeological and paleontological finds. Where preservation of site is recommended, the agricultural layout and utilities will be adjusted

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

The development of Ke-ahole Agricultural Park will commit for the duration of this project 209 acres of relatively undisturbed land to the development of agricultural farm lots. The proposed action commits the resources of manpower, energy, materials, and finance necessary to complete the

site. The agricultural park development would also involve an irreversible commitment of utilities such as water, electrical, and communication services.

AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The primary state governmental policy that encourages the development of an agricultural park at Ke-ahole is Chapter 171, Part V, Hawaii Revised Statutes, entitled "Lands for Agricultural Purposes." The creation of an agricultural park at Ke-ahole is in harmony with the policies of the state government to encourage agricultural growth in the state, and, specifically, to strengthen the agricultural economy of the Kona coast through diversification.

ENVIRONMENTAL IMPACT STATEMENT
FOR
KE-AHOLE AGRICULTURAL PARK

I. PROJECT DESCRIPTION

STATEMENT OF OBJECTIVES

The Department of Agriculture, State of Hawaii, proposed the development of a 200-acre agricultural park at Ke-ahole on the island of Hawaii (see Figure I-1). The project is located approximately six miles north of Kailua, Kona, and one mile mauka of Ke-ahole Airport. The 209-acre development will be constructed within the confines of approximately 2,608 acres (tax key number 7-3-10:33) of state-owned land (see Figure I-2).

The objective of the agricultural park, as set forth in Chapter 171, Part V, Hawaii Revised Statutes, is to strengthen diversified agriculture in Hawaii by a plan that "...combines and concentrates in a common location agricultural activities for the purpose of production and distribution economies."

According to the agricultural park concept, the area will be subdivided into 5- to 15-acre leasehold plots for the cultivation of decorative plants, foliage, and other crops. The two most promising crops appear to be dendrobium orchids and tomatoes grown in shade houses. Residences for the farmers may be constructed on each plot or, in phase II only, on individual 10,000-square foot lots at a village center. Additional land will be set aside for a processing and distribution center and research work.

Due to constraints in water availability, the agricultural park will be developed in increments. Phase I involves the development of about 66 acres of land on the north side of the Kona Palisades Access Road. Phase II will involve the development of about 132 acres, primarily on the south side of the Kona Palisades Access Road, as shown on Figure I-2. Phase II will also include about 11 acres of archaeological reserve lots.

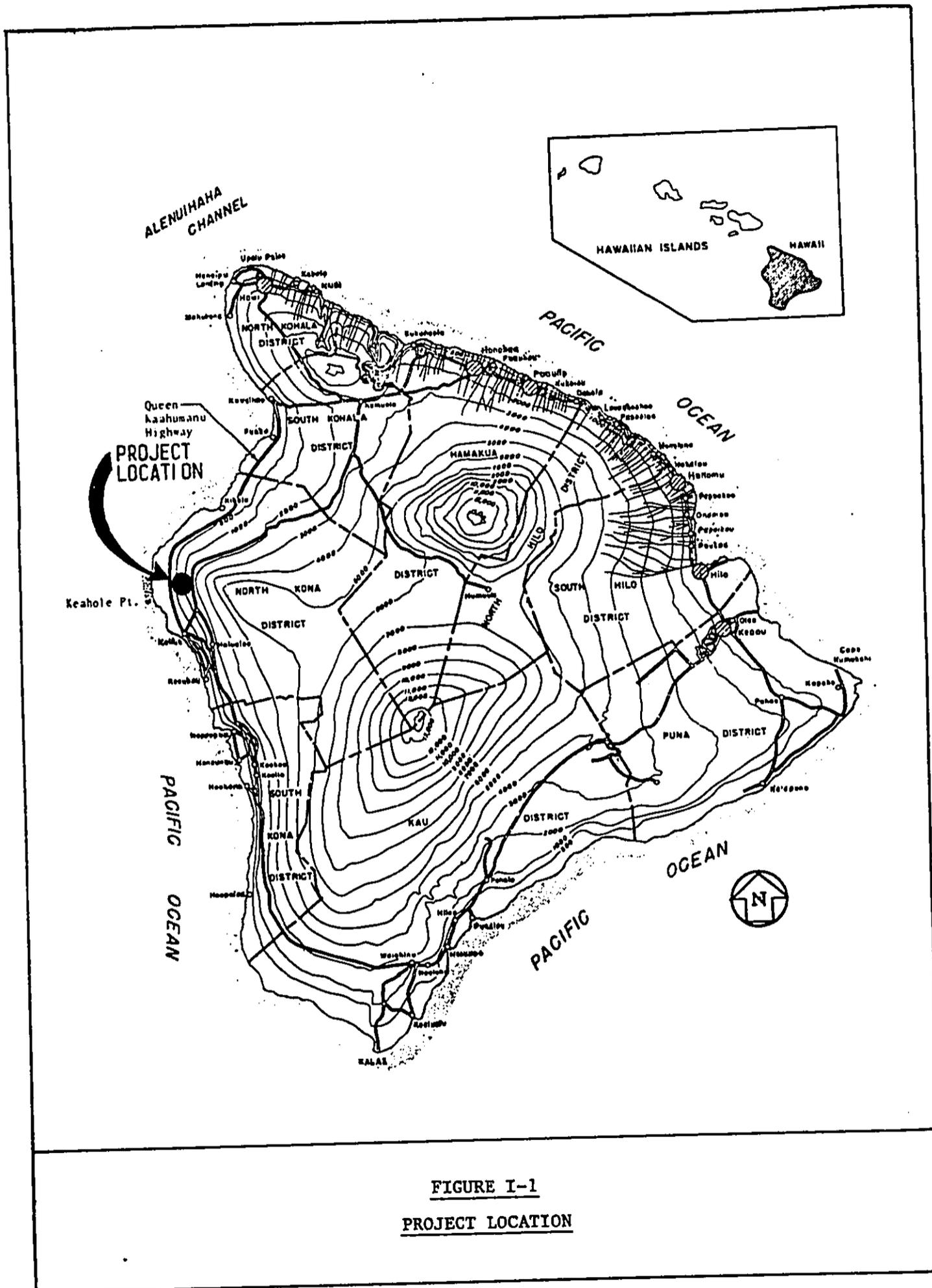
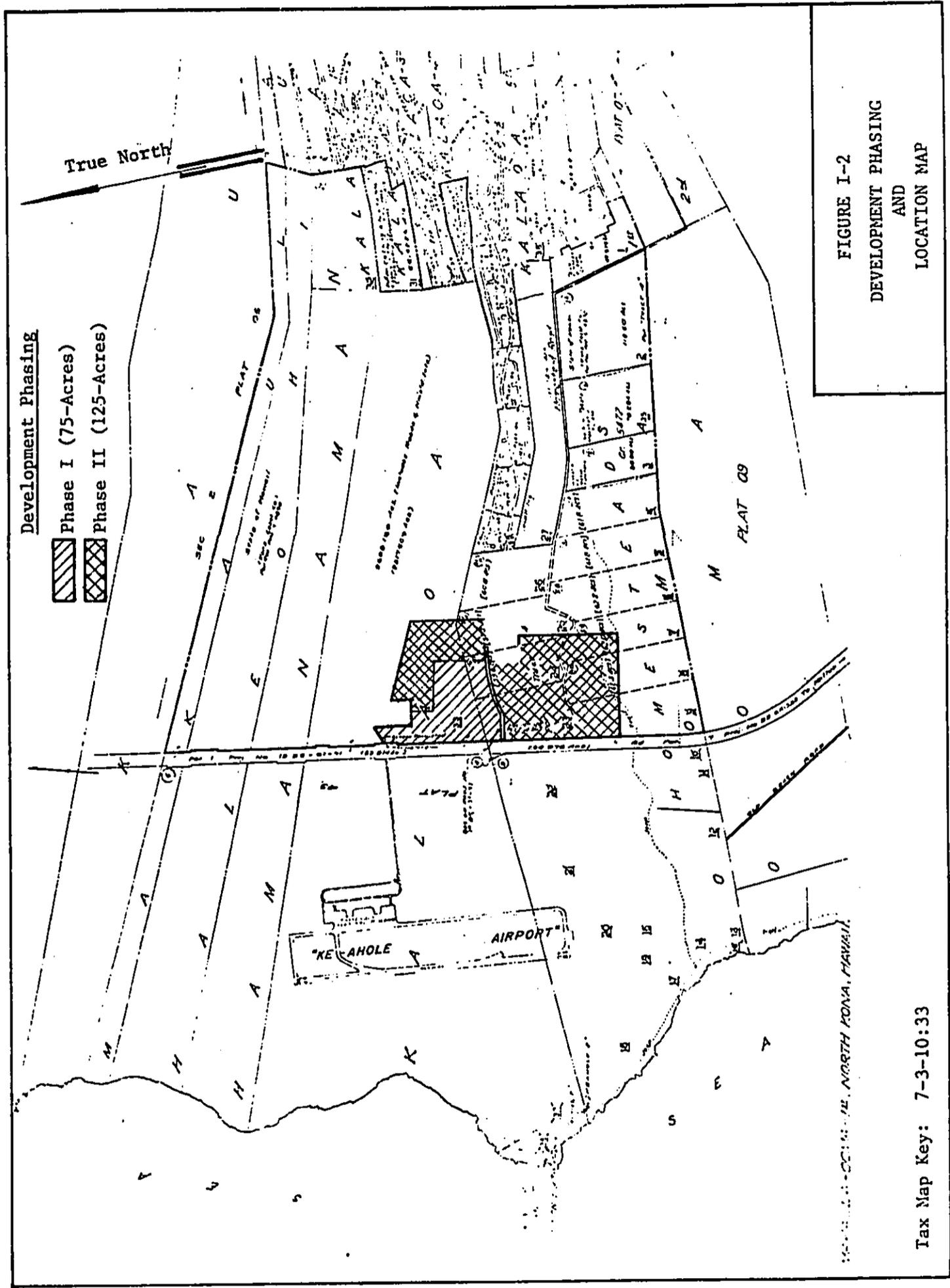


FIGURE I-1
PROJECT LOCATION



The development of phase II will depend upon the improvement of the existing water system with the installation of a larger transmission line in the proposed Kuakini bypass highway. The construction schedule for the bypass highway, however, is indefinite.

The development of phase I will begin as soon as the permits are obtained and plans are completed early in 1978. The development of phase II will be deferred until the water system is improved.

The proposed project is in consonance with state policy to encourage and support diversified agricultural development. The agricultural park will complement the existing rural environment, provide employment, and help stimulate the economy in the area.

GENERAL DESCRIPTION

Technical

The Ke-ahole Agricultural Park will be developed in several steps. The following actions are required to construct the agricultural park:

1. Archaeological and paleontological findings will be located, studied and (where necessary), salvaged. The agricultural lots and utilities will be built around any significant findings.
2. Any endangered species of vegetation or wildlife that might be found within the project boundaries will be located.
3. The electrical power for the individual sites will be supplied via new underground lines from the existing HELCO substation. Underground connections to the Hawaiian Telephone lines will provide communication for the entire site.
4. The roads in Ke-ahole Agricultural Park will be constructed according to the subdivision rules and regulations of the County of Hawaii. The access road for the agricultural park will be the existing Kona Palisades Access Road, which runs in an east-west direction from Queen Kaahumanu Highway to the Kona Palisades subdivision. The road right-of-way is 60 feet wide, with a 20-foot wide paved asphaltic section.

5. Sewage from the individual lots will be handled by cesspools. The cesspools will conform to Chapter 38, State Department of Health Rules and Regulations.
6. A connection to the existing 12-inch waterline on Queen Kaahumanu Highway will provide water services for the agricultural park. A daily demand of about 540,000 gallons of water will ultimately be required by the agricultural park at full development (about 150 acres in crop and 29 houses). The water pressure from the existing water system will be able to provide adequate water service for the phase I development. A pump station and a storage reservoir will be constructed during the phase II development to provide water service for the entire project.

The phase I water service will be limited to about 200,000 gallons per day. Due to the existing limitations of the present system, the Department of Water Supply, County of Hawaii, can meet an initial demand of 100,000 gallons per day in late 1977. An additional 100,000 gallons per day will be available in early 1979 upon the completion of a 24-inch transmission main and two 1.0-million gallon concrete tanks along a portion of Kuakini Highway. It is believed that the remaining 340,000 gallons per day needed to fully develop the 209-acre site will be available with the installation of a larger transmission line that will supplement the existing 8-inch main in Kuakini Highway. Presently, this 8-inch main acts as a bottleneck in the water system. The longer water main will be installed in the road bed of the proposed Kuakini bypass, a highway project with an indefinite construction schedule at this time. The water requirements for phase II of the project will be integrated with the overall water demand of the Kona area. Satisfying this demand will involve the options of developing additional ground or surface water and increasing the reuse of treated municipal wastewater. The plans for the Kona wastewater system(s) are still being formulated, including provisions for water reuse in parks and golf courses. Because of the distance to the main population center, however, it is not anticipated that the direct reuse plans will include the proposed Ke-ahole agricultural subdivision.

The initial phase of the agricultural park will consist of ten 5-acre lots, one 8-acre lot, 6 acres for agricultural experiments, and 2 acres for storing and packaging. The 200,000 gallons per day committed by the Department of Water Supply by 1979 will be of sufficient quantity to support the daily domestic and agricultural demands for phase I. The utilities for the initial phase will be built with provisions for future extensions.

Clearing and Grading

The existing ground surface is predominantly covered with pili grass, with isolated pockets of lantana and other plants listed in Appendix A-1. No endangered plant species will be destroyed during the clearing and grading operations.

The surface of the area to be developed is very irregular, with outcrops of lava rock that vary from about three to four feet high. The maximum heights of the cuts and fills for the farm roads and lots will be about five feet, and the grading will mostly consist of leveling the tops of the outcropping lava rock and other ground irregularities.

Social

The project will help strengthen the socio-economic base of the Kona area by promoting the development of diversified agriculture. Full- and part-time jobs will become available as the agricultural park tenants develop and expand their operations. The development of the agricultural park is also in accordance with the rural character of the area.

Environmental

The major environmental characteristic associated with the proposed action is the replacement of open space with a farming environment that is to be used for the cultivation of flowers, foliage, and vegetables. Construction of the agricultural park is not expected to significantly affect the archaeological sites. The agricultural lots and utilities will be adjusted to avoid the disturbance of significant archaeological findings. The existing sparse vegetation at the project site will be destroyed with the development of agricultural activity.

USE OF PUBLIC FUNDS OR LANDS

The construction cost (Table I-1) of the roads, water and sewage system, electrical and communication service will be paid from state funds. Maintenance cost for the roads and water system will be paid with county funds.

TABLE I-1

ESTIMATED KE-AHOLE CONSTRUCTION COST

<u>Item</u>	<u>Estimated Cost (\$1,000)</u>
Road Construction	\$188
Drainage System	66
Water System	191
Power Supply*	<u>23</u>
Total	\$468

* Cost difference between overhead lines (\$21,000) and the proposed direct burial system (\$44,000). Telephone lines will also be underground

As mentioned previously, the project will be built entirely on state-owned lands.

HISTORICAL PERSPECTIVE, PHASING AND TIMING OF ACTION

The concept of the agricultural park originated with Act 110 of the 1972 legislative session. Act 110 amended Chapter 171, Hawaii Revised Statutes, and became Part V, entitled "Lands for Agricultural Purposes." This section authorized "the Board of Land and Natural Resources to acquire by lease, exchange, direct purchase or eminent domain private property for disposition for agricultural purposes, including but not limited to agricultural parks."

A tentative schedule for phase I Ke-ahole Agricultural Park facilities calls for design and construction to be conducted in early 1978. The date for the ultimate development of the site is dependent on the availability of an adequate water supply.

II. DESCRIPTION OF ENVIRONMENTAL SETTING

CLIMATE

Characteristic of the leeward areas of the Hawaiian Islands, the climate of the Ke-ahole region is warm and semi-tropical. Seasonal changes are mild. Temperatures are fairly uniform except at higher elevations. Skies are clear or partly cloudy 60 to 70 percent of the time. During the winter months, an occasional cyclonic or 'Kona' storm may disrupt the generally prevailing weather conditions.

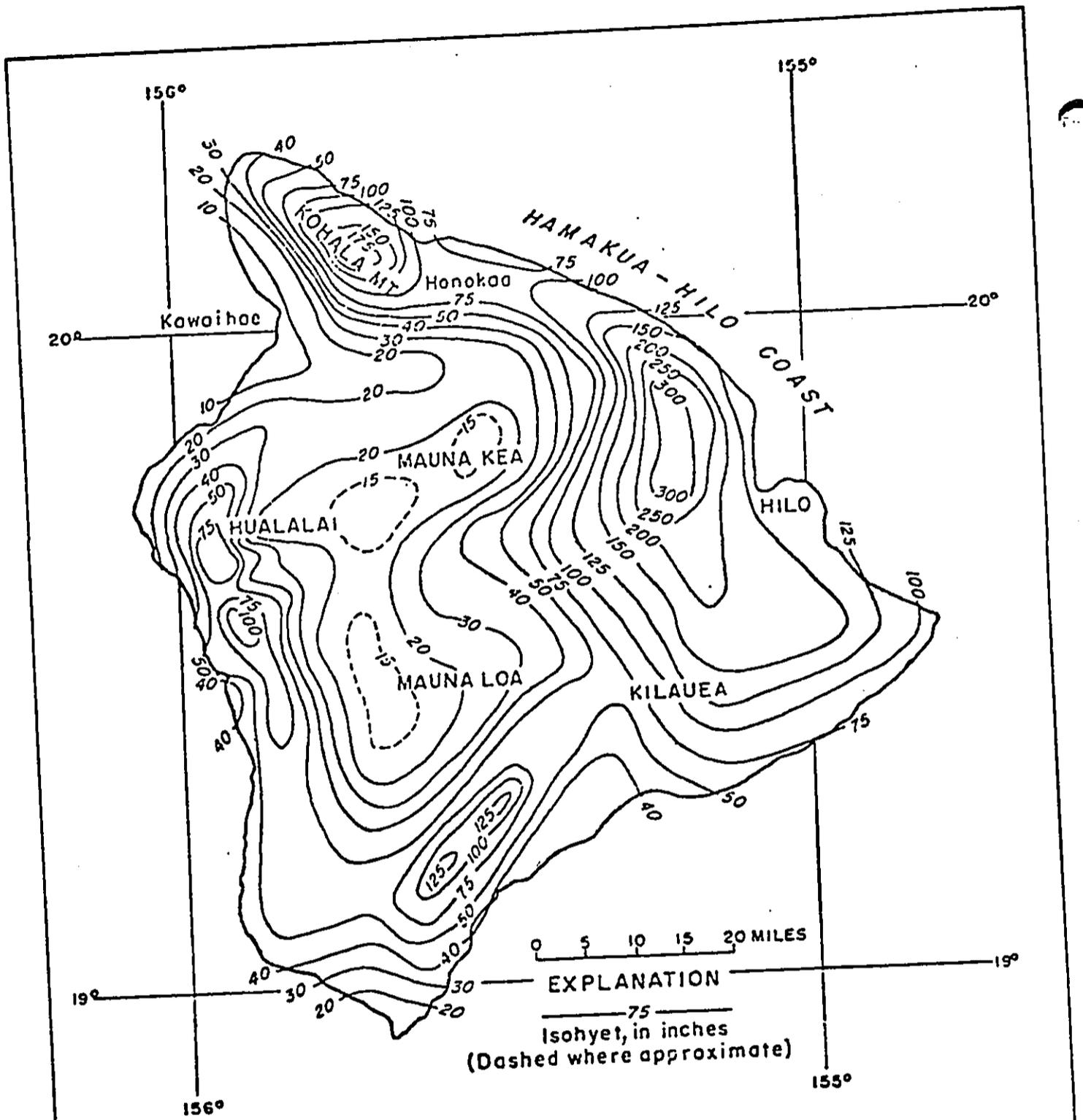
The slight seasonal variation of the temperature is due to the tempering effect of the surrounding ocean. The average temperatures for the warmest and coldest months of the year differ by only 9 deg F, while the daily range is between 10 and 18 degrees. Mean daily minimum and mean daily maximum temperature are 69 and 83 deg F. respectively.

In general, the winds in the Hawaiian Islands are northeastern trades, but, along the Kona coast, winds are predominantly from the southwest due to the sheltering effect of Mauna Kea, Mauna Loa, and Hualalei. Diurnal heating and cooling of the island give rise to onshore breezes during the day and offshore breezes at night. The wind speed ranges from 0 to 15 mph 96 percent of the year. During Kona storms, low pressure fronts cause southern winds that may become gusty, with speeds approaching 30 to 40 mph.

Annual rainfall along the coastal region averages only about 20 inches but increases at higher elevations. At the 3,000-foot elevation on the slopes of Hualalai, the annual rainfall averages 75 to 100 inches. The wetter periods of the year occur from May through September, which are usually the dry months for the rest of the state. Rainfall maximums tend to occur in late afternoon and evening from showers that form due to orographic effects on the daytime sea breezes (see Figure II-1).

TOPOGRAPHY AND GEOLOGY

Lands in the subject region generally slope at eight to ten percent toward the sea. In the lower elevations along the coastline, the land is



Source: U.S. Geological Survey, The Water Resources of the Kona Area, USGS Circular C46

FIGURE II-1
RAINFALL DISTRIBUTION, ISLAND OF HAWAII

relatively flat. Due to the low rainfall and rocky conditions, the area is marked only by small, dry gulches.

The geology is dominated by the Hualalai volcanic series of rocks. The basaltic substrata--consisting of poorly layered, heterogenous sequences of a'a, clinkers, and pahoehoe--are porous and permeable. The layers are from 6 inches to 100 feet in thickness and contain lava tubes, cracks, crevices, and fissures. In specific areas where dense a'a flows have been formed due to settling, erosion, and subsequent flows, the surface may be nearly impermeable.

The elevation along the makai boundary of the subject area is 140 feet and climbs to approximately 270 feet along the mauka border.

SOILS

According to the Soil Survey of the USDA-Soil Conservation Service and the UH-Agricultural Experiment Station, the main type of soil in the area is known as the Punaluu series. This consists of extremely stony or rocky peat and stony or rocky mulch. Soil features include fragmental a'a and pahoehoe at depths of less than 10 inches.

HYDROLOGY AND DRAINAGE

Erosion has not yet significantly affected the Hualalai slopes, and no significant drainage pattern has been established. Although some sedimentary rocks may be found in narrow fringes along the coastline, unlike the older islands of the Hawaiian chain, there is no comparatively level coastal plain comprised of a wedge of sediment that acts as a caprock.

Because of the high permeability of the basaltic rock and light rainfall, there are no perennial streams in the area. Overland flows are negligible, except during severe storms when gulches may have heavy discharges. There is no recorded flooding in the project area.

Groundwater occurs as a thin, unconfined basal lens. At the coast, the hydraulic gradient approaches zero; 1,000 feet inland, it is measured at 1 foot or less. Within two to three miles from shore, the basal lens

rises with a gradient of 1/2-foot to 3 feet per mile. In general, within several thousand feet of the coast, the basal water is brackish, with a chloride content of 1,000 to 2,000 ppm. Extremely low chloride water (10 ppm) is currently obtained by the County of Hawaii for domestic use from two wells located 6,000 feet inland from Kahaluu Bay.

Since the substrata is porous and the local groundwater lens is thin, the possibility of finding reliable supplies of low chloride basal water near the project area seems remote.

Neither the Department of Water Supply of the County of Hawaii nor the Division of Water and Land Development of the State Department of Land and Natural Resources has any future plan for water resource development in the immediate vicinity of the agricultural park.

UTILITIES

Hawaii Electric Light Company (HELCO) is the only public utility providing electrical energy on the island of Hawaii. Its main generating facilities are located in Hilo, with several minor plants located around the island. HELCO generates its electricity by the use of oil-fired steam generators. In addition, three sugar companies supply electricity to the island power system with power generated by the burning of sugar-cane waste (bagasse). This additional power from the sugar companies accounts for approximately 30 percent of HELCO's power. The islandwide capacity is 124 MW, with a present peak demand for the entire island of 72 MW.

A 69 KV overhead transmission line is located along the east boundary of Kaahumanu Highway. This transmission line connects to an existing HELCO generation and switching substation that is located east of the Ke-ahole Airport Access Road. The transmission line then branches east toward Hawaii Belt Highway and north toward Kawaihae. The substation provides power for the Ke-ahole Airport complex by a 12.47 KV line (see Figure II-2).

The Department of Water Supply, County of Hawaii, has installed a 12-inch water line along the eastern boundary of Queen Kaahumanu Highway. This system is supplied by a series of deep-water wells located in

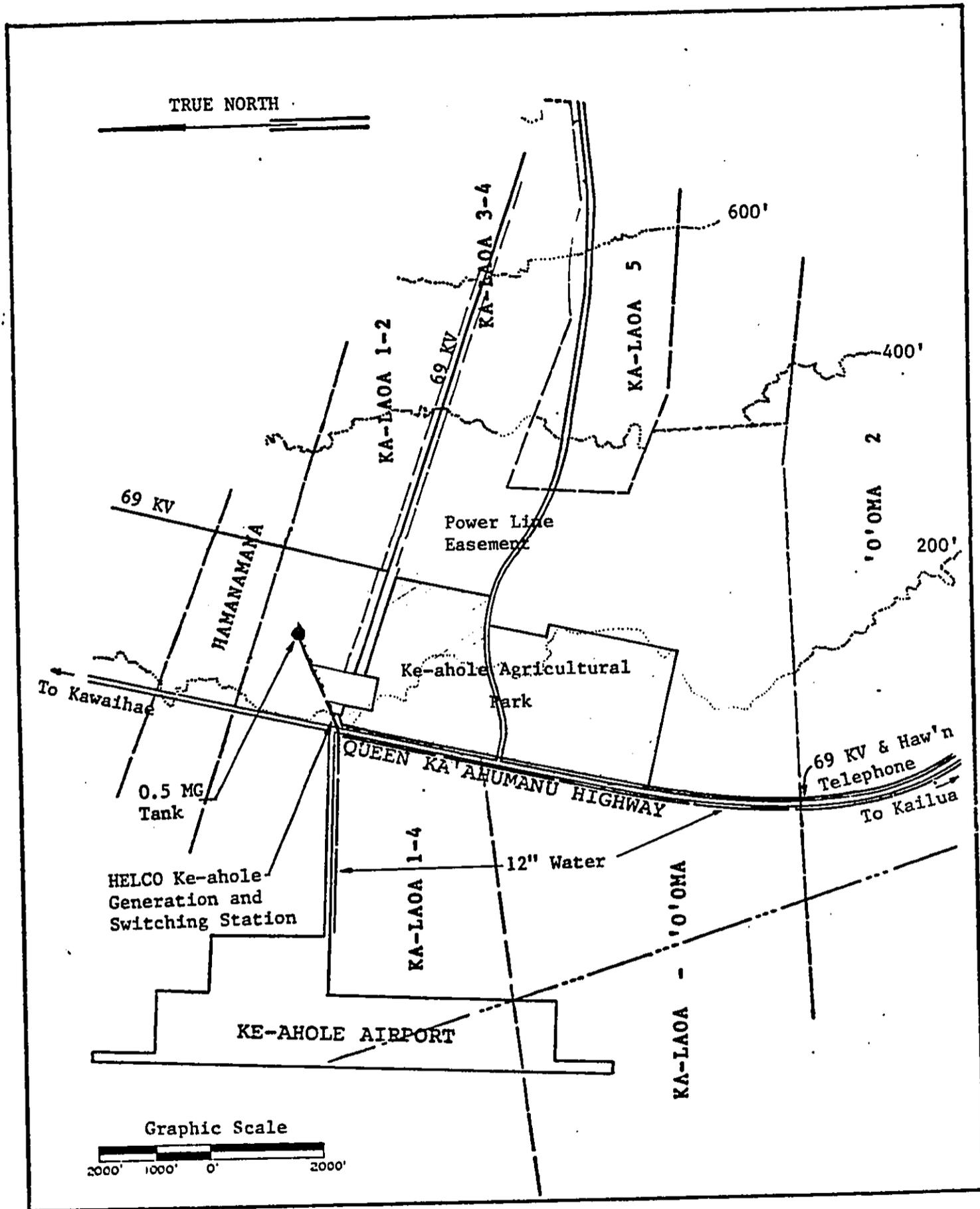


FIGURE II-2
EXISTING UTILITIES

Kahaluu. The main purpose of this line is to service the Ke-ahole Airport area. The Department of Water Supply has indicated that a maximum of approximately 100,000 gpd will be available for use at the agricultural park in late 1977. Another 100,000 gpd will be available in early 1979 upon the completion of a 24-inch transmission main along a portion of Kuakini Highway and the construction of two 1.0 MG concrete tanks. A 500,000-gallon storage reservoir, located east of the airport access road, provides fire protection for the airport complex only (see Figure II-2).

There are no municipal sewer facilities available within the Ke-ahole area. Although a sewer collection system along the highway is proposed in the North Kona Sewerage Master Plan, its construction is not anticipated for another 20 to 30 years. The nearest treatment facility is located at the Ke-ahole Airport. A 40,000 gallons per day secondary sewage treatment plant treats the domestic sewage from the airport complex. The airport system disposes its treated effluent into injection wells.

An existing Hawaiian Telephone line that is located on the same poles as HELCO's transmission line will provide the necessary communication service for the agricultural park.

TERRESTRIAL BIOLOGY

With the exception of one Hawaiian owl, Pueo (Asio flammeus), no endangered species of plants and wildlife were found in the vicinity of the proposed project during a survey conducted in July 1977 by Beatrice Krauss of the Lyon Arboretum, University of Hawaii. It should be noted that the Hawaiian owl was seen in the area near the southern boundary of the state-owned parcel outside of the area to be developed.

Similar vegetation to that found in the vicinity of the Ke-ahole Agricultural Park project is found in other areas of the island. The vegetation found during the survey consisted of a few native, endemic, and indigenous plants. Most of these plants were found in a 35-meter transect along the southern boundary of the state-owned parcel (see Figure II-3). Other vegetation found are plants brought in by early settlers from Polynesia and the exotic variety that were introduced later.

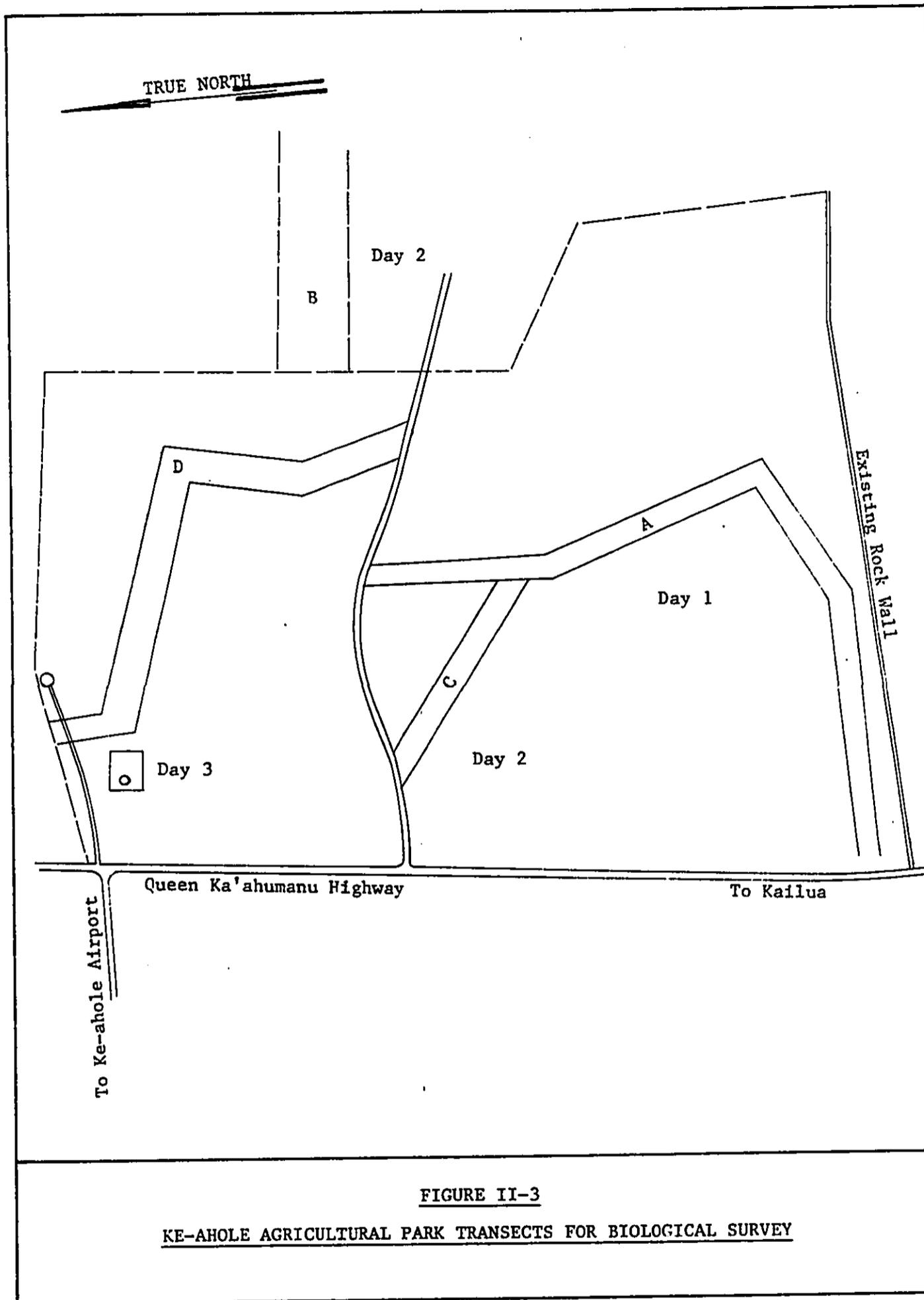


FIGURE II-3

KE-AHOLE AGRICULTURAL PARK TRANSECTS FOR BIOLOGICAL SURVEY

The Hawaiian owl was the only endemic Hawaiian bird observed during the survey. A number of exotic species were either seen or heard. They include several flocks of white-eyes, cardinals, and pheasants. The presence of other mammals, such as mongoose, mice, and goats, was indicated by fecal matter and skeletal remains found in the area. Other species that may inhabit the area are the francolin (Francolinus sp.) and the endangered Hawaiian hoary bat (Lasiurus cinereus semotus), but these were not seen during the survey.

The detailed listing of the vegetation in the area can be found in Appendix A-2 of this statement dealing with the biological description of the project site.

HISTORICAL AND CULTURAL SETTING

The Ke-ahole Agricultural Park is located mauka of Queen Kaahumanu Highway in the ahupua'a (land division) of Ka-laoa 1-4 and Ka-laoa-'O'oma, North Kona (see Figure II-4).

The Ke-ahole area is part of a broad, moderately sloping leeward plain stretching from Mahu-kona south of Kailua, and from the combined uplands of Hualalai, Mauna Kea and the Kohala mountains west down to the coast (see Figure II-5). This region is characterized by three terrestrial zones that directly influenced the settlement and associated subsistence activity of this area. These three zones are defined as follows:

1. The coastal zone: barren, rocky shorelines, isolated bays with coralline beach formations, inland ponds, brackish basal water, localized freshwater springs (dependent upon mauka conditions), and strand vegetation occurring in limited soil deposits
2. The transitional or "barren" zone: frequently bare, nondis-integrated lavas, arid conditions, extremely limited by scrub vegetation occurring in Kipuka (variation or change of form) surrounded by recent lava flows, and virtually no soil development; this is somewhat mitigated further north where Pleistocene lavas have begun to break down into thin soils and where sufficient runoff is generated by mauka rains to feed seasonally intermittent washes

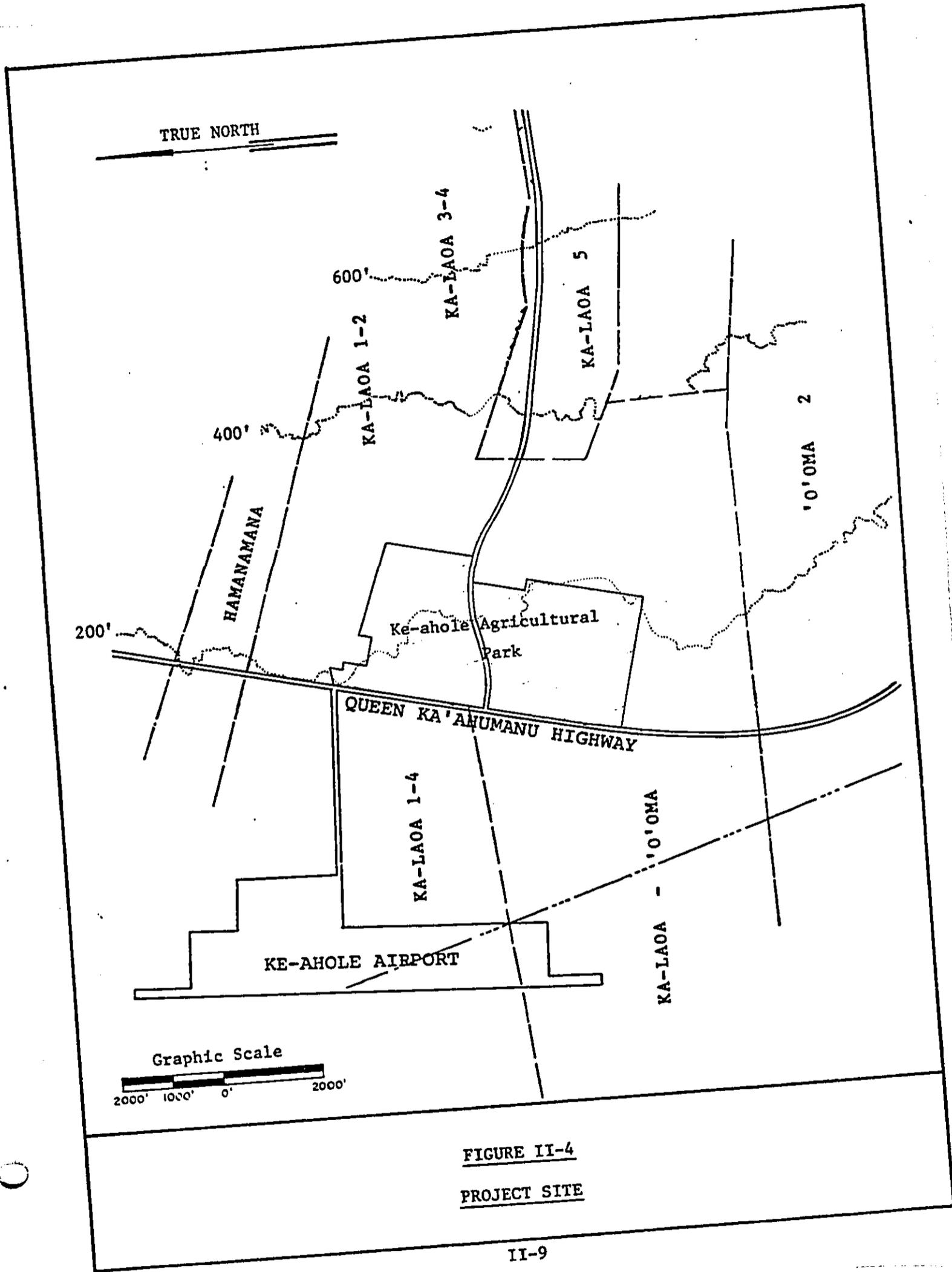


FIGURE II-4
PROJECT SITE

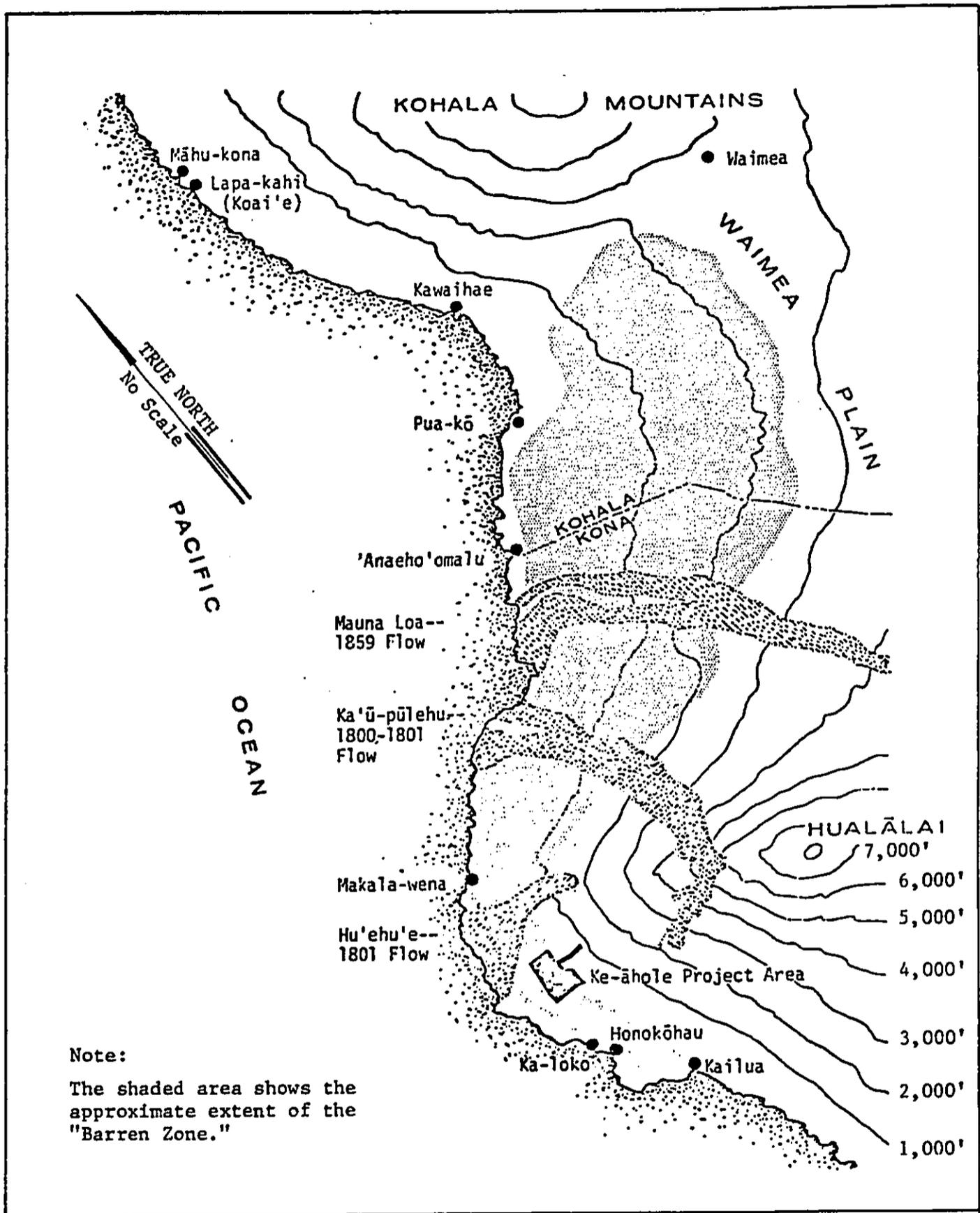


FIGURE II-5

LEEWARD KOHALA-NORTH KONA REGION SHOWING THE "BARREN ZONE"

3. The upland forest zone: moderate soil development, variable but adequate moisture from the soil, and well developed mixed-broad leaf forest vegetation

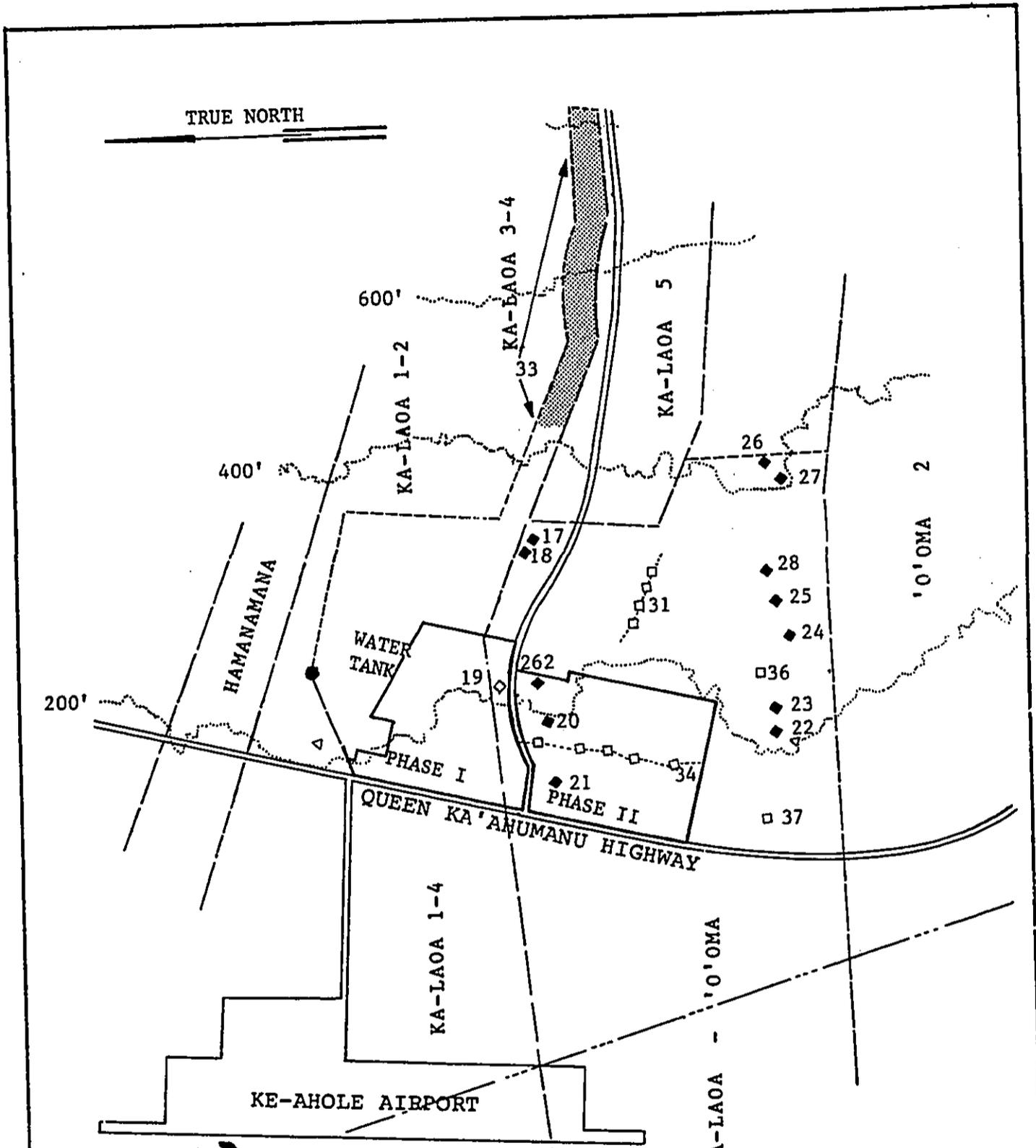
It should be noted that this environmental zonation is related to differences in relative elevation as well as to distance from either the coast or the mountains.

Previous archaeological investigations of the area catalogued numerous prehistoric cultural features on and near the coast. One such investigation (Ching, 1971) located a large lava-tube containing cultural remains and petroglyphs. This cave is listed in the State Register of Historic Places (Site 262). Other cultural features were also reported to be in the vicinity, including a second lava-tube with similar petroglyphs.

An initial archaeological reconnaissance survey of the Ke-ahole Agricultural Park site by Archaeological Research Center Hawaii, Inc. shows that a major portion of the area is fully within the desolate "barren zone." Twenty-two complexes and isolated archaeological features, including the previously registered lava-tube cave (Site 262), were found in the Ke-ahole project site (see Figure II-6).

The number of cultural features found in the lower section of the project area includes the following:

1. Twelve major habitation caves in collapsed lava-tube sinks
2. Two minor shelters in lava bubbles
3. One surface shelter or wind break
4. Twenty-four large ahu of stacked lava rock, some of which appear to mark possible trail alignments
5. Five stone platforms, not including those in the habitation caves
6. Three stone platforms and well-defined pavements, each supporting a well-stacked ahu
7. Six walled enclosures, one of which appears to be a historic homestead



Note: Except for the previously-recorded Site 262, all other numbers have been abbreviated to the last two digits. The open squares indicate the large, stacked ahu and possible trail alignments.

FIGURE II-6
 ARCHAEOLOGICAL SITES RECORDED BY ARCH STUDY

8. One free-standing, core-filled rock wall, a historic hupua'a boundary wall

All of these features are comparable to those found in the "barren zone" elsewhere in the region. These findings conform to the expected pattern of archaeological sites, except for the numerous "hunting blinds" and the scoria quarries reported elsewhere in the region that were not found within the Ke-ahole project area.

The entire mauka corridor was found to be part of an extensive upland agricultural and residential system (Site 6433). Features observed in the mauka corridor included house enclosures; platforms; large, well-stacked ahu; terraces; miscellaneous wall sections; and numerous clusters of rock mounds, all suggesting that the local crop was probably sweet potato.

A more detailed discussion of the archaeology of the area is given in Appendix A-3 of this statement.

SOCIO-ECONOMIC BACKGROUND

This section presents a brief overview of the economic and social trends occurring in the area surrounding the proposed agricultural park at Ke-ahole.

State of Hawaii

During the years since statehood in 1959, the State of Hawaii has exhibited dramatic economic growth, with the state gross product increasing at an average annual rate of 10.8 percent, reaching \$75 billion in 1976, as shown in Table II-1. The economy of Hawaii during the past decade has become more diversified and dynamic, with the economic emphasis on sugar and pineapple being replaced by the visitor, construction, and retail industries.

Kona District

Based upon the 1970 census, the population of Hawaii County was 63,468. Within the Kona District, North Kona's population was 4,832 and neighboring South Kona was 4,004. According to 1975 estimates, the

TABLE II-1
MAJOR ECONOMIC ACTIVITIES
(\$ million)

	1966	1975	1976	Average Annual Change	
				1966-76	1975-76
Gross state product	\$2,701	6,888	7,545	10.8%	9.5%
Gross state product (1960 \$)	2,365	3,786	3,944	5.2	4.2
Retail sales	1,297	3,551	4,000	11.9	12.7
Visitor expenditures	280	1,270	1,420	17.6	11.8
Manufacturing:					
Sugar and pineapple	318	506	365	1.5	-27.9
Diversified	294	811	835	11.0	3.0
Federal Government:					
Defense	517	1,027	1,085	7.7	5.6
Nondefense	234	952	1,085	16.6	14.0
Construction completed	371	1,140	1,012	10.6	-11.2
Diversified agriculture	37	58	60	4.8	2.9
Resident population (000)	710	868	887	2.2	2.1
Total visitor arrivals (000)	835	2,829	3,195	14.4	12.9

Source: Bank of Hawaii

resident population of North Kona had risen to 7,700 while that of South Kona remained almost constant at about 4,000. These figures are expected to increase to 12,700 and 4,600 respectively by 1980.

Tourism is presently the dominant industry in Kona and has the greatest potential for the future. The construction of retailing industries is closely linked to tourism. Expenditures by visitors account for a substantial amount of Kona's annual revenues. The contribution from tourism was estimated to be \$80 million for 1975. This revenue is projected to rise to about \$130 million per year by 1990.

The construction industry is strongly interrelated with tourism and other businesses. Hotels, housing, roads, and offsite construction are ongoing to keep up with the increasing demands exerted by tourists and residents. The jobs generated through construction and their effect on the various retailing businesses of the area is significant. In 1970, earnings by employees of the construction industry totaled approximately \$9 million.

Kona's agricultural crops are numerous and varied due to the unique climatic conditions, topography, and soils of the district. The most important of the diversified agricultural crops in Kona, coffee, produces \$1.5 million annually, which is 48 percent of the total revenue produced by Kona's agriculture. The coffee industry has been on a continuing decline since 1957-58, when a peak of 18,496,000 pounds valued at \$6.5 million was produced. The forecasts indicate a continued long-term decline. A recent increase in the price of coffee, however, has made the coffee industry more lucrative.

Other promising crops are macadamia nuts and avocados. Macadamia nut production rose 14 percent in fiscal year 1975 and, by 1985, macadamia output is forecast to be about \$12.5 million. Overall, the agriculture of Kona generated \$3.2 million of income in 1973. By 1980, this figure is expected to rise to about \$8.6 million and, by 1985, to \$18.4 million. Only a fraction of the area zoned agricultural in the Kona area, however, is actually being cultivated. The economic section of the 1977 Hawaii State Plan presents a good discussion of the general constraints on the

success of diversified agriculture in Hawaii. The constraints applicable in some degree to Kona include the following:

1. Small Hawaii market, which minimizes the opportunity to take advantage of economies of scale
2. Competition in Hawaii's market from overseas producers
3. High costs in supplying overseas market
4. Short-term lease arrangements that discourage investments
5. Difficulty in obtaining agricultural loans
6. Poor coordination between production and local demand
7. Absence of effective marketing
8. Occasional water shortages in some areas
9. Poor quality control
10. Tropical crop diseases
11. Delay between planting and production for some crops (e.g., macadamia nuts)

The proposed Ke-ahole agricultural subdivision will tend to minimize many of these constraints in that the initial economic burden of development will be reduced by the installation of supporting utilities by the state. Also, the projected market demands for the proposed crops--flowers, decorative plants and foliage, and some vegetables--are among the ones showing the highest annual growth rates in Hawaii. Another positive aspect is that the agricultural development will be phased so that there will be an opportunity to develop agricultural techniques as well as a firm market.

III. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

AIR QUALITY

During construction, dust and emissions from construction vehicles will be generated. The impact of these pollutants, however, will be localized and temporary. After completion, dust from agricultural activities and from vehicles associated with the project is expected to be insignificant.

It is the opinion of biochemists who were consulted that chemical sprays required for the control of insects and diseases of dendrobiums and tomatoes would have no adverse effect on the atmosphere. It is also assumed that all major crops would be grown in shade houses or greenhouses and that there would be no opportunity for the wind to blow sprays on other plants for which the spray was not intended. Spraying by aircraft is not expected to be used in the agricultural park. Furthermore, the average wind velocity for this area is not sufficient to blow the chemical sprays a substantial distance.

DRAINAGE

The slope of the Ke-ahole Agricultural Park site is very uniform, with no significant drainage channels in the area. The annual rainfall is approximately 20 inches, and the highly permeable lava allows the runoff to rapidly percolate into the ground. It is apparent from the high permeability of the land and the low annual rainfall that the development of the agricultural park will not cause drainage problems.

NOISE

Construction activities will generate a certain amount of noise. No blasting is planned for the project itself; however, some blasting may be required for the construction of the waterline, powerline, and roads, if exceptionally hard basaltic rock is encountered. There are no residential homes or commercial areas that will be affected by the noise from the construction activities and farming operations.

VISUAL IMPACT

The aesthetic effect of the agricultural park may be significant since the existing lava fields are a unique scenic resource of the Kona area. The construction activities and equipment will disrupt the present, generally natural landscape. This visual disturbance will diminish after construction activities are completed. Although an existing road passes through the site, the net visual impact of the area as viewed from Kaahumanu Highway will consist of agricultural activities, greenhouses, farming equipment, and an occasional residence. The visual impact is expected to be generally attractive to many people in that there will be a relief from the monotony of the lava field.

To minimize any detrimental visual effects, the power and telephone lines will be placed underground. This measure is in line with the proposal to make Queen Kaahumanu a scenic highway that involves a plan by the State Department of Transportation to move the existing powerline some 3,000 feet mauka.

UTILITY DEMAND

At its ultimate development, the Ke-ahole Agricultural Park will cover a total of 209 acres. Since the development will be incremental, the utility needs, such as roads, water, electricity, telephone, and sewage disposal, will increase gradually.

With the exception of water these utility demands will easily be accommodated by the existing utilities of the area.

The initial phase of the proposed development will require about 200,000 gpd from the existing water system. When this becomes available for use by early 1979, it will adequately supply water for the first phase development of about 66 acres. The additional water needed to support the remaining 143 acres will require the replacement of an 8-inch water line in Kuakini Highway with a larger transmission line.

GROUNDWATER IMPACT

The groundwater underlying the area could eventually be affected to a very slight but insignificant degree by the seepage of domestic sewage and

chemicals used in crop production. The domestic sewage produced by the twenty-nine families will be disposed of by using cesspools. A total of approximately 8,700 gallons per day will be discharged in the twenty-nine cesspools. Of this amount, a portion will reach the groundwater and eventually the ocean off the Kona coast (Class AA). The volume of sewage which reaches the underlying groundwater is not expected to have a significant impact because it is very much smaller than the groundwater flux, and most of the possibly detrimental material will be removed by its passage through the intervening geological formations.

The chemical sprays used on the crops should not have a significant effect on the environment. Sprays used on potted dendrobiums would be largely absorbed by the plants. Approved sprays for tomatoes would be applied to the dry leaves and fruits of the plants and would have little opportunity to mix with irrigation water and seep through the lava.

TERRESTRIAL BIOLOGY IMPACT

The construction of the Ke-ahole Agricultural Park will result in the destruction of the present sparse natural vegetation within the boundaries of the proposed park. The few native, endemic, and indigenous plants found there, however, are not rare and can be found in many other areas on the island. It should also be noted that the proposed agricultural park is being located in the area of the state-owned parcel having the least vegetation.

Similarly, the potential impacts to wildlife are expected to be minimal in that there is very little wildlife in the project area. The field survey conducted for this statement by Beatrice Krauss showed that the area near the southern border of the state-owned parcel had somewhat more vegetation and more evidence of wildlife (including the endangered Hawaiian owl) than the area of the proposed agricultural development.

According to the review comments by the Federal Fish and Wildlife Service, it is probable that any displacement of wildlife from the area to be developed will result in the loss of those individuals because of the presumed maximum concentration of wildlife species in the largely undisturbed adjacent areas. As previously noted, however, this effect is

expected to be minimal because of the very low wildlife population in the project area.

HISTORICAL AND CULTURAL IMPACT

The archaeological reconnaissance completed by Archaeological Research Center Hawaii, Inc. as a part of the EIS preparation has located the known sites well enough to permit their avoidance, where possible, during the development of Ke-ahole Agricultural Park. Where avoidance is not practicable, additional archaeological surveys will be conducted to determine the proper site disposition. Specific recommendations presented by Archaeological Research Center Hawaii, Inc. for additional surveys are as follows:

1. A portion of the agricultural park should be initially located in the area north of the Kona Palisades Access Road. This area is almost completely clear of archaeological sites. The initial development of approximately 66 acres for phase I of the agricultural park in this area should have no immediate impact upon sites 6417 and 6418 (see Figure II-6). Future expansion of the agricultural park in a mauka direction, however, will require additional evaluation of these two sites.

Although the initial development of the site will not have a direct impact on Site 6419, it is recommended that this site be systematically tested for subsurface deposits.

2. The initial development will have an adverse impact upon the archaeological sites located south of the Kona Palisades Access Road. These sites include three lava-tube habitation caves (sites 6420, 6421, and 6422) and a series of ahu and small lava-bubble shelters that are apparently associated with a north-south trail (Site 6234). It is recommended that full salvage excavation be undertaken for these sites. It is further recommended that arrangements be made for either reinternment or for transport to a designated repository in the event that human burials are found at Site 6434. These studies will be done prior to phase II construction of the agricultural park.

3. The development of the agricultural park will potentially have an adverse impact upon the registered Site 262. Test excavations at the very minimum, but preferably full salvage excavations should be considered.

Finally, with the current restriction on development because of the availability of water with the existing facilities, the remainder of the sites located in the mauka areas need no further work at this time. Should the proposed agricultural park expand in this direction, these sites must be reevaluated to mitigate any potentially adverse impact the expansion may have upon these resources.

Eligibility of any sites for the National Register of Historic places will be determined by additional surveys. The requirements of Section 106 of the National Historic Preservation Act of 1966 will be met and coordinated with the State Historic Preservation officer.

SOCIO-ECONOMIC IMPACTS

The development of an agricultural park at Ke-ahole will help expand the social and economic base of the community and broaden the diversification of agricultural products of North Kona.

Potential impacts on various sectors of the economy are discussed below.

Construction Industry

Building and road construction will provide local contractors and laborers with employment opportunities. The installation of utilities will require the services of local contractors. Local material suppliers will also benefit from the project.

Agriculture

Besides the general impact on the Kona area, the full benefits of the project will be realized by the 29 families selected to occupy the land.

The costs, returns, and net profit per acre will be partially dependent on the crops planted. Production feasibility based on ecological adaptation, market potential, and net income favor such crops as dendrobiums, potted flowers, foliage plants, and tomatoes. The high cost of bringing in soil or other growing media would make the production of extensive type crops uneconomical.

Based on a five-acre lot (four acres planted), the dendrobium orchid, which is considered to be a very promising floral product for Hawaiian and U.S. mainland markets, will produce an estimated net return of \$8,890 per acre. An estimated budget indicating possible net income is shown in Table III-1. The production of potted dendrobiums would require land levelling (estimated cost of \$1,400 per acre) and shade houses but no extensive importation of soil. The budget shown in Table III-1 indicates that a five-acre farm lot with four acres in cultivation would be adequate in size for a highly intensive crop, such as dendrobiums.

Other possible alternative crops for the Ke-ahole park land are various vegetables. Vegetables such as tomatoes and green peppers are expected to be well adapted to greenhouse production. Tomato production appears to offer the best possibility. This crop, under optimal conditions, would be as intensive or more intensive than dendrobiums, but, because of higher production costs, it would yield a lower net income. An estimated budget indicating possible net income from greenhouse tomatoes is shown in Table III-2. Tomato production would require bringing in 10 inches of fill soil at an estimated cost of \$10,000 per acre.

The abovementioned crops are only some of the most feasible examples of intensive crop production. In actuality, most farmers would be expected to grow a variety of crops and would adjust their production over time to changes on market conditions and costs of production.

Tourism

Tourism, presently Kona's largest economic industry, will be further supported by the creation of the Ke-ahole Agricultural Park.

The agricultural park at Ke-ahole would require a packing and distribution center for floral products. In addition to being an attraction

TABLE III-1

COSTS AND RETURNS AND NET PROFIT PER ACRE,
DENDROBIUM PRODUCTION IN KE-AHOLE*

Item	Per Acre	4 Acres
Gross Returns: 15,000 dozen sprays per acre @ \$3/dozen f.o.b. farm	\$45,000	\$180,000
<u>Costs:</u>		
Lease Rent	300	1,200
Property Tax	8	32
Labor and Management	20,000	80,000
Water: 1,015,000 gal @ \$55¢/1,000	602	2,408
Fertilizer, Fungicides, Insecticides, and Herbicides	1,200	4,800
Replacement of Pots, Planting Media, etc.	3,000	12,000
Depreciation and Amortization of Investment	8,000	32,000
Miscellaneous Operations Costs	3,000	12,000
Total Costs	\$36,110	\$144,440
Net Return to Management and Capital	\$ 8,890	\$ 35,560

* Adapted and modified from budget data in a publication by Samuel G. Camp and Perry F. Philipp, entitled "The Economics of Growing Dendrobium on Oahu for Mainland Exports, "University of Hawaii Agricultural Experiment Station, Departmental Paper 37, March, 1976.

TABLE III-2

COSTS AND RETURNS, TOMATO PRODUCTION AT KE-AHOLE*

Item	Per Acre	Per Farm (4 acres)
Gross Return: 224,000 # @ 33¢/lb	\$73,970	\$295,680
Labor and Management Cost	23,000	92,000
Materials	15,000	60,000
Depreciation and Maintenance	20,000	80,000
Interest on Investment	7,000	28,000
Miscellaneous Overhead	2,000	8,000
Total Cost	\$67,000	\$268,000
Net Returns	\$ 6,920	\$ 27,680

* Adapted and modified from budget data in a publication by Perry F. Phillip, et al., entitled "The Economics of Growing Tomatoes in Plastic Greenhouses on Oahu," University of Hawaii Agricultural Experiment Station, Departmental Paper 11, July 1973. Since the price of tomatoes is subject to great variation, net profit would also fluctuate from year to year.

for tourists, the complex, with its excellent location near the airport, would serve as a means of promoting and selling the flowers and foliage to tourists.

Employment

Employment will increase temporarily during the construction phase, but not significantly. Additional employment will be created by the packing and distribution center and by the hiring of field helpers to tend and harvest the crops. It is estimated that between 200 and 300 workers will be employed by the 200-acre development. The number of employment opportunities is dependent on the variety of crop under cultivation.

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

The proposed action is in consonance with the current land use, zoning, and general plan designations for the area. The mauka portion of the 2,608-acre parcel of state-owned land in question is designated for agricultural use by the State Land Use Commission (SLUC). This area is currently zoned "unplanned" by the County of Hawaii. The county general plan has specified the mauka area for extensive agriculture. The remaining area is designated "conservation" by the SLUC and zoned "open" by the County of Hawaii. The county general plan indicates conservation use. The proposed 209 acres of the Ke-ahole Agricultural Park is located within the conservation zone (see Figure IV-1).

The acreage designated for conservation falls under the "General Use Conservation Subzone", as defined by the State Department of Land and Natural Resources (DLNR). In the regulations for land use within conservation districts (Section 2,B), "diversified agricultural operations" is listed as a permitted use. The conditions for the "GU" Conservation Subzone emphasize compatibility with the physical environment. The proposed agricultural park meets this criteria since the agricultural operations will blend with the existing rural, open space setting. The agricultural park is not expected to create a significant disruptive visual intrusion along the highway.

Residences, storage buildings, and underground utilities will be constructed to service the agricultural park. The impact of these structures, however, is expected to be minimal. Generally, the physical and environmental conditions of the area will be maintained.

The preservation and development of agriculture is supported at the state level of government. The agricultural park at Ke-ahole is a direct enactment of this policy to encourage diversified agricultural operations throughout the state. This proposed action will also help protect the rural lifestyle at the Kona region. It will offer alternate employment opportunities for the residents outside the heavily developed resort area of Kona.

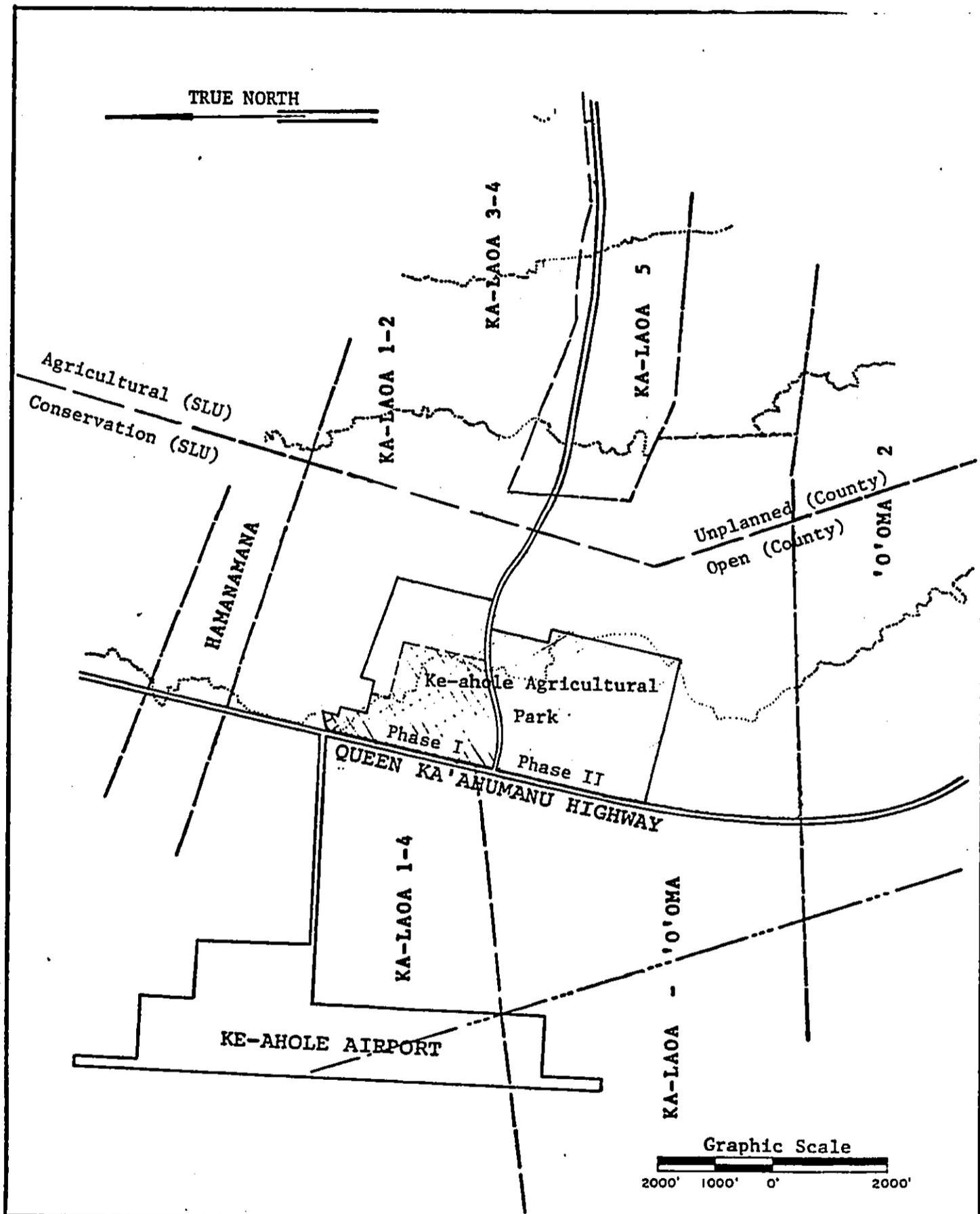


FIGURE IV-1

LAND USE

V. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS
WHICH CANNOT BE AVOIDED

Summaries of the adverse environmental impacts that were discussed in the previous section are given below.

1. There will be a visual impact of the agricultural park where there is now undisturbed land.
2. While mitigation measures will be employed, there will be some noise and air pollution from dust and machines due to the construction activities.
3. The groundwater will be affected to a slight but probably insignificant degree by the seepage of sewage, fertilizer, and pesticides into the groundwater table.
4. In spite of the precautions taken, there may be some occasional minor effect on the air quality from pesticides.
5. The development of the agricultural park will result in the loss of the existing sparse vegetation and possibly some wildlife from the area that will be disturbed.

VI. ALTERNATIVES TO THE PROPOSED ACTION

No action on the proposed Ke-ahole Agricultural Park would be contrary to state policy, which supports agriculture. In addition, the no-action alternative would not bolster the agriculture industry in Kona, which has been on the decline.

The Ke-ahole site is considered a prime location for the following reasons:

1. It is located in a climatic zone favorable to shade house production of dendrobiums, potted plants, and greenhouse production of certain vegetables, particularly tomatoes. Prospective applicants for park land are particularly interested in these crops, which are analyzed in detail in another section of this report.
2. Accessibility of the property through Kaahumanu Highway and Kona Palisades Access Road is excellent.
3. Electricity is available from the substation at the northern edge of the park site.
4. Water is available to the park site through a 12-inch water line running along Queen Kaahumanu Highway. A water supply of 100,000 gallons per day could be made available immediately and another 100,000 gallons would be made available in 1979. Availability of additional water depends upon the development of a 3.5-million gallon well at Kahaluu in 1981 and the replacement of the current 8-inch waterline by a waterline 12 inches or more in diameter from the source of the water supply to Ke-ahole.
5. The location adjacent to Ke-ahole Airport provides an excellent site for air shipment of flowers and foliage and, seasonally, for tomatoes. It is also an ideal location for a flower and foliage packing house and a tourist attraction.

Several alternative locations were considered as possible agricultural park sites. These alternatives are as follows:

1. A 100-acre state-owned plot located 0.6 miles north of the airport road offers a possible alternative. It has the advantage of having a substratum of a'ala lava rather than the pahoehoe lava, which covers the Ke-ahole site. It has the disadvantages of containing only 100 acres and being located a greater distance from the various utilities, notably water and power lines.
2. There are other state-owned sites mauka of Kaahumanu Highway between Ke-ahole and Kailua. These sites appear to have somewhat rougher topography than the Ke-ahole site. These sites are also much farther from the airport.
3. Except for possible consideration of the 100-acre plot described in item 1 above, the cost of developing other lands between Ke-ahole and Kawaihae would be much more expensive because of the lack of access, except for those lands adjacent to Kaahumanu Highway. The extension of water and power lines for the sole purpose of serving an agricultural park would be prohibitive. The greater distance to the airport and to Kailua would also be a disadvantage.
4. Alternative state lands are available at higher elevations in Kona. It is likely that land could be found with soil that could be used for agricultural production. For production of dendrobiums and other potted plants, however, soil as a continuous growing media would not be necessary. The lower rainfall and greater amount of sunshine at Ke-ahole are considered to be more favorable for dendrobium production. To confirm the concept, the Kona branch of the University of Hawaii Cooperative Extension Service is conducting a controlled test of dendrobium production at Ke-ahole in relation to production at the branch UH Experiment Station on the Belt Road.

The dendrobiums are producing more flowers at the Ke-ahole site and do not appear to be affected by the proximity of the airport. This site is considered a unique agricultural park site for a particular type of agriculture. Recommending this site does not imply that agricultural parks should not also be established at other locations.

VII. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT
AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The development of the Ke-ahole Agricultural Park will incur temporary short-term losses and generally result in long-term gains.

Short-term losses are primarily disruptions directly related to the construction activities.

Construction of the agricultural park will commit little-used lava lands with sparse vegetation to long-term, highly productive fields. The completed project will also add long-term economic benefits to the community.

VIII. MITIGATION MEASURES PROPOSED TO MINIMIZE IMPACTS

Several mitigation measures will be implemented for the adverse impacts. They are identified below:

<u>Impact</u>	<u>Mitigation Measures</u>
Noise and air pollution during construction	All applicable government regulations will be followed
Sewage disposal	Disposal measures will comply with state and federal requirements
Traffic disruption	Flagmen will be provided to coordinate traffic flow during construction hours
Visual impact	All applicable subdivision rules and regulations of Hawaii County will be followed, and all utilities will be placed underground
Archaeological sites	Archaeological and paleontological finds will be located, studied, and, where necessary, salvaged. Where preservation of the site is recommended, the agricultural layout and utilities will be adjusted to preserve the sites. As presently planned, phase II will include 11 acres of archaeological preservation area.

IX. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES
WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION
SHOULD IT BE IMPLEMENTED

The development of the Ke-ahole Agricultural Park will commit, for the duration of this project, 200 acres of undisturbed land to agricultural purposes. The proposed action commits the resources of manpower, energy, materials, and finance necessary to complete the site. The agricultural park development at Ke-ahole would also involve an irreversible commitment of utilities, such as water, electricity, and communication services.

X. AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF
GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE
ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The primary state governmental policy that encourages the development of an agricultural park at Ke-ahole originated with Act 110 of the 1972 legislative session. Act 110 amended Chapter 171, Hawaii Revised Statutes, and became Part V, entitled "Lands for Agricultural Purposes".

The 1972 legislature reported that there was a growing scarcity of agricultural lands throughout the state caused by urban encroachment. This urban encroachment has made it difficult for agriculture enterprises to survive and has caused a reduction in the agriculture base of the economy.

The enactment of Act 110 authorized the Board of Land and Natural Resources to acquire by lease, exchange, direct purchase, or eminent domain private property for disposition for agricultural purposes, including, but not limited to, agricultural parks.

The Kona Community Development Plan completed in 1975 placed emphasis upon three basic Kona industries of tourism, construction, and agriculture and upon the need to preserve the "Kona lifestyle."

The creation of an agricultural park at Ke-ahole is in harmony with the policies of the state government to encourage agricultural growth in the state, and, specifically, to strengthen the agricultural economy of the Kona coast through diversification.

XI. LIST OF NECESSARY APPROVALS

The development of the agricultural park at Ke-ahole will require various governmental approvals. A list of approvals is as follows:

STATE OF HAWAII

1. Department of Land and Natural Resources (DNLR) - Conservation District Use Application required
2. Department of Health (DOH) - Sewage disposal methods shall conform to Chapter 38.
3. Department of Transportation (DOT) - All access and utility connections to the main highway will require the approval of the Highways Division, DOT.

COUNTY OF HAWAII

1. Planning Department - the County General Plan designation must be changed from "unplanned" to agriculture.
2. Department of Public Works - Approval of construction plans
3. Department of Water Supply - Approval of construction plans

XII. ORGANIZATIONS AND PERSONS CONSULTED

FEDERAL AGENCIES

1. Forest Service, U.S. Department of Agriculture
2. Soil Conservation Service, U.S. Department of Agriculture

STATE AGENCIES

1. Department of Health
2. Department of Transportation
3. Department of Education
4. Office of Environmental Quality Control
5. Department of Defense, Office of the Adjutant General
6. Department of Hawaiian Homes
7. Department of Social Services and Housing
8. Department of Land and Natural Resources

COUNTY OF HAWAII

1. Planning Department
2. Department of Water Supply
3. Office of the County Clerk
4. Department of Public Works
5. Department of Parks & Recreation

UNIVERSITY OF HAWAII

1. Water Resources Research Center
2. College of Tropical Agriculture
3. Cooperative Extension Service
4. Environmental Center

OTHER ORGANIZATIONS

1. Hawaii Electric Light Company
2. American Lung Association
3. Kona Coast Chamber of Commerce

XIII. COMMENTS AND RESPONSES MADE DURING
THE CONSULTATION PERIOD

The letters included in the first portion of this chapter are the comments and subsequent responses pertaining to the EIS preparation notice. The letters and responses in the second portion of this chapter are those involved in the general EIS review process.

HAWAII ELECTRIC LIGHT COMPANY, INC.
P. O. BOX 1027 HILLO, HAWAII-96720



77-26-7A

July 26, 1977

M&E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Attention: Mr. L. C. Fruto

Gentlemen:

SUBJECT: Environmental Impact Statement for the
Proposed Ke-ahole Agricultural Park
Island of Hawaii

Reference is made to your letter of July 22, 1977.

We have plotted on the attached sketch our existing
generation and switching station. Also plotted is
the electric power line that runs from the station
to the Hawaii Belt Road and also towards Kawaihae.

In preparation of your plans, please take into consi-
deration our facilities.

Very truly yours,

Jitsuo Niwao, Manager
Engineering Department

JN:cmh
Attachment

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
100 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

September 13, 1977

Mr. Jitsuo Niwao, Manager
Engineering Department
Hawaii Electric Light Company, Inc.
Hilo, Hawaii 96720

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

In reference to your letter of July 26, 1977, please be informed that the 69 kv transmission line and the Ke-ahole Generating & Switching Station will not be adversely affected by the subject subdivision. The south boundary of the power line easement will be used as the same boundary of the proposed agricultural park.

L. C. Fruto
L. C. Fruto
Project Manager

cc: Dept. of Agriculture

Branch Office P. O. Box 3519, Agaña, Guam 96910

DOCUMENT CAPTURED AS RECEIVED

GEORGE R. ARIYOSHI
Governor



ANDREW I. T. CHANG
DIRECTOR OF SOCIAL SERVICES & HOUSING

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
P. O. Box 539
Honolulu, Hawaii 96809

July 26, 1977

M & E Pacific, Inc.
Pacific Trade Center, Suite 600
150 South King Street
Honolulu, Hawaii 96813

Attention: Mr. L. C. Frute

Dear Sir:

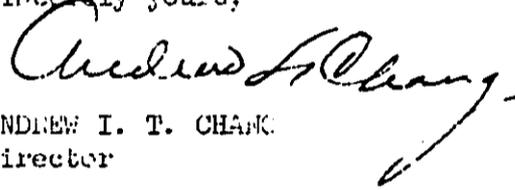
Subject: Environmental Impact Statement
for the Proposed Ke-Anole Agri-
cultural Park, Island of Hawaii

Subject: EIS has been reviewed for affect on departmental programs.

We have no comment regarding this Agricultural Park Complex.

Thank you for the opportunity to review and comment.

Sincerely yours,


ANDREW I. T. CHANG
Director

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Mr. Andrew I. T. Chang, Director
State of Hawaii
Department of Social Services
P. O. Box 339
Honolulu, Hawaii 96809

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

I wish to thank you for the "no comment" response on the preparation notice for the environmental impact statement for the proposed Ke-ahole Agricultural Park. The EIS will soon be available for general review through the OEQC.

L. C. Fruto
L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

PROJECT OFFICES

WAIMEA OFFICE
P O BOX 125
KAMUELA, HAWAII 96743

KEAUKAHA OFFICE
P O BOX 833
HILO, HAWAII 96720



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

July 27, 1977

PROJECT OFFICES

MAUI OFFICE
P O BOX 22
KAHULUI, MAUI 96732

MOLOKAI OFFICE
P O BOX 188
HOOLEHUA, MOLOKAI 96728

KAUAI OFFICE
P O BOX 332
LIHUE, KAUAI 96766

M & E Pacific, Inc.
Pacific Trade Center
Suite 600
190 South King Street
Honolulu, Hawaii 96813

Gentlemen:

Subject: Environmental Impact Statement for the
Proposed Ke-ahole Agricultural Park
Island of Hawaii

Since the project does not affect our lands, we have no comments to offer.

Thank you for the opportunity to review.

Owau no me ka ha'aha'a,
(I am, humbly yours)

A handwritten signature in cursive script that reads "Billie Beamer".

(MRS.) BILLIE BEAMER, CHAIRMAN

WB:kt

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Mrs. Billie Beamer, Chairman
State of Hawaii
Department of Hawaiian Homes
P. O. Box 1879
Honolulu, Hawaii 96805

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

I wish to thank you for the "no comment" response on the preparation notice for the environmental impact statement for the proposed Ke-ahole Agricultural Park. The EIS will soon be available for general review through the OEQC.



L.C. FRUTO
Project Manager

cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable ME PAC

AMERICAN  LUNG ASSOCIATION *of Hawaii*

July 28, 1977

Mr. L. C. Fruto
M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fruto:

Subject: EIS for the Proposed Ke-ahole Agricultural Park

We have received an EIS Preparation Notice and letter from the Department of Agriculture seeking our comments on the subject project.

In the consultation phase of EIS preparation, it is our normal procedure to offer suggestions as to how the air quality impact of a given project might be analysed. In this particular case, air quality impact would not at first glance appear to be great; however, the magnitude of impact will depend largely on what type of agricultural activities will be carried on and whether the lots will be lived on by the farmers. We would therefore suggest that consideration be given to the following factors:

1. Fugitive dust from construction.
2. Emissions from construction vehicles.
3. Emissions from vehicles associated with the project after completion.
4. Fugitive dust from agricultural activities after completion.
5. Pesticide use and possible drift to adjacent properties after project completion.
6. The proximity of other residences or structures.

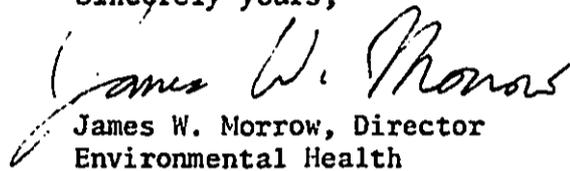
The above is not intended to imply that any or all of the items listed will be significant problems, but rather that these are some of the

Mr. L. C. Fruto
July 28, 1977
Page 2

factors which should be reviewed and considered in assessing air quality impact.

If you have any questions or if we can be of any further assistance please do not hesitate to call or write.

Sincerely yours,


James W. Morrow, Director
Environmental Health

JWM:lp

cc: Dr. Richard E. Marland

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

September 13, 1977

Mr. James W. Morrow, Director
American Lung Association of Hawaii
North Kukui Street
Honolulu, Hawaii 96817

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

The following is our reply to the six items listed in your letter of July 28, 1977:

1. Fugitive dust from construction

Ans: Any construction involving excavation and grading will create dust. This can be mitigated with the use of dust palliatives such as water.

2. Emissions from construction vehicles

Ans: Standard road building equipment will be used in the construction of the project such as bulldozers, graders and rollers. It is anticipated these types of equipment will be limited in number and their emissions will not create high concentrations of toxic emissions.

3. Emissions from vehicles associated with the project.

Ans: Emissions from vehicles will be generated by vehicles going into and out of the farm area. Farming as an activity does not generate too much traffic and, at the most, it is estimated that each farm may generate 10 vehicle trips per day. For 29 farms, the average daily traffic may be 290 vehicles and, with peak hour traffic of 10 percent, the densest traffic will only be 29 vehicles. It is not expected that emissions from these

M&E Pacific, Inc.

Mr. James W. Morrow
Page 2
September 13, 1977

vehicles will create air pollution as in a freeway that carry as many as 2000 vehicles per hour per lane. Moreover, it is assumed that all the vehicles will comply with existing laws on air pollution.

4. Fugitive dust from agricultural activities after completion.

Ans: The agricultural park will be used mainly for growing potted plants, foliage and ornamentals in shade houses. The soil formation is aa and will not be subjected to repetitive plowing and cultivation such as a dirt farm. Fugitive dust is not likely to occur from the agricultural activities planned in the agricultural park.

5. Pesticide use and possible drift to adjacent properties.

Ans: As stated previously, the farm produce will be grown under sun shades and some farmers may even construct regular hot houses. These farm structures will prevent the possible drift of pesticides to adjacent properties.

6. Proximity of other residences or structures.

Ans: There are no existing residences adjacent to the proposed agricultural park; however, alternative plans are being considered. One plan is to permit a dwelling unit on each farm and another plan is to create a village type housing development for 29 units. Neither of these plans has been finalized. The nearest structures are Ke-ahole Airport about 4,500 feet makai and Kona Palisades about 2000 feet mauka of the project.

L. C. Fruto
L. C. FRUTO
Project Manager

cc: Dept. of Agriculture



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

P. O. BOX 1820

HILO, HAWAII 96720

25 ALFANI STREET

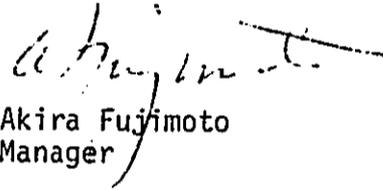
July 29, 1977

Mr. L. C. Fruto
M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, HI 96813

Re: Environmental Impact Statement for the
Proposed Ke-ahole Agricultural Park
Island of Hawaii, TMK: 7-3-10:33

A review has been made on the Environmental Impact Statement for the proposed project. Insofar as to water availability, we are enclosing a copy of our July 20, 1977 letter to Mr. John Farias.

In respect to the project location, the area makai of the Queen Kaahumanu Highway would be preferable to our system operation. There are certain areas from the proposed project site which would fall out of our existing service area.


Akira Fujimoto
Manager

GK

Enc.

... Water brings progress...



COPY

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

P. O. BOX 1820

HILO, HAWAII 96720

25 AUPUNI STREET

JUL 20, 1977

Mr. John Farina, Sr.
Chairman, Board of Agriculture
State of Hawaii
1425 South King Street
Honolulu, HI 96814

Re: Keolu Agricultural Park
North Kona, Hawaii

We can at this time commit approximately 100,000 gpd for use late in 1977. This date and consumption commitment are based on the successful completion and operation of the pumps, controls and transmission pipeline up to the tunnel portal which is now under construction. Upon completion of this phase, it is our intent to serve the Keauhou area with water from the shaft source, thereby, allowing the Kahaluu deep well source water to be pumped to the Kailua area.

Presently, HRS was planned to construct the next phase of this project which includes the installation of a 24-inch transmission main along a portion of Kuakini Highway and the construction of two (2) 1.0-MG concrete tanks. Upon completion of this phase which is tentatively scheduled for the first quarter of 1979, another 100,000 gpd will be available to the Kailua area.

As mentioned at the meeting in Kona on July 7, there is a bottleneck within a portion of Kuakini Highway which consists of a section of an 8-inch pipeline. Your total requirement of 400,000 gpd to fully develop 200 acres can only be realized by the installation of a larger transmission line to supplement the existing 8-inch main on Kuakini Highway. Until this has been done, we can only make a commitment as stated.

Akira Fujimoto
Manager

EH

cc - Representative H. Inaba

... *Water brings progress...*

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

September 13, 1977

Mr. Akira Fujimoto, Manager
Department of Water Supply
County of Hawaii
P.O. Box 1820
Hilo, Hawaii 96720

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

Reference is made to your letter of July 29, 1977 and the enclosed letter of July 20, 1977 concerning the availability of water for subject agricultural park.

We realize that by 1979 only 200,000 gallons per day would be available and in this regard we are planning to develop the agricultural park in two phases. The first phase will be developed within the service area of 200,000 gpd and the second phase will be developed when the installation of longer water mains to supplement the existing 8-inch main on Kuakini Highway is accomplished.

The area makai of Queen Kaahumanu Highway has been investigated as an alternate site but these areas, aside from being in the State Land Use (SLU) Conservation District, are also within the Special Management Area (SMA). There is also the possibility of interference with the aviation rights and navigational aids at the approaches to Ke-ahole Airport.



L. C. FRUTO
PROJECT MANAGER

cc: Dept. of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR



VALENTINE A. SIEFERMANN
MAJOR GENERAL
ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
FORT RUGER, HONOLULU, HAWAII 96816

HIENG

94 230 377

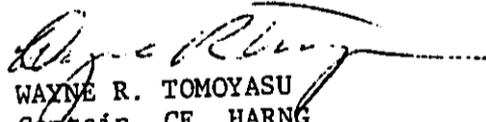
Mr. L. C. Fruto
M&E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fruto:

Environmental Impact State for the Proposed
Ke-ahole Agricultural Park, Island of Hawaii

Thank you for sending us a copy of the proposed subject. We have received
the maps and have no comments to offer.

Yours truly,


WAYNE R. TOMOYASU
Captain, CE, HARNG
Contr & Engr Officer

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Captain Wayne R. Tomyasu
Control & Engineer Officer
Office of the Adjutant General
Department of Defense
Fort Ruger
Honolulu, Hawaii 96816

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

I wish to thank you for the "no comment" response on the preparation notice for the environmental impact statement for the proposed Ke-ahole Agricultural Park. The EIS will soon be available for general review through the OEQC.



L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC



KONA COAST
Chamber of Commerce

HAWAII
BICENTENNIAL
75-57421 KUAKINI HWY, KAILUA KONA, HAWAII 96741
TELEPHONE (808) 329-1754

August 3, 1977

Mr. L. C. Fruto
M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 So. King St.
Honolulu, HI 96813

Dear Mr. Fruto,

Thank you for extending the opportunity to the Kona Coast Chamber of Commerce to comment on the proposed Keahole Agricultural Park on the island of Hawaii.

As you are aware, the Kona Coast Chamber of Commerce has actively participated in the expansion of business, agricultural, social and cultural ventures along the Kona Coast and in the State of Hawaii. This project as proposed fulfills the basic objectives as outlined in the purpose of the Kona Coast Chamber of Commerce.

Agriculture has been, and is expected to be in the future, an economic mainstay for the community. We have been proud to claim that our area is the only commercially cultivated region in the entire United States in the production of coffee. In addition, avocado, macadamia nut, papaya and truck farm operations have added and enhanced the agricultural industry along the Kona Coast. The development of an agricultural park at Keahole will expand the social and economic base of the community and broaden the diversification of agricultural production of the area.

Currently, the Kona Coast faces a 10.8% rate of unemployment. A factor contributing to this high rate involved problems farmers face in acquiring and maintaining suitable land on which to farm. The area proposed offers optimum growing and marketing conditions for the cultivation of flowers and foliage through the expansion of the agricultural venture. This unemployment level can be reduced with involvement of more farmers, farm workers and related services.

The location, with its close proximity to Keahole Airport, offers a unique situation. In addition to the ease and speed in the transportation of the products an important by-product arises. The area could enhance the area's visitor industry through the application of tours through the farming community. This would create a lasting impression on the visitor as he enters or leaves the Kona Coast.

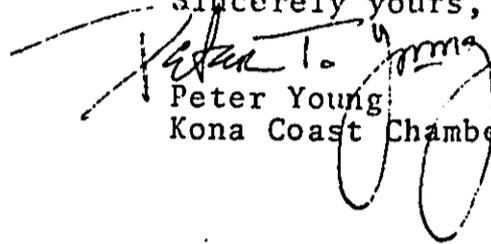
As the potato is to Idaho, so are flowers to Hawaii. The development of an agricultural park in an area now barren in

Mr. L.C. Fruto - page 2

lava fields would help to beautify our community for the enjoyment of the resident and visitor alike. This project would strengthen the local pride in our natural beauty and expose to others throughout the world the Hawaii they have dreamed of seeing.

The Kona Coast Chamber of Commerce wishes to extend its whole-hearted support for this project and offers its assistance in helping to make it a reality. Please do not hesitate in soliciting our help.

Sincerely yours,



Peter Young
Kona Coast Chamber of Commerce

cc: John Farias, Chairman
Board of Agriculture
1428 So. King St.
Honolulu, Hi. 96814

PY/ly

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

September 13, 1977

Mr. Peter Young
Kona Coast Chamber of Commerce
75-5742 T Kuakini Highway
Kailua-Kona, Hawaii 96740

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

I wish to thank you very much for your whole-hearted support for the proposed Ke-ahole Agricultural Park and hope that it would, in fact, broaden the social and economic base of Kona.



L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

COOPERATIVE EXTENSION SERVICE

University of Hawaii at Manoa · College of Tropical Agriculture
United States Department of Agriculture Cooperating

August 3, 1977

Mr. L. C. Fruto
M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, HI 96813

Dear Mr. Fruto:

The EIS preparation notice for the Environmental Impact statement for the proposed Ke-ahole Ag. Park includes most of the pertinent areas of concern. This project has the general support of the Kona Farm Bureau, Kona Chamber of Commerce, Hawaii Leeward Planning Conference, the State House and Senate, the Dept. of Ag., Governor Ariyoshi, the Kona County Agent, the Department of Land and Natural Resources, and the Ag. Coordinator of the Res. & Development Dept. of the County of Hawaii.

I would like to mention a few other concerns.

1. The majority of the farmers would prefer to live on the proposed Ag. Park. They would be able to provide security and manage the farm more efficiently.
2. The area 0.6 mile north of the inlet road to Ke-ahole Ag. Park mauka of the road (part of tax map parcel 7-3-10:33) should still be considered an alternate site. This area is an aa area, which is preferred over pahoehoe.
3. Some vegetable growers are interested in trying to grow vegetables on the site. Soil would be brought in. An example is the Roy Honda Farm.
4. It might be a good idea to set aside a parcel of land for the University of Hawaii for experiment and another parcel for a possible cooperative.

Please contact me for more details.

Sincerely,



Melvin Wong, County Extension Agent

Hawaii County · P.O. Box 208 · Kula, Hawaii 96750 / Cable Address: UNIHAW
An Equal Opportunity Employer

cc: W. Ikeda
Director

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Mr. Melvin Wong
County Extension Agent
Cooperative Extension Service
P.O. Box 208
Kealahou, Hawaii 96750

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

Your letter of August 3, 1977 mentioned a few concerns regarding the subject notice.

It is very true that if farmers were allowed to live on the proposed agricultural park they would be able to provide security and manage their farms more efficiently. We are fearful, however, that some lessors may build a house on the farm lot and do very little work; perhaps not even subsistence farming. In that case, the farm lot would only be a house lot. We are now studying the possibility of grouping the houses together in a cluster, but the feasibility of this plan would depend upon the existing land use controls.

The selected site for the agricultural park is a portion of tax map parcel 7-3-10:33, which is the same as the parcel you suggested.

Vegetables may be grown in the agricultural park on imported soil, but the limited water supply in the initial phase of the project may preclude the growing of vegetables. The area is more suited to the propagation of potted plants, foliage and ornamentals.

Lots will be reserved for research, experimental and cooperative purposes.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

GEORGE R. ARIYOSHI
GOVERNOR

HAWAII DEPT OF AGR

AUG 10 3 50 PM '77



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P O BOX 2160
HONOLULU, HAWAII 96804

CHARLES G CLARK
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

August 4, 1977

MEMO TO: Honorable John Farias, Chairman
Board of Agriculture
F R O M: Charles G. Clark, Superintendent
Department of Education
SUBJECT: Environmental Impact Statement for the
Proposed Ke-ahole Agricultural Park
Island of Hawaii

We have reviewed the subject EIS and fully support the proposal.

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Mr. Charles G. Clark, Superintendent
State of Hawaii
Department of Education
P. O. Box 2360
Honolulu, Hawaii 96804

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

I wish to thank you for the "no comment" response on the preparation notice for the environmental impact statement for the proposed Ke-ahole Agricultural Park. The EIS will soon be available for general review through the OEQC.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC



HAWAII DEPT OF AGR
DEPARTMENT OF PARKS & RECREATION
AUG 3 4 11 PM '77
COUNTY OF HAWAII

Herbert Matayoshi, Mayor
Milton Hakoda, Director

July 29, 1977

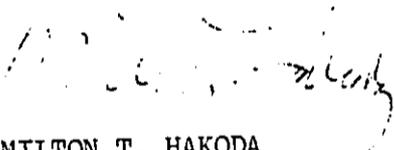
AUG 4 1977

Mr. John Farias, Jr., Chairman
Board of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

SUBJECT: Proposed Ke-ahole Agricultural Park _ EIS

We have reviewed the EIS preparation notice and have no adverse comments to offer on the project.

Thank you for the opportunity to review the report.


MILTON T. HAKODA
Director

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Mr. Milton T. Hakoda, Director
Department of Parks and Recreation
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

SUBJECT: Response to EIS Preparation Notice
 Ke-ahole Agricultural Park

I wish to thank you for the "no comment" response on the preparation notice for the environmental impact statement for the proposed Ke-ahole Agricultural Park. The EIS will soon be available for general review through the OEQC.



L. C. FRUTO
Project Manager

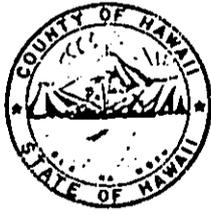
cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

HERBERT T. MATAYOSHI
MAYOR

EDWARD K. HARADA HAWAII DEPT OF AGR
CHIEF ENGINEER

AUG 8 2 34 PM '77



BUREAUS AND DIVISIONS:
AUTOMOTIVE EQUIPMENT & MOTOR POOL
BUILDING CONSTRUCTION & INSPECTION
PLANS AND SURVEYS
ROAD CONSTRUCTION AND MAINTENANCE
SEWERS AND SANITATION
TRAFFIC SAFETY AND CONTROL

COUNTY OF HAWAII
DEPARTMENT OF PUBLIC WORKS
25 AUPUNI ST.
HILO, HAWAII 96720

August 4, 1977

AUG 9 1977

John Le...

Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED
KE-ANOLE AGRICULTURAL PARK - ISLAND OF HAWAII
(PREPARATION NOTICE)

We have reviewed the subject environmental impact statement preparation notice. Since the preparation notice indicates coverage of clearing and grading, construction of roads, drainage improvements, sewage disposal facilities, and the impact of the proposal to other utilities and roads, we have no comments to offer at this time.

Edward Harada
EDWARD HARADA
Chief Engineer

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable. MEPAC

September 13, 1977

Mr. Edward Harada
Chief Engineer
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

Thank you very much for your response of "no comment" to the development of Ke-ahole Agricultural Park. We will, however, forward the detail construction plans at a later date for your review and approval.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR



RICHARD E. MARLAND, PH.D.
DIRECTOR

TELEPHONE NO.
548-6915

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST
ROOM 301
HONOLULU, HAWAII 96813

August 8, 1977

Mr. L.C. Fruto
M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fruto:

SUBJECT: EIS Preparation Notice for the Proposed Ke-ahole
Agricultural Park, Kona, Hawaii

Thank you for providing the opportunity for us to comment on
the subject EIS preparation notice.

Development of the proposed Agricultural park may affect
conditions on the Queen Kaahumanu Highway. Since it has jurisdiction
over the highway, we suggest that the State Department of Transportation
be consulted. We suggest also that the EIS's for Honokohau Boat
Harbor, Phase II, and the Natural Energy Laboratory of Hawaii at
Ke-ahole could be used as sources of information for the preparation
of the subject EIS.

The physical and visual impact of the proposed project should
be considered. The incidence of dust and pesticide spray drift
could also be of significance if farmers are to reside on the lots.

We look forward to receiving the EIS for this proposed project.

Sincerely,

A handwritten signature in cursive script, appearing to read "Richard E. Marland".

Richard E. Marland
Director

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Mr. Richard E. Marland, Director
Office of Environmental Quality Control
550 Halekauwila Street
Room 301
Honolulu, Hawaii 96813

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

In your letter of August 8, 1977 you asked us to consult the State Department of Transportation because Queen Kaahumanu Highway is under its jurisdiction. We realize that Queen Kaahumanu is a limited access highway and that no vehicular ingress or egress will be permitted from the proposed agricultural park into the highway without the permission of that department. We intend to use the recently constructed Kona Palisades Access Road as the main access into the agricultural park.

We anticipate that shade houses will be erected by the farmers for the propagation of potted plants, foliage and ornamentals and the farm lots will not be subjected to repetitive plowing. Thus, we do not foresee any problem from fugitive dust. The shade houses will prevent spray drifts from the use of pesticides.

The evaluation of the physical and visual impact of the proposed project is a subjective matter. The agriculture park will look like a green spot in the huge expanse of lava field. We do not think it will have an adverse visual impact. As a matter of fact, it may present a more dynamic scenery than the monotonous scenery of lava fields.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

Branch Office P. O. Box 3519, Agaña, Guam 96910



COUNTY OF
HAWAII

HAWAII DEPT OF AGR
PLANNING DEPARTMENT

25 AUPUNI STREET • HILO, HAWAII 98720

HERBERT T. MATA YOSHI
Mayor

SIDNEY M. FUKU
Director

DUANE KANUHA
Deputy Director

AUG 18 1977

August 12, 1977

Mr. John Farias, Chairman
Board of Agriculture
1428 S. King Street
Honolulu, HI 96814

Dear Mr. Farias:

Environmental Impact Statement (EIS)
Preparation Notice for the Proposed
Keahole Agricultural Park, Island of HI

Thank you for the opportunity to review the above EIS preparation notice. We have the following comments:

1. Of the four (4) parcels of land being considered, parcels 7-3-43:3, 7-4-8:3, and portions of 7-3-9:5 are within the Special Management Area (SMA) and will require a permit from either this office or the Planning Commission.
2. These four parcels are also within a State Land Use (SLU) Conservation District. Portions of parcels 7-3-10:33 and 7-3-9:5; however, are within the SLU Agricultural District. Act 132, Session Laws of Hawaii 1977 would apply only to these latter two portions. A SLU boundary amendment or a Conservation District Use permit may be required for the non-agriculturally designated parcels and/or portions of parcels.
3. It appears that water for this park will be provided through the County Department of Water Supply's system. The higher cost of such water may have some impact on the success of this agricultural park proposal.

We hope our comments will be of some benefit to you. We look forward to reviewing the EIS. Meanwhile, should we be of any further assistance, please contact us.

Sincerely,

SIDNEY FUKU
Director

RN: mmk

cc: Research & Development
DWS

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable ME PAC

September 13, 1977

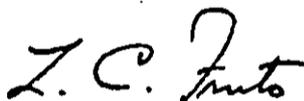
Mr. Sidney Fuke, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

In reference to your letter of August 12, 1977, we wish to inform you that a portion of Lot Tax Key 7-3-10:33 has been selected as the site for the Ke-ahole Agricultural Park. Since a portion of this land is in the Conservation District, permission from the State Department of Land and Natural Resources will be obtained to use it for agricultural purposes.

The high cost of water would, in some way, affect the cost of farming. Our economic studies, however, indicate that the raising of potted plants, principally dendrobiums, would be feasible.

We will contact you at a later date for the review and approval of the plans.



L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

P. O. Box 50004, Honolulu, Hawaii 96850

August 12, 1977

Mr. L. C. Fruto
M&E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fruto:

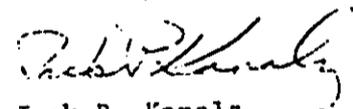
Subject: EIS Preparation Notice for the Proposed Ke-ahole
Agricultural Park, Island of Hawaii

The subject preparation notice was reviewed and the following comments are offered for your consideration when preparing the EIS:

1. The preparation notice states, "... cesspools or other small-scale waste disposal systems may be required." The EIS should address the effect cesspools will have on the class AA waters off Ke-ahole Airport and on the ground water in the area.
2. Information on soils in the area is contained in the "Soil Survey of the Island of Hawaii, State of Hawaii," published by the USDA-Soil Conservation Service in cooperation with the University of Hawaii, Agricultural Experiment Station.

Thank you for the opportunity to review this document.

Sincerely,



Jack P. Kanalz
State Conservationist



M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Mr. Jack P. Kanalz
State Conservationist
United States Department of Agriculture
Soil Conservation Service
P. O. Box 50004
Honolulu, Hawaii 96850

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

The sewage effluent from the proposed agricultural park is estimated to be only about 8,700 gallons per day distributed in 29 cesspools that are spaced far apart. Of this amount, only a small portion (if any) will reach the coastline, which is about a mile and a half away. It is not expected that the sewage effluent will cause any detrimental effect to this Class AA water along the Kona Coast.

The soil in the area is classified as being in the Punaluu Series, which consists of extremely stony or rocky peat and stony or rocky mulch.



L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

RECEIVED AUG 15 1977

Hale-ua Branch Library

P.O. Box 387

Holualoa Hawaii 96725

Aug 12, 1977

M&E Pacific, Inc.
Pacific Trade Center
Suite 600
190 South King Street
Honolulu Hi. 96813

Dear Sir

Holualoa library would like to request a copy of Ke-ahole
Agricultural Park, North Kona, Hawaii, State Dept. of
Agriculture. Thank you for notifying us of this
document through EAC bulletin

Sincerely,
Kathy Tomita

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

September 15, 1977

Holualoa Library
P. O. Box 387
Holualoa, Hawaii 96725

ATTENTION: Ms. Kathy Tomita

SUBJECT: Response to the EIS Preparation Notice
Ke-ahole Agricultural Park

In reference to your letter of August 12, 1977, we will send you
a copy of the Environmental Impact Statement as soon as it is filed
with the Environmental Quality Commission.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Branch Office P. O. Box 3519, Agaña, Guam 96910

Kona County Farm Bureau

Member: Hawaii Farm Bureau Federation
American Farm Bureau Federation

TELEPHONE:
KONA 238-435
P. O. BOX 208
KEALAKEKUA, HAWAII

August 14, 1977

John Farias, Jr.
Chairman, Board Of Agriculture
Department Of Agriculture
1428 South King Street
Honolulu, Hawaii 96314

Dear Mr. Farias:

In reference to your letter dated July 29, 1977, the officers of the Kona County Farm Bureau met a few nights ago and decided that we request that housing provision be included in the plan for the Ke-ahole Agricultural Park.

Your kind consideration on this matter will be greatly appreciated.

Sincerely yours,

KONA COUNTY FARM BUREAU

Kenneth Komo

Kenneth Komo
Corres. Secretary

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

September 13, 1977

Mr. Kenneth Komo
Corresponding Secretary
Kona County Farm Bureau
P. O. Box 208
Kealahou, Hawaii 96750

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

Your letter of August 14, 1977 suggests that housing provisions be included in the plan for the Ke-ahole Agricultural Park.

This matter is still under consideration since we are fearful that some tenants may build a house on the farm lot and do very little farm work. In that case, the farm lot would only be a house lot. We are now studying the possibility of grouping the houses together in a cluster, but the feasibility of this plan would depend upon the existing land use controls.

L. C. Fruto
L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

HAWAII DEPT OF AGR 630 Sansome Street
San Francisco, California 94111
AUG 18 4 26 PM '77

8440 (3500)
August 15, 1977

Mr. John Farias, Jr., Chairman
Board of Agriculture
State of Hawaii
Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

AUG 23 1977



Dear Mr. Farias:

Thank you for allowing us to review the EIS preparation notice for the proposed Ke-ahole Agricultural Park, Island of Hawaii. We have no specific comments at this time.

We would like to review the draft E.I.S. Please send a copy to the Institute of Pacific Island Forestry. Their address is 1151 Punchbowl Street, Room 323, Honolulu, Hawaii 96813.

Sincerely,

for Curtis L. Smith
DOUGLAS R. LEISZ
Regional Forester

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

September 13, 1977

Mr. Douglas R. Leisz, Regional Forester
United States Department of Agriculture
Forest Service
630 Sansome Street
San Francisco, California 94111

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

I wish to thank you for the "no comment" response on the preparation notice for the environmental impact statement for the proposed Ke-ahole Agricultural Park. The EIS will soon be available for general review through the OEQC.



L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



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

August 16, 1977

GEORGE A. L. YUEN
DIRECTOR OF HEALTH

Audrey W. Mertz, M.D., M.P.H.
Deputy Director of Health

Henry N. Thompson, M.A.
Deputy Director of Health

James S. Kumagai, Ph.D., P.E.
Deputy Director of Health

In reply, please refer to
File: EPHS- SS.

Mr. L. C. Fruto
M&E Pacific, Inc.
Pacific Trade Center, Suite 600
190 S. King St.
Honolulu, Hawaii 96813

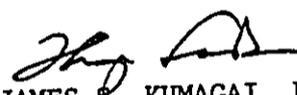
Dear Mr. Fruto:

Subject: Request for Comments on Proposed Environmental Impact
Statement (EIS) for the Proposed Ke-ahole Agricultural
Park, Island of Hawaii

Thank you for allowing us to review and comment on the subject
proposed EIS. Please be informed that we have no comments or objections
to this project at this time.

We realize that the statements are general in nature due to
preliminary plans being the sole source of discussion. We, therefore,
reserve the right to impose future environmental restrictions on the
project at the time final plans are submitted to this office for review.

Sincerely,


FOR JAMES S. KUMAGAI, Ph.D.
Deputy Director for
Environmental Health

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

September 13, 1977

Mr. James S. Kumagai, Ph.D
Deputy Director for Environmental Health
Department of Health
State of Hawaii
1250 Punchbowl Street
Honolulu, Hawaii 96801

SUBJECT: Response to the EIS Preparation Notice
Ke-ahole Agricultural Park

Thank you very much for your response of "no comment" to the proposed development of Ke-ahole Agricultural Park. The final plans will be submitted at a later date for your review and approval.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

R B Legaspi
COUNTY CLERK



Yasuki Arakaki
DEPUTY COUNTY CLERK

Harry A. Takahashi
LEGISLATIVE AUDITOR

OFFICE OF THE COUNTY CLERK
COUNTY OF HAWAII
HILO, HAWAII 96720

August 17, 1977

Re: C-454/ATC-15

M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Subject: EIS For Proposed Ke-ahole Agricultural Park

The Hawaii County Council at its meeting held August 10, 1977, referred Mr. John Farias, Jr.'s letter of July 22, 1977 on the above subject matter to the Planning Committee. The Agriculture and Tourism Committee members are urged to submit comments and concerns to the Agriculture and Tourism Committee Chairman by August 20, 1977.

R. B. Legaspi
R. B. Legaspi
COUNTY CLERK

M&E Pacific, Inc.

Environmental Engineers

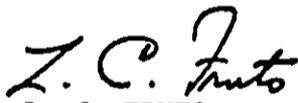
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

September 13, 1977

Mr. R. B. Legaspi
County Clerk
Office of the County Clerk
County of Hawaii
Hilo, Hawaii 96720

SUBJECT: Response to the EIS Preparation Notice
Ke-ahole Agricultural Park
Re: C-454/ATC-15

This is to inform you that we have not received any comments from the Hawaii County Council concerning the environmental impact statement for the proposed Ke-ahole Agricultural Park. The environmental statement is now ready for printing and distribution. Your comments, however, may be submitted when the EIS statement is distributed.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

UNIVERSITY OF HAWAII

Water Resources Research Center

Office of the Director

August 22, 1977

M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Attn: Mr. L. C. Fruto

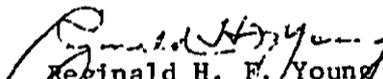
Dear Mr. Fruto:

Re: EIS Preparation Notice for Proposed Ke-ahole Ag Park,
July 22, 1977. There are several points of interest to us concerning
land use and water which we feel should be elaborated in the EIS, as
follows:

- a. Is the site in fact suitable for diversified agricultural
use and not too rocky for tillage?
- b. How was the estimated 400,000 to 500,000 gpd water consump-
tion determined?
 - 1) Type of crop
 - 2) Suitability of crop to site and soil
 - 3) Alternate sites for crop which might have lesser
irrigation requirements

We look forward to the review of the EIS.

Sincerely,


Reginald H. F. Young
Asst. Director, WRRC

RHFY:jmn

cc: E. Murabayashi

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3651 Cable MEPAC

September 13, 1977

Mr. Reginal H. F. Young
Assistant Director
Water Resources Research Center
University of Hawaii
2540 Dole Street
Honolulu, Hawaii 96822

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

Your letter of August 22, 1977 suggests that certain aspects of land use and water should be elaborated in the EIS. The specific questions and answers follow:

- a. Is the site in fact suitable for diversified agricultural use and not too rocky for tillage?

Ans: The plants that may be grown in the agricultural park are potted flowers, foliage and ornamental plants. For these plants, no top soil will be needed and the land will not be subjected to repetitive plowing and tillage. Some vegetables such as tomatoes may be grown on imported soil.

- b. How was the estimated 400,000 to 500,000 gpd water consumption determined?

1. Type of crop.

Ans: For dendrobiums, potted flowers and foliage, the water consumption is estimated to be about 3000 gallons per acre per day and for vegetables and tomatoes, the requirement will be 6000 gallons per acre per day.

2. Suitability of crop to site and soil.

Ans: The site is suitable because of the following reasons:

It is located in a climatic zone favorable to shade house production of dendrobiums, potted

M&E Pacific, Inc.

Mr. Reginal H. F. Young

Page 2

September 13, 1977

plants and greenhouse production of certain vegetables, particularly tomatoes.

Accessibility of the property through the airport road and the mauka-makai road through the property is excellent.

Electricity is available from the main highway at the entrance to the park site.

Water is available to the park site through a 12-inch water line along Kaahumanu Highway adjacent to the makai border of the project. A water supply of 200,000 gallons would be made available in 1979. Additional availability depends upon developing of a 3.5 million gallon well at Kahaluu in 1982 and supplementing the current 8- and 12-inch pipeline along Kuakini Highway by a water line of 18 to 20 inches in diameter from the source of the water supply to Palani Road. There is a 0.5 mgd water tank on the property which presently serves Ke-ahole Airport.

The location adjacent to Ke-ahole Airport provides an excellent site for shipment of flowers and foliage and, seasonally, for tomatoes. It is also an ideal location for a flower and foliage packing house and a tourist attraction.

3. Alternate sites for crop which might have lesser irrigation requirements.

Ans: Other areas at higher elevations that would have lesser irrigation requirements are also available but the site would not have all of the advantages cited in the above paragraph.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR



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

August 23, 1977

E. ALVEY WRIGHT
DIRECTOR

DEPUTY DIRECTOR
WALLACE AOKI
RYOKICHI HIGASHIMURA
DOUGLAS K. SAKAMOTO
CHARLES O. SWANSON

IN REPLY, REFER TO:

AT-EM
2353

M & E Pacific, Inc.
Pacific Trade Center
190 South King Street
Suite 600
Honolulu, Hawaii 96813

Attention: Mr. L. C. Fruto

Gentlemen:

Subject: Environmental Impact Statement
for the Proposed Ke-ahole
Agricultural Park
Island of Hawaii

We have reviewed your Environmental Impact Statement
Preparation Notice for the Ke-ahole Agricultural Park and
have the following comments:

1. The 5 mg. tank which you show on your location
map was built by the Air Transportation Facilities
Division to meet "fire water" requirements for the
Ke-ahole terminal building.
2. Utilizing the unused portions of "Airport" land
for the agricultural park must be done discrimi-
nately due to flight path considerations and
possible interference with navigational aids.

Very truly yours,

A handwritten signature in cursive script, appearing to read "E. Alvey Wright".

E. ALVEY WRIGHT
Director

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
150 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

September 13, 1977

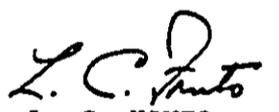
Mr. F. Alvey Wright, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Sir:

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

In reference to your letter of August 23, 1977, we wish to inform you that the existing 0.5 mg. tank will not be affected by the proposed agricultural park.

The agricultural park will be located mauka of Queen Kaahumanu Highway and will not interfere with the flight path and navigational aids at Ke-ahole Airport.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



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

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

August 24, 1977

M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, HI 96813

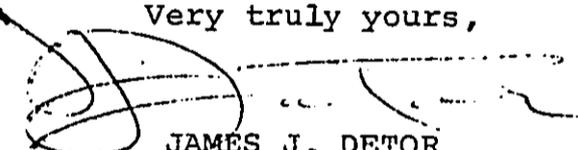
Attention: Mr. L. C. Fruto

Dear Sir:

Subject: Environmental Impact Statement for the Proposed
Ke-ahole Agricultural Park, Kona, Hawaii

The preparation notice for subject EIS addresses the problems quite well. The only suggestion we have is that the study include the probable environmental effect of the project upon the residential community situated immediately mauka.

Very truly yours,


JAMES J. DETOR
Land Management Administrator

cc: Honorable John Farias, Jr.

M&E Pacific, Inc.

Environmental Engineers

September 13, 1977

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

Mr. James J. Detor
Land Management Administrator
Division of Land Management
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

Your letter of August 24, 1977 suggests that we study the probable environmental effect of the proposed Ke-ahole Agricultural Park upon the residential community situated immediately mauka of the project.

The proposed agricultural park will not create any dust, noise and insecticide sprays that may be blown in the residential subdivision. However, we will use the recently constructed Kona Palisade Access Road as the main access road to the agricultural park. It is estimated that the anticipated traffic from the 29 lots would not be more than 290 vehicles per day or a maximum of 29 vehicles during peak hours. This volume of traffic would not create any congestion on the access road.

L. C. Fruto

L. C. FRUTO
Project Manager

cc: Dept. of Agriculture



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

Kamamalu Building, 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

GEORGE R. ARIYOSHI
Governor

HIDETO KONO
Director

FRANK SKRIVANEK
Deputy Director

August 26, 1977

Ref. No. 4370

Mr. L.C. Fruto
M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

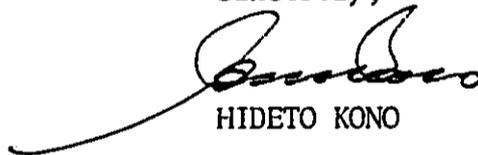
Dear Mr. Fruto:

Subject: Environmental Impact Statement Preparation Notice for
the Proposed Ke-ahole Agricultural Park, County of Hawaii

We have reviewed the subject EIS preparation notice and would like
to offer the following comments for your consideration.

1. Compare the water demand for the proposed development to the existing supply and projected demands for water for the remainder of the Kona area. Discuss any official plans to build facilities relating to water supply and how this relates to the short and long term impacts of the proposed project.
2. Consider the project's economic impact on the other flowers and foliage growing areas in Hawaii County in regards to their economic vitality.
3. Discuss the reasons for the selection of the proposed site over the three alternative sites indicated in the preparation notice.

Sincerely,



HIDETO KONO

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

September 13, 1977

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

Subject: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

The answers to the comments contained in your letter of August 26, 1977 are as follows:

1. Water Demand: The Hawaii County Department of Water Supply assured us that for the short term demand about 200,000 gallons per day could be furnished by 1979 and for the long term demand another 300,000 gallons per day would be available when the existing 8-inch water line in Kuakini Highway is supplemented by an 18- or 20-inch line to be located on the realigned Kuakini Highway from Holualoa to Palani Road.
2. Project's economic impact on the other flowers and foliage growing areas in Hawaii County in regard to their economic vitality: Numerous organizations, government agencies and individuals have expressed interest in the development of an agricultural park in Kona. Among these are the Kona Farm Bureau, the Kona Coast Chamber of Commerce, the Hawaii Leeward Planning Conference, the Hawaii State House and Senate, Governor George Ariyoshi, Rep. Minoru Inaba, Mayor Herbert Matayoshi, the State Department of Land and Natural Resources, the Agricultural Coordinator of the Hawaii County Department of Research and Development, the State Department of Agriculture, and the Kona representatives of the Cooperative Extension Service of the University of Hawaii. The development of this agricultural park is compatible with the interest of the State Administration in expanding diversified agriculture and in retaining open space.

Aside from the interest shown by governmental agencies and private organizations, production feasibility based on

M&E Pacific, Inc.

Mr. Hideto Kono

Page 2

September 13, 1977

ecological adaptation, market potential and net income favor such crops as dendrobiums, potted flowers, foliage plants and tomatoes. Dendrobium orchid, however, is considered to be a most promising floral product for Hawaii and U. S. Mainland markets and eventually for foreign markets. There seems to be no question that a substantial market exists for this product, based on preliminary research conducted by the College of Tropical Agriculture of the University of Hawaii.

Not much dendrobium is grown on the island of Hawaii and even in Oahu, where production is more or less a backyard activity, only excess dendrobiums are exported. Therefore, it is expected that dendrobium production in the proposed agricultural park would not adversely affect the other floral growers on the island of Hawaii.

Other crops that can be grown in the agricultural park are vegetables, particularly tomatoes which have a high market potential.

3. Discuss the reasons for the selection of the proposed site over the three alternate sites indicated in the preparation notice: The Ke-ahole site is considered a prime location for the following reasons:
 - a. It is located in a climatic zone favorable to shade house production of dendrobiums, potted plants and greenhouse production of certain vegetables, particularly tomatoes.
 - b. Accessibility of the property through Kaahumanu Highway and the Kona Palisade Access Road through the property is excellent.
 - c. Electricity is available from the main highway at the entrance to the park site.
 - d. The terrain is not as rough as the other sites.
 - e. The location adjacent to Ke-ahole Airport provides an excellent site for shipment of flowers and foliage and, seasonally, tomatoes. It is also an ideal location for a flower and foliage packing house and a tourist attraction.



L. C. FRUTO
Project Manager

cc: Dept. of Agriculture



University of Hawaii at Manoa

College of Tropical Agriculture
Bilger Hall 239 • 2545 The Mall
Honolulu, Hawaii 96822

Office of the Dean and Director

August 22, 1977

M&E Pacific, Inc.
(Formerly Sunn, Low, Tom & Hara, Inc.)
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Attention: Mr. L. C. Fruto

Gentlemen:

Subject: Environmental Impact Statement for the Proposed
Ke-ahole Agricultural Park, Island of Hawaii

The College of Tropical Agriculture, University of Hawaii, has received the Environmental Impact Statement Preparation Notice for the above project.

Because of our continuing interest in agricultural development in Kona, we would like very much to be kept informed of the progress of the preparation of the EIS. From our point of view, we would like to see emphasis given to the following issues in the preparation notice:

- (1) The available water for the project and possible impact on agriculture, tourism, domestic use, and other industrial use in Kona that might occur if such a diversion was made.
- (2) The marketing feasibility of the products anticipated and the competitive impact on producers of these products throughout the State.

We would also like to raise the issue of the impact on the transportation system presently in use by the State's agricultural industry. In addition, we believe that the alternative sites should be assessed with respect to possible damage to crops from airport pollution (jet fumes).

Our staff would appreciate the opportunity to interact with your consultants in their preparation of the EIS.

Yours sincerely,

William R. Furtick
Dean

cc: John Farias, Jr. AN EQUAL OPPORTUNITY EMPLOYER

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable MEPAC

September 13, 1977

Office of Environmental Quality Control
Office of the Governor
550 Halekiauila Street
Tani Office Building, Third Floor
Honolulu, Hawaii 96813

Mr. William R. Furtick, Dean
College of Tropical Agriculture
University of Hawaii at Manoa
Bilger Hall - The Mall
Honolulu, Hawaii 96822

SUBJECT: Response to EIS Preparation Notice
Ke-ahole Agricultural Park

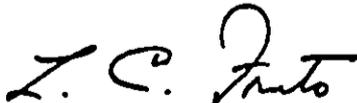
Your letter of August 22, 1977 suggests that emphasis be given to certain issues concerning the availability of water, marketing feasibility of the products, transportation system and airport pollution (jet fumes). Our comments on these issues follow:

Water: No studies on the specific impacts of diverting water from other usages to farming have been made. The Hawaii County, Department of Water Supply, assured us that about 200,000 gallons per day could be furnished by 1979, and it is believed that 300,000 gallons per day would be available when the North Kona water transmission system is improved. We presume that the Department of Water Supply had considered the water usage of all the segments of the Kona economy when they committed the quantity of water for the agricultural park.

Marketing feasibility: A study made by Dr. Frank S. Scott, Jr. indicated that there is a market potential for such crops as dendrobiums, potted flowers, foliage plants and tomatoes. He stated that there would seem to be minimal risk in producing 20 to 30 acres of dendrobiums and other potted plants and that the acreage in dendrobiums could be increased or phased into other crops as more precise information on the market potential becomes available.

Transportation: The matter of transporting agricultural products is still an unresolved issue and will remain unresolved for some time. At the present time, however, the shipment of produce from the proposed agricultural park has to be by either air or barge.

Jet fumes: There is an existing test plot of dendrobiums adjacent to the proposed agricultural park. The plants are thriving very well and do not seem to be affected by the jet fumes.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

Branch Office P. O. Box 3519, Agaña, Guam 96910

Advisory Council on
Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

August 29, 1977

Mr. L. C. Fruto
M & E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fruto:

This is in response to John Farias, Jr.'s notice of intent dated July 22, 1977, to prepare an environmental impact statement for the Proposed Ke-ahole Agricultural Park, North Kona, Hawaii.

Pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320), the Council is charged with the responsibility of providing Federal agencies with comments on their undertakings which affect cultural resources. Until the Council has been notified by a Federal agency that it has determined an undertaking will affect a property included in or eligible for inclusion in the National Register of Historic Places, the Council is unable to comment.

The Council on Environmental Quality's guidelines for compliance with the National Environmental Policy Act of 1969 direct Federal agencies to forward copies of environmental statements prepared for undertakings which will have an impact on cultural resources to the Council for review and comment. Therefore, because the Council has no legislative or administrative authority to comment to state or private agencies the following remarks are directed to the U.S. Department of Agriculture, who will be assisting in the construction of the undertaking.

As part of its planning process the USDA should arrange to have the areas to be impacted by the undertaking surveyed to identify cultural properties eligible for inclusion in the National Register of Historic Places. After the survey is complete, if USDA determines, in consultation with the Hawaii State Historic Preservation Officer, that the undertaking will result in an effect on any property included in or eligible for inclusion in the National Register it is required to afford the Council an opportunity to comment on the undertaking pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f, as amended, 90 Stat. 1320) in accordance with the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800).

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

Page 2

Mr. L. C. Fruto

Proposed Ke-ahole Agricultural Park, /North Kona, Hawaii

August 29, 1977

Subsequently, the environmental statement prepared for the undertaking should assess its impact on historic and cultural resources. If any of these properties are included in or eligible for inclusion in the National Register the environmental documentation should demonstrate contact with the Council and included a copy of its comments. Should you have questions or require additional assistance in this matter, please contact Michael H. Bureman of the Council's staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946, an FTS number.

Sincerely yours,



Louis S. Wall
Assistant Director, Office
of Review and Compliance

M&E Pacific, Inc.

Environmental Engineers

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

September 13, 1977

Mr. Michael H. Bureman
Assistant Director,
Office of Review and Compliance
Advisory Council on Historic Preservation
P. O. Box 25085
Denver, Colorado 80255

SUBJECT: Response to EIS Notice
Ke-ahole Agricultural Park

In reference to your letter of August 29, 1977, please be informed that we have engaged Archaeological Research Center Hawaii, Inc. to perform a surface archaeological survey at the project site. Their recommendations on specific archaeological sites will be forwarded at a later date.


L. C. FRUTO
Project Manager

cc: Dept. of Agriculture

SPARK M. MATSUNAGA
HAWAII

HAWAII DEPT OF AGR
WASHINGTON, D.C. 20510
HONOLULU OFFICE:
3104 PRINCE KUNIO BUILDING
HONOLULU, HAWAII 96813

United States Senate

WASHINGTON, D.C. 20510

August 8, 1977

CHIEF DEPUTY
MAJORITY WHIP

CHAIRMAN, SUBCOMMITTEE ON
TOURISM AND SUGAR
COMMITTEE ON FINANCE

MEMBER:

COMMITTEE ON ENERGY AND
NATURAL RESOURCES

COMMITTEE ON
VETERANS' AFFAIRS

Honorable John Farias, Jr.
Chairman, Board of Agriculture
Department of Agriculture
State of Hawaii
1428 S. King Street
Honolulu, Hawaii 96814.

Dear John:

Thank you for your recent letter informing me of the current Board of Agriculture preparations for submission of an environmental impact statement for the proposed Ke-ahole Agricultural Park on the Island of Hawaii.

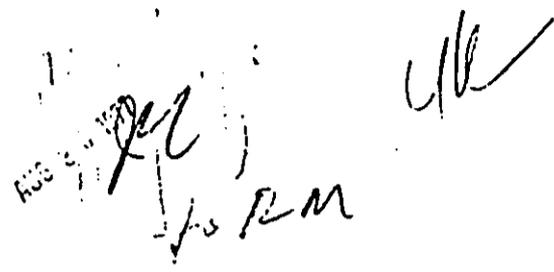
I have no specific concerns over the proposed park at this time. However, I would greatly appreciate being kept informed of the status of this proposal as it develops.

Aloha and best wishes.

Sincerely,


Spark Matsunaga
U. S. Senator




AUG 15 2 07 PM '77
JCF
JRM
UK

DANIEL K. INOUE
HAWAII

HAWAII DEPT OF AGRICULTURE *United States Senate*

AUG 22 4 13 PM '77

WASHINGTON, D.C. 20510

August 18, 1977

REC-25-1877

John Farias

Mr. John Farias, Jr.
Chairman of the Board of Agriculture
Department of Agriculture
State of Hawaii
1420 South King Street
Honolulu, Hawaii 96814

Dear John:

On behalf of Senator Inouye, who is currently in Hawaii, I wish to acknowledge receipt of your communication requesting comments on the proposed Ke-ahole Agricultural Park. While I do not anticipate that the Senator will be submitting formal comments, I shall call proposed project to his attention. I know that he shares your interest in diversifying agricultural opportunities in Hawaii and will want to be of any possible help.

Aloha,

E. Ravnholt

EILER C. RAVNHOLT
Administrative Assistant

ECR:bhm



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

HONOLULU, HAWAII

TELEPHONE 531-1111

FACSIMILE 531-1111

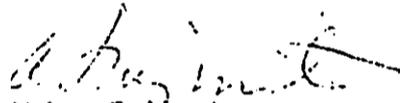
September 23, 1977

Environmental Quality Commission
Office of the Governor
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, HI 96813

KE-AHOLE AGRICULTURAL PARK

As you requested, we have reviewed the environmental impact statement for this park and have no additional comments to offer. The statement addresses itself on the subject of water in line with our communication to Mr. John Farias, Jr., and in our discussion with the Kona Farm Bureau members.

Since we may want to refer to this document in the future, we have retained it in our files.


Akira Fujimoto
Manager

WHS

... Water brings progress ...

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. Akira Fujimoto, Manager
Department of Water Supply
County of Hawaii
P. O. Box 1820
Hilo, Hawaii 96720

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.

L. C. Fruto

L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

HAWAII DEPT OF AGR
SEP 27 4 37 PM '77

SEP 26 1977

AP/W-PS-EC

Office of the Governor
State of Hawaii
Environmental Quality Commission
550 Halekuanila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Thank you for the opportunity to review the inclosed Environmental Impact Statement for Ke-ahole Agricultural Park, Ke-ahole, North Kona, Hawaii. A review has been conducted and there are no comments. The document is returned as requested.

Sincerely,

1 Incl
As stated

CARL P. RODOLPH
Colonel, CE
Director of Facilities Engineering

Copy furnished:
Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

DEPARTMENT OF THE ARMY
DIRECTORATE OF FACILITIES ENGINEERING
US ARMY SUPPORT COMMAND, HAWAII
FORT SHAFTER, HAWAII 96858

M&E PACIFIC, INC.
SUNN, LOW, TOM & HARA, INC.

ENVIRONMENTAL ENGINEERS

November 17, 1977

Carl P. Rodolph
Colonel, CE
Director of Facilities Engineering
Department of the Army
Directorate of Facilities Engineering
US Army Support Command, Hawaii
Fort Shafter, Hawaii 96858

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.


L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR



VALENTINE A. SIEFERMANN
MAJOR GENERAL
ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
FORT RUGER, HONOLULU, HAWAII 96816

HIENG

26 SEP 1977

Department of Agriculture
1428 South King St.
Honolulu, Hawaii 96813

Gentlemen:

Ke-ahole Agricultural Park

Thank you for sending us a copy of the "Ke-ahole Agricultural Park" project Environmental Impact Statement. We have received the publication and have no comments to offer.

Yours truly,


WAYNE R. TOMOYASU
Captain, CE, HARN6
Contr & Engr Officer

HAWAII DEPT OF AGR
SEP 27 4 36 PM '77

M&E PACIFIC, INC.
SUNN, LOW, TOM & HARA, INC.

ENVIRONMENTAL ENGINEERS

November 17, 1977

Wayne R. Tomoyasu
Captain, CE, Harng
Contr & Emgr Officer
State of Hawaii
Department of Defense
Office of the Adjutant General
Fort Ruger, Honolulu, Hawaii 96816

**Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park**

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.

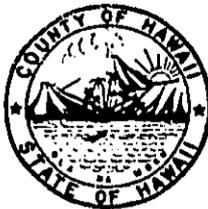
L. C. Fruto
L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

HERBERT T. MATAYOSHI
MAYOR

EDWARD K. HARADA
CHIEF ENGINEER



BUREAUS AND DIVISIONS:
AUTOMOTIVE EQUIPMENT & MOTOR POOL
BUILDING CONSTRUCTION & INSPECTION
PLANS AND SURVEYS
ROAD CONSTRUCTION AND MAINTENANCE
SEWERS AND SANITATION
TRAFFIC SAFETY AND CONTROL

COUNTY OF HAWAII
DEPARTMENT OF PUBLIC WORKS
25 AUPUNI ST.
HILO, HAWAII 96720

September 26, 1977

Office of Environmental Quality Control
350 Maikawila Street, Rm. 301
Honolulu, HI 96813

Department of Agriculture
1428 South King Street
Honolulu, HI 96814

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT
PROPOSED KE-AHOLE AGRICULTURAL PARK
Ke-ahole, North Kona, Hawaii

We have reviewed the subject Environmental Impact Statement and have no comments to offer at this time.

We believe the specifics of clearing and grading, construction of roads, and drainage improvements will be more precisely covered in the construction plans.

We therefore reserve comment until such time when the construction plans are developed and sent to us for review and comments.

EDWARD HARADA
Chief Engineer

HAWAII DEPT OF AGR
SEP 28 3 26 PM '77

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. Edward Harada, Chief Engineer
County of Hawaii
Department of Public Works
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agri-
cultural Park. The revised EIS is presently being prepared and will be
available through the OEQC.



L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

HEADQUARTERS
FOURTEENTH NAVAL DISTRICT
BOX 110
XXXXXXXXXXXXXXXXXX
Pearl Harbor, Hawaii 96860

IN REPLY REFER TO:
002A:FWD:amh
Ser 1993

28 SEP 1977

Environmental Quality Commission
State of Hawaii
Office of the Governor
550 Halekiauila Street, Room 301
Honolulu, Hawaii 96813

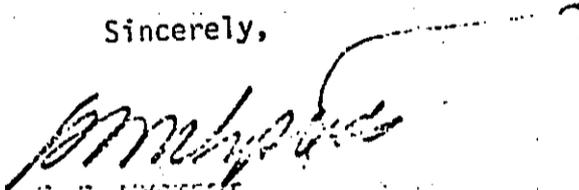
Gentlemen:

Environmental Impact Statement
for Ke-ahole Agricultural Park

The Environmental Impact Statement for Ke-ahole Agricultural
Park has been reviewed, and the Navy has no comments. As requested,
the subject EIS is returned.

Thank you for the opportunity to review the EIS.

Sincerely,


R. P. NYSTEDT
CAPTAIN, OEC, USN
DISTRICT CIVIL ENGINEER
BY DIRECTION OF THE COMMANDANT

Encl

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

R. P. Nystedt
Captain, CEC, USN
District Civil Engineer
Headquarters
Fourteenth Naval District
Box 110
Pearl Harbor, Hawaii 96860

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.


L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR



ANDREW I. T. CHANG
DIRECTOR OF SOCIAL SERVICES & HOUSING

HAWAII DEPT OF AGR
SEP 30 1 05 PM '77

to Pat Han
OCT 2 1977

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
P. O. Box 339
Honolulu, Hawaii 96809

September 28, 1977

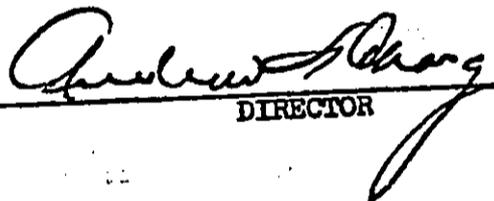
MEMORANDUM

TO: Environmental Quality Commission
550 Halekauwila St., Room 301
Honolulu, Hawaii 96813

FROM: Andrew I. T. Chang, Director
Department of Social Services and Housing

SUBJECT: Environmental Impact Statement,
Ke-ahole Agricultural Park, Ke-ahole, North Kona, Hawaii

Subject EIS has been reviewed for its impact on departmental programs.
We have no comment to make and we are returning the EIS for your usage.
Thank you for the opportunity to review and comment.



DIRECTOR

Attachment
cc: Governor (Ofc. of EQC)
Dept. of Agriculture

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 21, 1977

Mr. Andrew I. T. Chang, Director
Department of Social Services and Housing
P. O. Box 339
Honolulu, Hawaii 96809

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.

L. C. Fruto

L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

KAHOLE P. APILITHI
GOVERNOR



VALENTINE A. SLEEMANN
MAJOR GENERAL
ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
FORT RUGER HONOLULU HAWAII 96816

28 SEP 1977

HIENG

Mr. Donald Bremner, Chairman
Environmental Quality Commission
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Bremner:

Ke-ahole Agricultural Park

Thank you for sending us a copy of the "Ke-ahole Agricultural Park" project Environmental Impact Statement. We have received the publication and have no comments to offer.

Yours truly,

A handwritten signature in cursive script, appearing to read "Wayne R. Tomoyasu".

WAYNE R. TOMOYASU
Captain, CE, HARNG
Contr & Engr Officer

M&E PACIFIC, INC.
SUNN, LOW, TOM & HARA, INC.

ENVIRONMENTAL ENGINEERS

November 17, 1977

Wayne R. Tomoyasu
Captain, CE, Harng
Contr & Emgr Officer
State of Hawaii
Department of Defense
Office of the Adjutant General
Fort Ruger, Honolulu, Hawaii 96816

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.



L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

COPY

DEPARTMENT OF PARKS & RECREATION
COUNTY OF HAWAII
HILO, HAWAII 96720

HAWAII DEPT OF AGR

OCT 3 2 04 PM '77

[Handwritten signature]

OCT 2 1977 *[Handwritten initials]*

September 29, 1977

Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

RE: Keahole Agricultural Park, Keahole, North Kona, Hawaii

The EIS for the subject project has been reviewed and we have no comments or objections to offer.

Thank you for the opportunity to review the report. As requested, the report is being returned.

Milton T. Hakoda

Milton T. Hakoda
Director

encl.

cc: Dept. of Agriculture

SEARCHED	INDEXED
SERIALIZED	FILED
OCT 2 1977	
FBI - HONOLULU	

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. Milton T. Hakoda, Director
Department of Parks & Recreation
County of Hawaii
Hilo, Hawaii 96720

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.


L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture.



DEPARTMENT OF THE ARMY
HONOLULU DISTRICT, CORPS OF ENGINEERS
BLDG. 230, FT. SHAFTER
Hawaii 96858

PODED-PH

30 September 1977

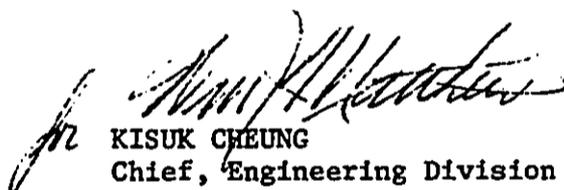
Chairman
Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814

Dear Sir:

We have reviewed the Environmental Impact Statement (EIS) for the Ke-ahole Agricultural Park as requested by the State Office of Environmental Quality Control, letter received 20 September 1977. We have no comments regarding the project in relation to the Corps responsibilities.

We suggest that the State Historic Preservation Officer be consulted regarding the adequacy of mapping and salvaging archaeological resources as described on page III-4 in the EIS. Comments concerning the archaeological data in the EIS made by Mr. Ross Cordy, Archaeologist, Environmental Resources Section, Planning Branch, Phone: 438-2264, are attached and provided for your consideration in finalizing the environmental statement.

Sincerely yours,


KISUK CHEUNG
Chief, Engineering Division

2 Incl
1. Comments
2. EIS

HAWAII DEPT OF AGR
OCT 4 3 34 PM '77



Comments Regarding Archaeological Resources

1. Appendix A-3, the archaeological report, appears to be abridged, thus lacks some credibility and cohesion.
2. A past literature review pertinent to the area is not discussed or provided in the archaeological report.
3. The archaeological sites in the project area are not analyzed for their relationship to settlement patterns in the area.
4. References to substantiate project site comparison to other sites is not provided.
5. Dimensions of the archaeological sites are not provided, e.g., height of walls and length and widths of platforms and enclosures.
6. The reasons for recommending salvage and further investigations are not clearly provided.

M&E PACIFIC, INC.

SUNN, LOW, TOM & HARA, INC.

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. Kisuk Cheung
Chief, Engineering Division
Honolulu District, Corps of Engineers
Bldg. 230, Fort Shafter
Honolulu, Hawaii 96858

SUBJECT: Response to Comments regarding the EIS
for the Proposed Ke-ahole Agricultural Park

Your comments, dated September 30, 1977, on the EIS for the proposed Ke-ahole Agricultural Park are appreciated.

Since your comments were confined to the archaeological portion of the EIS, we have asked the Archaeological Research Center Hawaii, Inc. to prepare responses. Enclosed is their revised report.

We trust that the revised report adequately answers your concerns.


L. C. FRUTO
Project Manager

HK/jn

Encl.

cc: Department of Agriculture

ARCHAEOLOGICAL RESEARCH CENTER HAWAII, INC.

P. O. Box 285; Lawai, Kauai, Hawaii 96765; Ph. 332-8521

24
October
1977

M&E Pacific, Inc.
Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813

ATTENTION: Mr. Larry C. Fruto

SUBJECT: Reply to Review Comments, Final Report - Archaeological Survey
of the Proposed Agricultural Part at Ke-ahole, North Kona, Hawai'i
Island. ARCH 14-122

Gentlemen:

Having read the review comments concerning the above final report contained in your letter of 11 October 1977, the main point seems to be one of completeness and emphasis. For the most part, the study was an intensive surface survey necessarily limiting the data to surface observations. What test excavations were undertaken was done beyond the original Scope of Work. As such, it was stated in the report that only the results of the survey were to be discussed at this time. The results of the test excavations will be forthcoming in an expanded and revised paper (Ke-ahole Report, pp. 2-3).

Inferences regarding site function were provisionally suggested in the report. The reviewer's comment calling for specific references substantiating these inferences, however, appears to be justified. These are included in the final draft.

Overall interpretive statements regarding the relationship of the Ke-ahole sites to the settlement pattern of the area are another matter, however. A cursory review of the previous studies in the leeward Kohala-Kona region was presented to a) indicate the limited extent of the previous work in the inland areas in contrast to that along the coast; and b) to outline two alternative models of Hawaiian settlement and set the environmental context in which the Ke-ahole sites were found and which also compares most favorably with one of the two models (Ke-ahole Report, pp. 3, 14-16). It is to be understood that detailed fieldwork was concentrated only in the larger lower tract of the project area.

HAWAII DEPT OF AGR

OCT 26 8 00 AM '77

OCT 26 1977

October 21, 1977

STP 8.4512

Office of Environmental
Quality Control
550 Halekauwila St., Rm. 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Environmental Impact Statement
Ke-ahole Agricultural Park

Thank you very much for giving us the opportunity to review the above-captioned document. We have the following comments regarding the proposed development.

1. Of primary concern is the DOT proposed supplemental CIP request for \$1,500,000 to establish the Queen Kaahumanu Highway as a scenic highway and to relocate existing power lines within the highway R/W to a line 3,000 feet mauka of the highway. The EIS is silent on the matter of underground utilities. It would seem doubtful that the State would go to the expense of installing underground utilities in an agricultural park. Thus, we are faced with the prospect of the DOT spending \$1,500,000 to eliminate overhead utility lines from the highway, while the DOA establishes an adjacent agricultural park with a forest of overhead utility lines immediately beyond the highway boundary.

It should also be noted that the Kona Palisades subdivision to the mauka of the proposed agricultural park was developed with underground utilities. An agricultural park with overhead utilities on the lower boundary of the subdivision would certainly have a visual impact on those property owners and could tend to depress property values.

SUNN, LOW, TOM & HARA, INC.

Mr. W. Y. Thompson
November 17, 1977
Page 2

the "CDUA process be duly completed" (BLNR Minutes of February 13, 1976). The Department of Agriculture, therefore, is proceeding to meet this condition.

It is the intention of the Department of Agriculture, however, to pursue a Land Use District boundary reclassification at a later date.

We trust that your comments have been adequately answered.

L.C. Fruto

L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. W. Y. Thompson
Chairman of the Board
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Response to Comments regarding the EIS for
the Proposed Ke-ahole Agricultural Park

Your comments, dated October 21, 1977, on the subject EIS are appreciated. This letter will respond using the format of a brief statement of your comment followed by our response.

Comment: The water requirements for Phase II of the agricultural park will not be available until a larger transmission line is installed along the proposed realignment of Kuakini Highway. Water for the agricultural park is therefore in part dependent on the scheduling of the realignment.

Response: The scheduling for the development of Phase II of the Ke-ahole Agricultural Park is presently indefinite but will be coordinated with the county Water Department.

Comment: It will be necessary to obtain subdivision approval and DLNR approval of any disposition of State land.

Response: Subdivision approval will be sought. It is our understanding that DLNR will administer the lease agreements related to this project.

Comment: It is suggested that, instead of seeking conservation district approval, application should be made to the land use commission for reclassifying the area to agriculture.

Response: The Department of Agriculture has prepared the following response to this suggestion:

In order to expedite the development of the Ke-ahole Agricultural Park, the decision was made to seek a Conservation District Use approval from the Board of Land and Natural Resources (BLNR). Subsequently the BLNR approved the concept of establishing the Ke-ahole Agricultural Park and as a condition of approval required that

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809
October 21, 1977

W. Y. THOMPSON, Chairman
~~CHRISTOPHER COBB, Chairman~~
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Environmental Quality Commission
550 Halekauwila St.
Honolulu, HI 96813

Gentlemen:

We have reviewed the EIS for the Ke-ahole Agricultural Park.

The EIS indicates the park will require 540,000 gallons per day. The County Water Department indicates 200,000 gallons per day can be available in 1979. The remaining 340,000 will not be available until a larger transmission line is installed to supplement the existing 8 inch main in Kuakini Highway. This new and larger line is to be built with the pending realignment of Kuakini Highway. Water for the agricultural park, is therefore, in part dependent on the scheduling of the realignment.

The only other comment we have is that in addition to the approvals listed on page XI-1, it will also be necessary to get subdivision approval and our Board's approval of any disposition of State land. Moreover, it is suggested that, instead of seeking Conservation District approval, application should be made to the Land Use Commission for reclassifying the area to Agriculture.

Very truly yours,


W. Y. THOMPSON
Chairman of the Board

cc: DOWALD
Land Management



M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

Mr. Nevin D. Holmberg

November 21, 1977

Page 2

Comment: The loss of the present vegetation and wildlife in the project area should be included as an adverse environmental effect.

Response: The EIS has been changed to reflect this comment.

Comment: Mitigation measures include only those actions reducing the adverse impacts on the environment that go beyond those minimum standards required by regulation and law.

Response: We believe this definition of mitigation measures is too narrow. Such a restricted listing would not convey the full picture of what actions will be taken, consequently, the list of mitigation measures includes both those that have been included in regulations and law and those that have no specific legal requirements.

Comment: The genus name for the Hawaiian owl is misspelled.

Response: The spelling has been corrected.

We trust that these responses satisfactorily answer your concerns.

L. C. Fruto
L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 21, 1977

Mr. Nevin D. Holmberg
Acting Field Supervisor
Division of Ecological Services
Fish and Wildlife Service
U.S. Department of the Interior
300 Ala Moana Blvd., Room 5302
Honolulu, Hawaii 96850

SUBJECT: Response to Comments on EIS for the proposed
Ke-ahole Agricultural Park

Your comments on the proposed Ke-ahole Agricultural Park EIS contained in your letter dated October 14, 1977 are appreciated. This letter will serve to respond to your concerns using the format of a brief statement of each of your comments followed by our response.

Comment: Although wildlife species are frequently highly mobile, displacement to other areas generally amounts to the loss of the organism because natural areas usually already support wildlife populations at their maximum levels.

Response: The EIS has been changed to reflect this comment. It should be noted, however, that the area to be developed has very sparse vegetation and wildlife populations. Most of the flora and fauna species listed in the terrestrial biology report in the appendix of the EIS were found in the area near the southern border in the state owned parcel away from the area to be developed. Of particular note in this regard is the Hawaiian owl or Pueo (Asio lamneus) which was sighted outside of the area to be developed.

Comment: The investigators conducting biological and other surveys should be identified.

Response: All investigators have been identified in the revised EIS. Specifically, the biological survey was conducted by Beatrice Krauss of the Lyon Arboretum, University of Hawaii.

Comment: The list of species inhabiting the area should include the francolin (Francolinus sp.) and the endangered Hawaiian hoary bat (Lasiurus cineridus semotus).

Response: These species were included in the text of the EIS as possible inhabitants of the area, however, they were not sighted during the survey.

Specific Comments

✓ Page II-6, 1st line - Terrestrial Biology - the genus name is misspelled.

✓ Page II-6, 3rd paragraph - Terrestrial Biology - The list of species inhabiting the area should include the francolin (Francolinus sp.) and the endangered Hawaiian hoary bat (Lasiurus cinereus semotus).

Page III-3, 2nd paragraph - Terrestrial Biology Impact - It is incorrect to imply that wildlife can be displaced to adjacent habitats with no adverse effects (See General Comments above). Appropriate changes should be made in this and the Summary section.

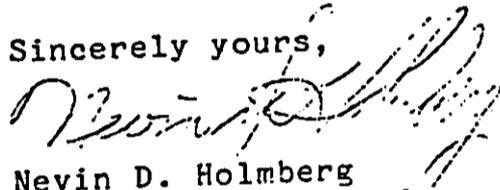
Page V-1, No. 2 - Probable Adverse Environmental Effects Which Cannot Be Avoided - A statement should be included addressing the loss of vegetation and wildlife presently inhabiting the project area.

Page VIII-1 - Mitigation Measures Proposed to Minimize Impact - There appears to be some confusion regarding the definition of mitigation measures. This term is considered to be actions by the contractor beyond those minimum standards required by regulation and law which reduce the adverse impacts a project will have on the environment.

Page A-2-3 - Fauna - Birds - The genus name is misspelled.

We appreciate this opportunity to comment.

Sincerely yours,


Nevin D. Holmberg
Acting Field Supervisor

cc: HA
ARD(AE)
NMFS
HDF&G



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
300 Ala Moana Blvd., Pm. 5302
P. O. Box 50167
Honolulu, Hawaii 96850

Reference: ES

October 14, 1977

Dr. Richard Marland
Office of Environmental Quality Control
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Re: Ke-ahloe
Agricultural
N. Kona, Hawaii

Dear Sir:

This provides comments on the Environmental Impact Statement for Ke-ahole Agricultural Park on the island of Hawaii.

General Comments

It is important to understand that although wildlife species are frequently highly mobile, their movements are guided by certain specific requirements such as food, water, shelter, and territory. A natural or relatively unmodified area usually supports wildlife populations at their maximum levels depending on the presence or absence of various limiting factors. It follows that an influx of additional organisms, such as those displaced from an adjacent project area, would increase competition for limited resources until the original population balance is achieved. Therefore, displaced organisms are essentially lost through secondary project impacts.

In addition, it should be noted that the credibility of an impact statement is enhanced by the reputation of its field investigators. We suggest that the identification of investigators conducting biological and other surveys be included in your reports.



M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. Owen Miyamoto
Chief, Air Transportation Facilities Division
Department of Transportation
State of Hawaii
Honolulu International Airport
Honolulu, Hawaii 96816

SUBJECT: Response to Comments on EIS for the Proposed
Ke-ahole Agricultural Park
Re: AT-EP 2556

Your comments on the proposed Ke-ahole Agricultural Park EIS contained in your letter dated October 6, 1977 are appreciated. This letter will serve to answer your concerns using the format of a brief statements of each of your comments followed by our response.

Comment: The proposed development does not appear to adversely impact the airport operation or its future development programs.

Response: No response necessary.

Comment: There will be an adverse visual impact if overhead power and telephone lines are extended to each farm lot.

Response: Power and telephone lines will be placed underground to minimize detrimental visual effects.

Comment: Standards of design and lease requirements should be imposed on the lessees so that the development will not be detrimental to the scenery.

Response: The visual effect on the agricultural park will probably be generally attractive to many people while it will be disruptive to others. The design and construction of the agricultural park will have to comply with all applicable subdivision rules and building codes. The Department of Land and Natural Resources will be the agency administering the leases of the lots. The specific provisions of these leases have not yet been formulated but they are expected to include some land-use restrictions.


L. C. FRUTO
Project Manager

HK/jn

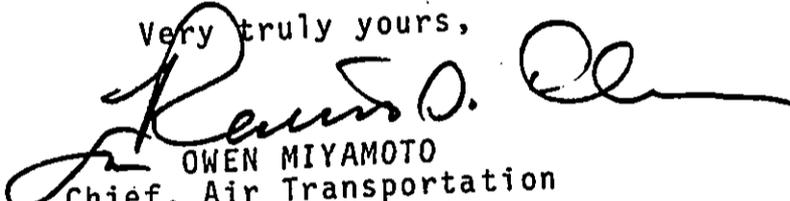
cc: Department of Agriculture
Pacific Trade Center · Suite 600 · 190 South King Street, Honolulu, Hawaii 96813 · (808) 521-3051 · Cable: SULTARA

Branch Offices: Ewa, Hilo, Kona, Aiea, Pearl and Heron

Mr. L. C. Fruto
Page 2
October 6, 1977

in the document may lead the reviewer to believe the farm lots to be green with crops and visually "be a relief from the monotony of the lava field." In this regard, we suggest that the EIS address the standards of the design of the agricultural park and the requirements that should be imposed on the lessees of the lots so that the development will not be detrimental to the scenery of the countryside.

Very truly yours,



OWEN MIYAMOTO
Chief, Air Transportation
Facilities Division

cc: EQC

GEORGE P. ARIZONA
DIRECTOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

HONOLULU INTERNATIONAL AIRPORT • HONOLULU, HAWAII 96819

October 6, 1977

E. ALVEY WINDGETT
DIRECTOR

WALLACE ADAMS
ROBERT HIGASHIMURA
ROBERT S. SAKAMOTO
CHARLES D. SWANSON

AT-EP
2556

Mr. L. C. Fruto
M & E Pacific, Inc.
Pacific Trade Center
Suite 600
190 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fruto:

Subject: EIS for the Proposed Ke-ahole
Agriculture Park
Island of Hawaii

Thank you for providing us with a copy of the subject
EIS.

The proposed development does not appear to adversely
impact the airport operation or its future development
programs. However, we wish to comment on the possible
visual impact attributable to the complex proposed along the
main coastal highway which is the primary transportation
route for tourists to and from Kona.

The existing overhead power and telephone lines along
Kaahumanu Highway already contributes to some adverse visual
impact of the landscape. If these utilities are extended
overhead to each farm lot, the additional poles and lines
will certainly adversely add to the deficiency.

Also, we do not expect that the green houses of all
types, forms, and colors that may appear on the farm lots
would be "generally attractive." We feel that the statements

M&E PACIFIC, INC.
Reply to Review Comments
October 24, 1977
Page 2

with only a reconnaissance being conducted in the upper area. In all, although the results discussed in the report are certainly suggestive, it was felt that any more definitive statements regarding settlement pattern at Ke-ahole would not have been appropriate at this time.

Regarding the dimensions of the archaeological sites, it is agreed that these should be included with this report, although these are provided in the site inventory forms. For the purposes of the Ke-ahole Report, site and feature dimensions will be listed in tabular form as an appendix.

Finally, as for reasons for recommending further studies in the project area, it should be pointed out that for the most part, no further work is recommended at this time since initial park development is limited to the areas immediately adjacent to the highway. Recommendations were made for specific sites within or near potential development areas. Except for the habitation, petroglyph and possible burial sites, these recommendations were only made provisionally pending the final decision of which areas were to be developed. It was felt that a more detailed discussion would be appropriate in terms of a proposal for follow up work.

If there are any questions concerning the above, please do not hesitate to contact me.

Nā Kau a Kau,

ARCHAEOLOGICAL RESEARCH CENTER HAWAII, INC.



Bertell D. Davis
Archaeologist VI

BDD:rlh

cc: Mr. James C. Kirchhofer,
Department of Agriculture

2. Access from the agricultural park to the highway should be restricted to the existing channelized intersection which serves the Kona Palisades subdivision. No access will be allowed at the connection immediately opposite the road into the airport. This access is a limited usage access only to service the water storage tank and the HELCO substation. If the agricultural park or other development is to use this access, it must be developed into a fully channelized intersection in accordance with our requirements.

In view of the potential usage of the Kona Palisades access road, proper setbacks should also be developed for the Queen Kaahumanu Highway. Present plans for this highway have no provisions for widening in the mauka direction, nor does it consider the construction of safety ramps or frontage roads.

3. The northerly boundary of the proposed Phase I of the agricultural park as shown on Figures I-2 and II-6 differs from that shown on Figures II-2 and II-4. The consultant's response of 9/13/77 to HELCO's letter of 7/26/77 states, "The south boundary of the power line easement will be used as the same boundary of the proposed ag park." None of the above noted Figures shows this.
4. The EIS should address the question of what agency will be responsible for monitoring and enforcing any conditions that may be imposed on prospective lessees of the agricultural park.
5. The existing power line is a high voltage (69 KV) transmission line. Any development proposing to tap off this line must install a substation to reduce this power to usable secondary voltage.
6. As noted in the Department of Water Supply's letter of 7/20/77, third paragraph, the full development of the agricultural park cannot be realized until a larger transmission main is installed in a section of Kuakini Highway. This larger main is intended to follow the alignment of our proposed Kuakini By-pass highway, a project whose construction schedule is indefinite.

Sincerely,

E. ALVEY WRIGHT
Director

ALK:jk
cc: DOA
LT-P

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 21, 1977

Mr. E. Alvey Wright, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

SUBJECT: Response to Comments regarding the EIS for
the Proposed Ke-ahole Agricultural Park
STP 8.4512

Your comments on the EIS for the proposed Ke-ahole Agricultural Park are appreciated. This letter will respond using the format of a brief statement of your comment followed by our response.

Comment: The DOT has made a supplemental CIP request for \$1,500,000 to establish the Queen Kaahumanu Highway as a scenic highway and to relocate the existing powerlines about 3,000 feet mauka of the highway. The proposed overhead utility lines in the proposed Ke-ahole Agricultural Park would be inconsistent with this effort.

Response: The EIS has been revised to show that underground utilities are being proposed for the Ke-ahole Agricultural Park.

Comment: Access from the agricultural park to the highway should be restricted to the existing intersection serving the Kona Palisades subdivision. No access will be allowed opposite the road to the airport. Proper setbacks should be provided.

Response: The plans for the agricultural park limit access to the existing road serving the Kona Palisades subdivision. No other points of access to the highway are planned. Ten-foot setbacks are being provided on each side of the Kona Palisades subdivision access road. No additional setbacks are being provided for the highway because there are no plans for highway expansion in the mauka direction.

Comment: The figures showing the boundaries of the proposed agricultural park are inconsistent with each other and with the description in the consultant's letter to HECO.

Response: The figures and text of the revised EIS have been made consistent.

SUNN, LOW, TOM & HARA, INC.

Mr. E. Alvey Wright
November 21, 1977
Page 2

Comment: There is a question as to which agency will be responsible for monitoring and enforcing any conditions that may be imposed on lessees of the agricultural park.

Response: The Department of Land and Natural Resources will administer the leases.

Comment: A substation will be required to tap off the existing 69 KV transmission line.

Response: The proposed agricultural park will tie into the existing substation and not directly to the overhead 69 KV transmission line.

Comment: The full development of the agricultural park is dependent on a larger water transmission main that is intended to follow the alignment of the proposed Kuakini By-pass Highway. The construction schedule of this highway project is indefinite.

Response: The Phase II portion of the proposed development will be coordinated with the planning of the water supply and distribution system for Kona. The schedule and other pertinent factors related to the water supply and distribution system development have to be coordinated with plans for highway construction, as you mentioned, as well as with the water reuse schemes for municipal wastewater. Since these developments presently have an indefinite schedule, the Phase II Agricultural Park will also have an indefinite schedule.

We trust that these responses satisfactorily answer your concerns.

L. C. Fruto

L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

Kona County Farm Bureau

Member: Hawaii Farm Bureau Federation
American Farm Bureau Federation

TELEPHONE
KONA 238-435

P. O. BOX 208
KEALAKEKUA, HAWAII

KONA

October 21, 1977

Department of Agriculture
1428 South King St.
Honolulu, HI 96814

Gentlemen:

The Kona Farm Bureau has no negative comments on the EIS for Ke-ahole Agricultural Park. We would like to commend the Department of Agriculture and M and E Pacific, Inc. on a job well done.

The farmers of Kona through the Farm Bureau appreciate the chance to make comment on this Ag. Park. We hope the Ke-ahole Ag. Park becomes a reality soon.

Sincerely,

Richard Matsumoto
Richard Matsumoto
President

MAILED
OCT 25 1977
C

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. Richard Matsumoto, President
Kona County Farm Bureau
P.O. Box 208
Kealahou, Hawaii

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.

L. C. Fruto

L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

HAWAII DEPT. OF AGR.

10 27 1977

Ant

Office of the Director

October 24, 1977

MEMORANDUM

TO: Chairman
Environmental Quality Commission

FROM: Doak C. Cox, Director *J.M. Miller for D.C. Cox.*

SUBJECT: Review of EIS for Ke-ahole Agricultural Park,
North Kōna, Hawaii

The Environmental Center review of the Ke-ahole Agricultural Park EIS has been prepared with the assistance of Harold Baker and Hiroshi Yamauchi of the Agricultural and Resource Economics Department and Darro Thuet and Jacquelin Miller of the Environmental Center.

Water is a key constraint in the feasibility of this proposed project. This is recognized at the outset on page I-1. We note that it is also the repeated concern of the respondees to the earlier EIS preparation notice. The discussion of this water constraint is unfortunately inadequate. The proposed scheme hinges largely upon the one page letter (July 20, 1977) from Akira Fujimoto (Manager of the Hawaii County Department of Water Supply) to John Farias, Jr. (Chairman, State Board of Agriculture). This letter which is reproduced in Section XIII essentially commits about 100,000 gpd to the Keahou area in late 1977 and another 100,000 gpd to the Kailua area in early 1979 if the County's water projects are completed on schedule. No further commitments can be made unless a bottleneck in transmission (i.e., a section of 8-inch pipeline) can be overcome by the installation of a larger supplemental transmission line.

A daily demand of 540,000 gallons of water will ultimately be required by the agricultural park at full development (150 acres in crop and 29 houses). But because of the limited water constraint only an initial phase of fifteen 5-acre lots (i.e., 75 acres) is planned with provisions for future extensions as more water becomes available.

The initial phase is planned under the assumption that the full 200,000 gpd will be available to the proposed agricultural park (p. I-5, 2nd para.). Is this a correct assumption to make? Will there be other competing demands for this water in the Keahou and Kailua areas? This was a key concern expressed in the letters from Hideto Kono (DPED) and Dean William R. Furtick (UH-College of Tropical Agriculture).

AN EQUAL OPPORTUNITY EMPLOYER

October 24, 1977

Even assuming that the full 200,000 gpd will be available to the proposed park, this amount will be sufficient to supply the daily domestic and agricultural demands for about 55 cultivated acres. This is still less than three-fourths of the initial phase acreage equivalent of 15 five-acre lots. Why? Overcoming the water constraint for the long run depends upon the development of a 3.5 mgd well in Kahaluu.

There is no discussion of the potential for reclamation and reuse of domestic sewage as an alternative source of irrigation water for the long run. Apparently, domestic sewage is disposed of through cesspools and injection wells. From the population data given on page II-13, if only about one-third of the North Kona sewage can be reclaimed for reuse, the volume of water that would become available could reach around 200,000 gpd. This is based on the 1975 population figure for North Kona. By 1980 the volume from North Kona alone could easily exceed 300,000 gpd if only a third of the domestic sewage is reclaimed for irrigation reuse. This irrigation reuse need not be limited to agricultural park purposes. Any reuse that may be realized for golf courses, parks, highway landscaping, etc., will release water for alternative purposes (including the agricultural park) and help relieve the water constraint problem for the area. What consideration has been given to reclamation of domestic sewage?

On the middle of page II-15, it is stated that "of the 8,500 acres of land available for cultivation, only 4,000 acres are currently being use." This is only one half of the available cultivable lands. Some discussion of this point is necessary to remove any doubts as to the reasons why the State is proposing to add another 200 acres (ultimately) through this proposed agricultural park. Is the water constraint the limiting factor here also? Are their other limiting factors (e.g., high lease rents, taxes, credits, etc.) which explain why there are so much idle agricultural lands? According to the socio-economic impact study, one of the factors tending to retard the development of diversified agriculture in Hawaii is the unavailability of accessible land at prices or lease rents which can be afforded for agricultural production.

The social economic aspects of water resource management needs more attention. Since water is such an important economic constraint for agricultural growth in Kona, the real economic cost of water needs to be thoroughly evaluated. This not only includes the partial outlays for water by consumers based on current water rates, but also the expected escalation of costs due to the heavy capital expenditure and repayment requirements of the Clean Drinking Water Act and the Water Pollution Control Act amendments in 1972.

There is some ambiguity in the statements relating to drainage and permeability made on page 2, 2nd paragraph and page V-1, item 3 as compared to pages II-3 and III-1. Mention is made, for example, on page 2 that the chemical sprays "are not anticipated to impact the ground water," yet on page III-2 it is stated that the ground water...may be affected to a slight degree.... Page IV-1, line 6 refers to the county general plan and states that the plan has specified the area for "extensive" agriculture. It is our understanding that the types of agriculture being proposed for the Ke-ahole Agricultural Park are "intensive" not "extensive." Is this, therefore, in opposition to the general plan designation? If so, what is the rationale to support the proposed useage?

October 24, 1977

- 3 -

Memo to Richard Marland

In addition to the expansion of the social economic aspects as they are related to water for this project, as was suggested previously, a detailed cost breakdown of the anticipated financial requirements of the state to develop this project should be included in the revised EIS. For example, what are the cost breakdowns for water and power transmission lines and road construction?

We appreciate your considerations of our comments.

DCC/JM/ck

cc: Harold Baker
Hiroshi Yamauchi
Darro Thuet
Jacquelin Miller
Department of Agriculture ✓
Office of Environmental Quality Control

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 21, 1977

Dr. Doak C. Cox, Director
Environmental Center
University of Hawaii
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

SUBJECT: Response to Comments regarding the EIS for
the Proposed Ke-ahole Agricultural Park

The comments from the environmental center on the EIS for the proposed agricultural park are appreciated. This letter will attempt to respond to your concerns using the format of a brief statement of each substantive comment followed by our response.

Comment: The discussion of the water constraint is inadequate since the scheme hinges on a one page letter from Akira Fujimoto (manager of the Hawaii County Department of Water Supply) essentially committing 100,000 gpd in later 1977 and another 100,000 gpd in early 1979. Have other competing demands been taken into account in this 200,000 gpd commitment for the first phase of the proposed agricultural park?

Response: Further communication with Akira Fujimoto has confirmed the commitment of 200,000 gpd by early 1979 to the proposed Ke-ahole Agricultural Park. Competing demands were taken into account in this commitment. The discussion of the water supply problem has been expanded.

Comment: Is the 200,000 gpd sufficient for the first phase of development of 15 five-acre lots?

Response: A more detailed design of the first phase development has been made and the results are included in the revised EIS. As presently planned, Phase I will involve ten 5-acre lots, one 8-acre lot, 6 acres for agricultural experiments and 2 acres for storing and packing for a total of 66 acres. Of this, only 52 acres will be cultivated since one acre from each of the lots may be used for other purposes. The 200,000 gpd should be more than adequate for the Phase I Development.

Comment: The ultimate development will have a demand of about 540,000 gpd. There should be a discussion of the potential of reclamation and reuse in the North Kona area.

Pacific Trade Center · Suite 600 · 190 South King Street, Honolulu, Hawaii 96813 · (808) 521-3051 · Cable: SULTARA
Branch Offices: Hilo, Hawaii; Agana, Guam

Dr. Doak C. Cox
November 21, 1977
Page 2

Response: The discussion of the Phase II water requirements has been expanded and put into context relative to the Kona area. The development, of Phase II is primarily dependent on water supply and will be coordinated with the overall water demand of the Kona area including options for supply development and increasing the reuse of treated municipal wastewater. The plans for these systems are still being formulated hence the Phase II development has an indefinite timetable. It is unlikely, however, that there will be direct reuse of Kailua wastewater at the proposed Ke-ahole Agricultural Park because of the distance involved.

Comment: The social economic aspects of water resource management needs more attention. Other constraints such as high lease rents, taxes, credits might be the limiting factor in the present lack of development of agricultural zoned lands in Kona.

Response: The discussion of the constraints on the development of diversified agricultural in Hawaii was expanded in the revised EIS using the points brought out in the economic section of the 1977 Hawaii State Plan. These constraints include a variety of economic factors as well as water supply. The proposed development at Ke-ahole should successfully eliminate these constraints by proper crop selection and the minimization of the initial economic burden by state participation. As noted earlier, the water constraint in Phase II will be coordinated with the water and wastewater plans for the overall Kona area.

Comment: There is some ambiguity concerning the effect on the groundwater.

Response: The revised EIS has been made consistent on this point. No significant effect is anticipated.

Comment: The county general plan specifies the area for extensive agriculture but the proposed Ke-ahole Agricultural Park will involve intensive agriculture.

Response: The county classification for extensive agriculture is for the area mauka of the proposed agricultural park. The park is in the area classified as conservation. Diversified agricultural operations (i.e., intensive agriculture) is listed as a permitted use in conservation districts. Therefore, the proposed use is not in opposition to the general plan designation.

Comment: A detailed cost breakdown of the state financial requirements to develop this project should be included in the revised EIS.

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

Dr. Doak C. Cox
November 21, 1977
Page 3

Response: Such an estimated breakdown has been included as follows:

Road Construction	\$188,000
Drainage System	66,000
Water System	191,000
Power Supply*	<u>23,000</u>
Total	\$468,000

* The power supply is for the difference between the cost of overhead lines (\$21,000), that would normally be born by the power company, and the proposed direct burial system (\$44,000). Telephone lines will also be under ground.

We trust that these responses satisfactorily answer your concerns.

L. C. Fruto
L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR



RICHARD E. MARLAND, PH.D.
DIRECTOR

TELEPHONE NO.
848-6915

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

October 25, 1977

MEMORANDUM

TO: John Farias, Chairman
Board of Agriculture

FROM: Richard E. Marland, Director
Office of Environmental Quality Control

SUBJECT: Environmental Impact Statement for Ke-Ahole Agricultural Park,
Ke-Ahole, North Kona, Hawaii

As of this date, this Office has received ten comments on the above subject. An attached sheet lists the responding agencies and/or organizations.

Before we begin commenting on the environmental impact statement, it is important to note that the proposed action is in concert with one of the guidelines stated in the State Environmental Policy Act (Chapter 344, Hawaii Revised Statutes). Section 344-4 (5) (A), states,

...all agencies, in development of programs, shall...promote and foster the agricultural industry of the State; and preserve and conserve productive agricultural lands;

In general, we have found that the subject document is well organized and well written. However, we have some minor comments to offer:

1. In the Project Description, phase I is discussed. However, it is not really clear what phase II will encompass. We recommend a discussion. Are there any more phases? What is the time frame for the phases?
2. On page II-8, the EIS contains a discussion about the terrestrial biology. However, reference should also be made to the appendix on the flora or a summary should be provided in the description.
3. The EIS should expand its discussion to include the impacts of clearing and grading for the proposed site.

Page 2

We have not attempted to summarize the comments of other reviewers. Instead, we recommend that each comment be given careful consideration by yourself.

We further recommend that (1) written responses, indicating a point by point discussion of the validity, significance, and relevance of comments be sent directly to all commentors, including this Office; (2) all comments and your responses be incorporated as an appendix to the revised EIS; and (3) a copy of the revised EIS or portions of the revised EIS be sent to those individual commentors who provided substantial comments to the EIS.

This Office also realizes that the fourteen day response period is quite short for adequate responses. Thus, we will consider responses beyond the fourteen day period.

We trust that these comments will be helpful to you in preparing the revised EIS. We thank you for the opportunity to review the draft EIS. We look forward to the revised EIS.

Attachments

cc: M & E Pacific Inc., with attachments

LIST OF RESPONDING AGENCIES AND/OR ORGANIZATIONS

FEDERAL

✓ *Department of the Army (Facilities Engineering)
✓ Fourteenth Naval District
✓ U.S. Fish and Wildlife Service

September 26, 1977
September 28, 1977
October 14, 1977

STATE

✓ Department of Defense
*Department of Social Services & Housing
Department of Transportation (Airports Div.)
Department of Accounting and General Services

September 26, 1977
September 28, 1977
October 6, 1977
October 7, 1977

COUNTY OF HAWAII

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

September 23, 1977
September 26, 1977
September 29, 1977

Comment previously forwarded by reviewer

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERS

November 17, 1977

Dr. Richard E. Marland
Director, OEQC
Office of the Governor
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

SUBJECT: Response to Comments regarding the EIS
for the Proposed Ke-ahole Agricultural Park

Thank you for forwarding the comments on the subject EIS and for your review and comments. We also appreciate the extension of the restrictive fourteen-day response period. The format of our response consists of a brief statement of the comment followed by the response.

Comment: The project description is not clear on what Phase II will encompass or what the time frame for the phases is.

Response: The EIS has been expanded to include a more extensive description of Phase II of the project. As presently planned there will not be further development after Phase II. The schedule for Phase II is indefinite because it is dependent on the availability of sufficient water, which in turn, is dependent on the indefinite realignment schedule for the proposed Kuakini By-pass Highway. Phase II will be coordinated with the plans of the County Water Department.

Comment: The text of the EIS should contain a reference to the terrestrial biology report in the appendix.

Response: The revised EIS contains a more extensive discussion of the effect on the terrestrial biology as well as a reference to the appendix.

Comment: The EIS should expand its discussion to include the impacts of clearing and grading for the proposed site.

Response: The revised EIS contains a discussion of clearing and grading.

We trust that these responses have satisfactorily answered your comments.


L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

Pacific Trade Center · Suite 600 · 190 South King Street, Honolulu, Hawaii 96813 · (808) 521-3051 · Cable: SULTARA
Branch Offices: Hilo, Hawaii; Agaña, Guam

P. O. Box 50004, Honolulu, HI 96850

1977

October 27, 1977

Environmental Quality Commission
Office of the Governor
550 Halekaiwila St., Rm. 301
Honolulu, HI 96850

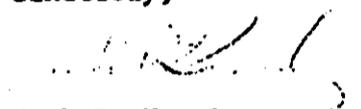
Gentlemen:

Subject: Environmental Impact Statement for Ke-ahole
Agricultural Park, North Kona, Hawaii

We have reviewed the EIS and have no comments to offer.

Thank you for the opportunity to review this document.

Sincerely,


Jack P. Kanalz
State Conservationist

cc: Department of Agriculture ✓
1428 South King St.
Honolulu, HI 96814

HAWAII DEPT OF AGR
OCT 27 10 00 AM

M&E PACIFIC, INC.
SUNN, LOW, TOM & HARA, INC.

ENVIRONMENTAL ENGINEERS

November 17, 1977

Mr. Jack P. Kanalz
State Conservationist
P. O. Box 50004
Honolulu, Hawaii 96850

Subject: Response to Comments regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agri-
cultural Park. The revised EIS is presently being prepared and will be
available through the OEQC.

L. C. Fruto

L. C. FRUTO
Project Manager

HR/jn

cc: Department of Agriculture

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR BASE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96853

NOV 1977



RECEIVED DEEV (Mr. Nakashima, 449-1831)

SUBJECT: Environmental Impact Statement (EIS) for Ke-ahole Agricultural Park,
Ke-ahole, North Kona, Hawaii

TO: Governor (Office of Environmental Quality Control)
550 Halekauwila Street
Room 301
Honolulu, Hawaii 96813

1. This headquarters has reviewed the subject EIS and has no comment to render relative to the proposed project.
2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the EIS.

Original signed by

ROBERT Q. K. CHING
Chief, Engineering, Construction
and Environmental Planning Div
Directorate of Civil Engineering

Cy to: Dept of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

COPY FOR Dept of Agriculture

NOV 1977

M&E PACIFIC, INC.

SUNN, LOW, TOM & HARA, INC.

ENVIRONMENTAL ENGINEERING

November 23, 1977

Mr. Robert Q. K. Ching
Chief Engineering, Construction and
Environmental Planning Division
Directorate of Civil Engineering
Department of the Air Force
Headquarters 15th Air Base Wing (PACAF)
Hickam Air Force Base, Hawaii 96853

SUBJECT: Response to Comments Regarding the EIS for
the Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the office of Environmental Quality Control.



L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

CORRECTION

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

M&E PACIFIC, INC.

SUNN, LOW, TOM & HARA, INC.

ENVIRONMENTAL ENGINEERING

November 23, 1977

Mr. Robert Q. K. Ching
Chief Engineering, Construction and
Environmental Planning Division
Directorate of Civil Engineering
Department of the Air Force
Headquarters 15th Air Base Wing (PACAF)
Hickam Air Force Base, Hawaii 96853

SUBJECT: Response to Comments Regarding the EIS for
the Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the office of Environmental Quality Control.



L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

GEORGE R. ARIYOSHI
GOVERNOR



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

HIDEO MURAKAMI
COMPTROLLER
MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

LETTER NO. (P) 2073.7

Dr. Richard Marland
Director
Office of Environmental
Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Dr. Marland:

Subject: EIS for He-ahole Agricultural Park

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

We find that this project will not have any adverse environmental impact on any existing or planned facility serviced by our department.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Hideo Murakami".
HIDEO MURAKAMI
State Comptroller

M&E PACIFIC, INC.

~~SUNN, LOW, TOM & HARA, INC.~~

ENVIRONMENTAL ENGINEERING

November 23, 1977

Mr. Hideo Murakami, State Comptroller
State of Hawaii
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawaii 96810

SUBJECT: Response to Comments Regarding the EIS for the
Proposed Ke-ahole Agricultural Park

Thank you for your review of the EIS for the proposed Ke-ahole Agricultural Park. The revised EIS is presently being prepared and will be available through the OEQC.


L. C. FRUTO
Project Manager

HK/jn

cc: Department of Agriculture

GEORGE R. ARI-CASHI
GOVERNOR OF HAWAII



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

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

FILE NO _____

November 4, 1977

Environmental Quality Commission
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Sir:

Subject: Ke-ahole Agricultural Park EIS, Hawaii Island

Thank you for the opportunity to comment on the draft EIS for the subject undertaking.

Archaeological reconnaissance has generally identified cultural resources that will be encountered during implementation of the 200 acre agricultural park. While some sites may avoid being impacted there appear to be others which will need further survey and study. All such sites should be investigated thoroughly in a coordinated program with the development of the agricultural park and all eligible sites should be prepared for nomination to the Hawaii Register of Historic Places. Further plans for investigation and nomination of archaeological sites should be reviewed through the State Historic Preservation Office.

Sincerely yours,

Jane L. Silverman
Historic Preservation Officer
State of Hawaii



M&E Pacific, Inc.

Environmental Engineers

November 28, 1977

Ms. Jane L. Silverman
Historic Preservation Officer
Division of State Parks
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Pacific Trade Center, Suite 600
190 South King Street
Honolulu, Hawaii 96813
(808) 521-3051 Cable: MEPAC

SUBJECT: Response to Comments Regarding the EIS
for the Proposed Ke-ahole Agricultural Park

Thank you for your review of the archaeological portion of the EIS for the proposed Ke-ahole Agricultural Park. This letter will respond to your concerns using the format of a brief statement of your comment followed by our response.

Comment: While some sites may avoid being impacted, there appear to be others which will need further survey and study. All such sites should be investigated thoroughly in a coordinated program with the development of the agricultural park.

Response: The planned phase I development of the proposed project involving some 66 acres has been designed to avoid any direct effect on the archaeological sites. To minimize indirect effects on nearby sites, the lessees will be informed of the importance of the sites and the plan for further study.

Phase II of the proposed development includes about 11 acres set aside for the preservation of archaeological sites. The development schedule for phase II is presently indefinite because it is dependent on the availability of a sufficient supply of water, which, in turn, is dependent on the unscheduled Kuakini Highway construction project. In any case, the EIS has made a commitment to a study of the affected archaeological sites to be carried out prior to the phase II development.

Comment: All eligible sites should be prepared for nomination to the Hawaii Register of Historic Places, with all plans for investigation and nomination to be reviewed through the State Historic Preservation Office.

M&E Pacific, Inc.

Ms. Jane L. Silverman
November 28, 1977
Page 2

Response: The consultants for this work, Archaeological Research Center Hawaii, Inc., are proceeding with the nomination of eligible sites for your office. Plans for future investigation will be submitted for review by the State Historic Preservation Office.

We trust that these responses satisfactorily answer your concerns.



L.C. FRUTO
Vice President

HJK/bs

cc: Department of Agriculture

A P P E N D I X A - 1

KE-AHOLE AGRICULTURAL PARK
Socio-Economic Impacts

By
Frank S. Scott, Jr.

Prepared For
M & E Pacific, Inc.
August, 1977

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KE-AHOLE AGRICULTURAL PARK
Socio-Economic Impacts

This report is an assessment of the economic feasibility and sociological and environmental impacts for the proposed Ke-ahole Agricultural Park in the North Kona district of the Island of Hawaii.

Need For The Agricultural Park

Numerous organizations, government agencies and individuals have expressed interest in the development of an agricultural park in Kona. Among these are the Kona Farm Bureau, the Kona Coast Chamber of Commerce, the Hawaii Leeward Planning Conference, the Hawaii State House and Senate, Governor George R. Ariyoshi, Minoru Inaba, State House of Representatives, West Hawaii District, Hawaii County Mayor Herbert T. Matayoshi, the State Department of Land and Natural Resources, the Agricultural Coordinator of the Hawaii County Department of Research and Development, the State Department of Agriculture, and the Kona representatives of the Cooperative Extension Service of the University of Hawaii. The development of such a park is compatible with the interest of the State Administration in expanding diversified agriculture and in retaining open space. One of the factors tending to retard the development of diversified agriculture in Hawaii is the unavailability of accessible land at prices or lease rents which can be afforded for agricultural production. The development of agricultural parks on State owned lands affords a partial solution to this problem.

Choice Of The Ke-ahole Site And Alternative Locations

The Ke-ahole site is considered a prime location for the following reasons:

- a. It is located in a climatic zone favorable to shade house production of dendrobiums, potted plants and greenhouse production of certain vegetables, particularly tomatoes. Prospective applicants for park land are particularly interested in these crops which are analyzed in detail in another section of this report.
- b. Accessibility of the property through the airport road and the mauka-makai road through the property is excellent.
- c. Electricity is available from the main highway at the entrance to the park site.
- d. Water is available to the park site through a 12-inch water line along Kaahumanu Highway adjacent to the makai border of the project. A water supply of 100,000 gallons would be made available in 1979. Additional availability depends upon the development of a 3.5 million gallon well at Kahaluu in 1982 and supplementing the current 8 and 12-inch pipeline along Kuakini Highway by a water line of 18 to 20 inches in diameter from the source of the water supply to Palani Road. There is a 0.5 mgd water tank on the property which presently serves Ke-ahole Airport.
- e. The location adjacent to Ke-ahole Airport provides an excellent site for shipment of flowers and foliage and, seasonally, for tomatoes. It is also an ideal location for a flower and foliage packing house and a tourist attraction.
- f. Alternative Sites:
 - (1) A 100 acre State owned plot located .6 miles north of the airport road offers a possible alternative. It has the advantage of containing "aa" rather than Pahoehoe lava which covers the Ke-ahole site. It has the disadvantages of containing only 100 acres and being located beyond the water and power lines, which already

reach the Ke-ahole site. It would cost an estimated \$36,000 to extend the power line from the airport road to the south border of this property.

- (2) There are other State owned sites mauka of the airport highway between Ke-ahole and Kailua. These sites appear to have somewhat rougher topography which would increase the cost of levelling, which is estimated at \$1,400 per acre for the Ke-ahole site. These sites also lack the important advantages of being adjacent to the airport and have the disadvantage of being closer to commercial developments.
- (3) Except for possible consideration of the 100-acre plot described in item "a" above, the cost of development of other lands between Ke-ahole and Kawaihae would be prohibitive because of lack of road access, except adjacent to the partially completed Kailua-Kawaihae road. The extension of water and power lines for the sole purpose of serving an agricultural park would be prohibitive. Also, the greater distance to the airport and to Kailua would be a disadvantage.
- (4) Alternative State lands are available at higher elevations in Kona. It is likely that land could be found with soil which could be used for agricultural production. However, for production of dendrobiums and other potted plants the soil would not be necessary. The lower rainfall and greater amount of sunshine at Ke-ahole than at higher elevations are considered to be more favorable for dendrobium production. The Kona branch of the University of Hawaii Cooperative Extension Service is conducting a controlled test of dendrobium production at Ke-ahole in relation to production at

the branch UH Experiment Station on the belt road. The dendrobiums are producing more flowers at the Ke-ahole site. The Ke-ahole site is considered a unique agricultural park site for a particular type of agriculture. Recommending this site does not imply that agricultural parks should not be located at higher elevations for other purposes.

Size Of Farm

Since the proposed Ke-ahole site is considered ideal for intensive crops, such as dendrobiums, and certain other ornamental and foliage plants, relatively small farm units would be feasible. This is supported by budget estimates for feasible crop alternatives in the crop feasibility section of this report.

It is proposed that the basic unit be 5 acres in size. Approximately one acre in each unit would be utilized for roads, setbacks, tool sheds and, possibly, a residence. Thus, each basic unit would provide 4 acres for agriculture. The 5-acre unit was unanimously recommended by State and County agencies, the Farm Bureau, and interested individual farmers.

Whereas a 5-acre plot is considered adequate for most farmers, it is recommended that some flexibility be allowed for somewhat larger units for less intensive agricultural enterprises.

Based on the above considerations, it is proposed that the first 200-acre increment be subdivided into the following units:

20 units @ 5 acres	=	100 acres
7 units @ 10 acres	=	70 acres
2 units @ 15 acres	=	<u>30</u> acres
Total		200 acres

There are two possible alternatives for allocating the land as indicated. One alternative is to lease 20 units of 5 acres each, to permit 7 leasees to

rent two 5-acre plots and 2 leasees to rent three 5-acre plots. The other alternative would be to subdivide the land into 20 units of 5 acres, 7 units of 10 acres, and 2 units of 15 acres. The latter would be less complicated but the former, consisting of all 5-acre plots, would allow greater flexibility in responding to the demand for various sizes of units. This method of subdividing was preferred by the majority of the persons whose opinions were solicited. If housing is permitted, it might be desirable to limit the farm to one dwelling regardless of the number of 5-acre units that are combined together in one lease.

Because of the high cost of bringing in soil or other growing media at \$10,000 per acre for crops more extensive than dendrobiums, such as vegetables, it is not likely that there would be a strong demand for large units.

Houses On Farm Lots

Most of the Big Island people with whom the house issue was discussed, indicated a strong preference for permitting homes on the farm lots. They thought that prospective farmers would have greater incentive and could farm more effectively with homes in their farm sites in the park. This also would make security less of a problem.

Since pollution is not expected to be a problem, a possible argument against permitting houses is that the attractiveness of such a development may draw a disproportionate number of tenants from outside the Big Island.

In order to insure that applicants for lots are intended farmers and to reduce the costs of housing development, a village system of housing is proposed as an alternative to locating houses on the agricultural plots. The village development would consist of 10,000 square foot lots, with one lot for each farm unit. Thus there would be a maximum of 29 village lots to provide housing for

each of the 29 farmers in the proposed 200-acre development. The first phase would include lots for 15 houses to serve the initial development of 15-5 acre tracts of farm land.

There would be certain disadvantages. Farmers would be required to commute short distances to their farms. This would make operation of the sprinkling system less convenient unless the system were completely automatic. There would be less security over the farm property.

It is anticipated that applicants who already have homes elsewhere will not need a home in the village development. Another possible way of viewing this situation, is that since Ke-ahole is a State project, perhaps everyone in the State should be given an equal opportunity to bid for leases. This would be consistent with the interest of the State Administration in dispersing Oahu population to the Neighbor Islands.

Crop Feasibility

Production feasibility based on ecological adaptation, the market potential and net income favor such crops as dendrobiums, potted flowers and foliage plants, and tomatoes. The high cost of bringing in soil or other growing media would make the production of extensive type crops uneconomic. It would be expected, however, that intensive crop production might be supplemented with some production of extensive crops.

The dendrobium orchid is considered to be a very promising floral product for the Hawaii and U.S. Mainland markets and, eventually, for foreign markets. There seems to be no question that a substantial potential market exists for this product, based on preliminary research conducted by the College of Tropical Agriculture of the University of Hawaii. Since this crop would be grown on benches in a shade house the pahoehoe ground surface would be ideal. As soon as a sufficient supply of dendrobiums is available, a more precise indication

of the U.S. Mainland market potential should be obtained through controlled market testing. In the meantime, there would seem to be minimal risk in producing 20 to 30 acres of dendrobiums and other potted plants on the first increment of 75 acres in a phased development of the Ke-ahole project. The acreage in dendrobiums could then be increased or phased into other crops at a later date as more precise information on the market potential becomes available. The production of all crops, including potted dendrobiums, would require land levelling (estimated cost of \$1,400 per acre), shade houses but no soil. An indication of the potentially high return per acre is shown in the assimilated budget in Table 1.

Table 1. Costs and Returns and Net Profit Per Acre,
Dendrobium Production in Ke-ahole ^{a/}

Item	Per Acre	4 Acres
Gross Returns: 15,000 dozen sprays per acre @ \$3/dozen f.o.b. farm	\$45,000	\$180,000
<u>Costs:</u>		
Lease Rent	300	1,200
Property Tax	8	32
Labor and Management	20,000	80,000
Water: 1,015,000 gal @ 55¢/1,000	602	2,408
Fertilizer, Fungicides, Insecticides, and Herbicides	1,200	4,800
Pots, Planting Media, etc.	3,000	12,000
Depreciation and Amortization of Investment ^{b/}	8,000	32,000
Miscellaneous Operating Costs	3,000	12,000
Total Costs	\$36,110	\$144,440
Net Return to Management and Capital	\$ 8,890	\$ 35,560

^{a/} Adapted and modified from budget data in a publication by Samuel G. Camp and Perry F. Philipp, entitled "The Economics of Growing Dendrobium on Oahu for Mainland Exports," University of Hawaii Agricultural Experiment Station, Departmental Paper 37, March, 1976.

^{b/} Including land levelling and shade house construction.

Whereas considerable variability in costs and returns would be expected, the budget indicates what might be expected in a realistic and fairly typical situation. In this example, the farm owner would gross \$45,000 per acre or \$180,000 for 4 usable acres in a 5-acre tract. Net returns would amount to \$8,890 per acre or \$35,560 for 4 acres of dendrobiums. The budget conclusively indicates that a 5-acre farm would be adequate in size for a highly intensive crop such as dendrobiums.

Potted foliage plants would also be well adapted to shade house production at Ke-ahole, but would be expected to yield a somewhat lower net return per acre. A great variety of plants could be produced in pots for sale to Honolulu and Mainland nurseries for further growth and distribution to retailers. Since conditions for growing these plants would be similar as for dendrobiums, a specific breakdown of type of plant and probable returns is not included in this report. Also, the demand for various types of potted plants undergoes continuous changes as new plants are introduced. There is need for an up-to-date comprehensive study of the market potential and cost of production of these plants.

Some farmers in the Kona area indicated an interest in growing vegetables on Ke-ahole park lands. Some vegetables, such as tomatoes and green peppers would be expected to be well adapted to greenhouse production at Ke-ahole. Tomato production appears to offer the best possibility. This crop, under optimal conditions, would be as intensive or more intensive than dendrobiums, but with higher costs would yield a lower net income, depending on the price of tomatoes. Tomatoes would have the advantage of providing much quicker returns than dendrobiums. The Hawaii market for tomatoes far exceeds local production. In 1976, the State produced 4,700,000 pounds of tomatoes from 200 acres and approximately 7,500,000 pounds were imported from the mainland. Sufficient

production to offset imports would require an additional 320 acres. Whereas the opportunity for greater self sufficiency in tomato production in Hawaii appears promising, there is no assurance that it is economically feasible to replace all imports with local production. During peak production periods in mainland areas and Mexico, good quality tomatoes are shipped to Hawaii at prices below Hawaii costs of production. As transportation costs from the Mainland and efficiency of production in Hawaii increase, Hawaii's ability to compete with imports will, of course, increase. Also there will be need for determining the ability of Ke-ahole park producers to compete with tomato producers in other areas of the State. The need for bringing in fill soil or other growing media would tend to increase the cost of tomato production at Ke-ahole in relation to other areas in the State but yields would likely be higher under ideal greenhouse production.

Vegetable production, particularly tomatoes, would pose a more serious problem in insect and disease control than for dendrobiums.

An estimated budget indicating possible net income from greenhouse tomatoes is shown in Table 2.

As in the case of dendrobiums, this highly intensive crop would provide efficient utilization of Ke-ahole park lands. Tomato production would require bringing in 10 inches of soil or other growing media at a cost of \$10,000 per acre, whereas dendrobiums would require no fill. Soil has been brought in at this cost at another tomato producing area in Kona and this type of development is considered feasible.

The above mentioned crops are given only as some of the most feasible examples of possible intensive crop production. In actuality, most farmers would be expected to grow a variety of crops and would adjust their production over time to changes in market conditions and costs of production.

Table 2. Costs and Returns, Tomato Production at Ke-ahole^{a/}

Item	Per Acre	Per Farm (4 Acres)
Gross Return: 224,000 # @ 33¢/lb.	\$73,970	\$295,680
Labor and Management Cost	23,000	92,000
Materials	15,000	60,000
Depreciation and Maintenance	20,000	80,000
Interest on Investment	7,000	28,000
Miscellaneous Overhead	2,000	8,000
Total Cost	\$67,000	\$268,000
Net Returns	\$ 6,920	\$ 27,680

^{a/} Adapted and modified from budget data in a publication by Perry F. Philipp, et al., entitled "The Economics of Growing Tomatoes in Plastic Greenhouses on Oahu," University of Hawaii Agricultural Experiment Station, Departmental Paper 11, July, 1973. Since the price of tomatoes is subject to great variation, net profit would also fluctuate from year to year.

Lease

Considering the high cost to the State of preparing the land for agriculture and the intensive type of agriculture which is proposed, a maximum annual lease rent of \$300 per acre is proposed. This assumes a value of \$6,000 per acre at which some agricultural land is currently selling in Kona and an annual charge of 5 percent of the value of the land. This would cover the State cost of constructing roads and extending water and power lines to the borders of the farms in the project. This fee could readily be afforded if the land were fully utilized for the production of dendrobiums, potted foliage plants, tomatoes or other intensive crops. It would pose a burden on farmers with only partially

developed tracts but would discourage applications for leases by persons who would not have the intention of fully developing their farms.

Since gross income per acre would vary according to type of crop and intensity of production, a maximum fixed lease fee plus a percentage of gross returns is proposed. A fixed fee of \$100 plus $\frac{1}{2}$ of one percent of gross returns would amount to a total annual lease charge of \$300 per acre for a dendrobium crop which might be expected to gross \$40,000 per acre ($\$100 + 0.5 \times 40,000 = \300). For a crop yielding only \$10,000 per acre the annual lease charge would amount to \$150 ($\$100 + 0.5 \times \$10,000$). A minimal progressive lease fee of $\frac{1}{2}$ of one percent of gross returns would not be expected to have a retarding effect on optimal use of the land. It is reported that Bishop Estate is considering increasing the lease charge per acre from \$50 on old leases to \$100 for new leases. One large landowner in Kona is considering leasing agricultural land at higher elevations at \$150 to \$200 per acre. Since the lease fee would not be expected to reflect the maximum use value of the land, the amount decided upon is an arbitrary figure.

Tourist - Packing Shed Complex

The agricultural park at Ke-ahole would require a packing and distribution center for floral products. This complex could be designed to serve jointly as a tourist attraction, with its excellent location near the airport. In addition to being an attraction for tourists it would serve as a means of selling and promoting the sale of flowers and foliage to tourists. In the event that such a complex is not permitted in the park itself, it could possibly be located on State land on the airport side of the road. It is proposed that 3 acres be set aside for this complex.

Requirements And Availability Of Water

Water requirements for major uses are estimated as follows:

House (4 family members).....	400 gal/acre/day
Dendrobiums (in 6" pots).....	3,000 gal/acre/day
Tomatoes (greenhouse).....	6,000 gal/acre/day

The Hawaii County Board of Water Supply has indicated that 100,000 gallons per day would be made available to the project through pipeline in late 1977 and another 100,000 gallons in 1979. Possible additional water could be made available from the 3½ million gallons daily which is expected to flow from the Kahaluu well in 1982. In order to supply additional water to Ke-ahole from this source, the existing 8 and 12-inch pipeline along Kuakini Highway would be supplemented by an 18 to 20-inch pipeline that will be constructed in the proposed realignment of Kuakini Highway in 1981. The construction of this highway is subject to review by the Historic Sites Section of the Department of Land and Natural Resources. If the above requirements are met, it seems reasonable to assume that at least an additional 400,000 gal/day could be made available to the Ke-ahole site.

At the daily requirements indicated above, the following acreages could be supplied as water supplies are developed:

100,000 gal/day (1977)

Dendrobiums and other potted plants, only...	33 acres
Or Tomatoes, only.....	17 acres

200,000 gal/day (1979)

Dendrobiums and other potted plants, only...	66 acres
Or Tomatoes, only.....	34 acres

Water requirements for 200 acres

Dendrobiums and other potted plants.....	600,000 gal/day
Tomatoes.....	1,200,000 gal/day
29 houses.....	11,600 gal/day

On this basis and assuming that only 150 of the 200 acres would actually be in crops, the following requirements would need to be met.

	<u>Gallons</u>	
(1) Dendrobiums and potted foliage plants, 150 acres @ 3,000 gal/a/day.....	450,000	
or		
(2) Dendrobiums and potted foliage plants, 125 acres @ 3,000 gal/a/day.....	375,000	} 525,000
Tomatoes, 25 acres @ 6,000 gal/a/day.....	150,000	

In order to provide for the combination of crops in item "2" plus houses, a minimum of 536,600 gal/day should be requested for full development of the 200-acre increment (150 acres in crops and 29 houses if houses are permitted). The proposed 29 houses would utilize 11,600 gallons at 400 gal/day/house.

Phased Development

The 200,000 gal/day of water which is expected to be available to the Ke-ahole project in 1979 would provide enough water for a maximum of 66 acres of dendrobiums and or potted foliage plants and 33 acres in tomatoes. Since dendrobiums and other potted plants would require less water than vegetables and would not require bringing in soil or other growing media, it is proposed that the first phase of the development be designated primarily for potted flowers and foliage plants. In relating the development to the availability of water, the first phase of the development should be limited to 55 acres in crops and 75 acres in total. This would provide 15-5 acre tracts. It would seem reasonable to require that at least 50 percent of the 55 acre development be required to take place within 5 years. The phased development would have the advantage of allowing for time to determine ecological adaptation and to conduct

test marketing research to obtain more precise indications of the market potentials for promising crops. It would seem reasonable to subdivide 200 acres under the assumption that additional water would be made available in 1982, but to restrict initial development to 75 acres. In addition to the necessity of restricting the development to 75 acres, this development would serve as a pilot project as a guide to future development of the entire park.

Employment And Gross Park Returns

Intensive dendrobium production would require a working manager per farm and an additional $1\frac{1}{2}$ workers per acre in crops. For the 200-acre development this would amount to 29 working managers for the 29 farms proposed. An additional 188 workers would be required for the 150 acres which would actually be in crops. Thus total employment would amount to 217 workers for the 200-acre development. The first phase of 15 farms and 55 acres in crops would require 15 working managers and 19 other workers for a total employment of 34 persons.

Intensive tomato production would require a working manager and 2 other workers per farm or 29 managers and 300 other workers for a total employment of 329 if the entire development were devoted to tomato production.

Maximum gross returns if the entire project were in dendrobiums would amount to \$45,000 per acre or \$6,750,000 for the estimated 150 acres in crops in the 200-acre development (Table 1). Total net returns for the entire 200-acre project would amount to \$1,333,500. For the first phase (55 acres in crops), gross returns would amount to \$2,475,000 and net returns at \$488,950 at the full development stage.

For tomatoes, at gross returns of \$73,970 per acre and net returns of \$6,920 per acre, total income for the entire 200-project would amount to \$11,095,500 gross and \$1,038,000 net. Whereas the estimated income per acre for tomatoes is

realistic, it is not likely that a substantial land area, if any, would be devoted to tomato production. Thus the total project projections for dendrobiums are more realistic.

Environmental Considerations

An investigation of possible environmental problems yielded no conclusive evidence that the proposed development would produce a significant amount of pollution. Officials of the Hilo office of the State Department of Health are of the opinion that cesspools for the limited number of houses which might be built on the project would not have an adverse effect on the environment. The sewage would be expected to slowly seep through the lava and enter the ocean one to 1½ miles from the makai border of the project.

It is the opinion of biochemists who were consulted that chemical sprays required for the control of insects and diseases of dendrobiums and tomatoes would have no adverse effect on the atmosphere. Sprays used on potted dendrobiums would be largely absorbed by the plants. Approved sprays for tomatoes would be applied to the dry leaves and fruit of the plants and would have no opportunity to mix with irrigation water and seep through the lava.

Biochemists and horticulturists gave no indication that tomato sprays would damage dendrobiums or that dendrobium sprays would damage tomatoes. This is particularly true for the dendrobium since it is a hardy plant. It is assumed, furthermore, that all major crops would be grown in shade houses or greenhouses and that there would be no opportunity for the wind to blow spray on a crop for which the spray was not intended.

Properly designed greenhouses would not be expected to be unsightly but, to the contrary, would attract the interest of travellers to and from the airport. Plumerias or bougainvilleas could be planted in the required 10-foot setback in the park mauka of the highway.

Producer Organizations

Success of the agricultural park would be highly dependent upon some form of marketing organization. The marketing of floral products, particularly on the U.S. Mainland, requires a well coordinated, well financed, and sophisticated effort. This could be accomplished through a marketing cooperative owned by producers or through a corporate marketing firm in which farmers would have an opportunity to buy stock. Whichever marketing organization is utilized, it is essential that all producers in the project commit themselves to a coordinated effort in supplying and developing markets for their products.

The marketing association would have the responsibility of keeping producers informed as to prices for the various products produced as well as for coordinating supply and demand. A marketing cooperative might also serve as a purchase cooperative for producers supply needs, such as fertilizer, chemicals, greenhouses and plants.

This association would also be expected to operate the packing shed and, possibly, the tourist complex.

Research

It is recommended that a parcel of land of 3 acres be designated for a test plot for applied research by the University of Hawaii for products grown in the agricultural park. In addition, it would be important to make an economic re-evaluation of the project after implementing the first 75-acre development. The research would include the determination of market potentials through controlled test marketing and comparative costs of production for promising crops.

Impact Of No Park

The impact of no park at Ke-ahole would amount to foregoing the economic and social development which the park would provide. Based on dendrobium production, this loss for the proposed 200-acre development would amount to \$6,750,000 in gross returns and \$1,333,500 in net returns, with a substantial loss in taxes to the State. The loss would involve 217 full time jobs.

The excellent opportunity to develop a much needed tourist destination point in conjunction with the proposed floral packing house would be lost.

In addition, failure to develop the project would mean a reduction in air shipments to Honolulu and to the mainland via Honolulu or Hilo of 1,875,000 dozen sprays of dendrobiums annually, assuming 125 acres in dendrobiums. The need for an adequate volume is a critical consideration in providing air freight service for the shipment of Hawaii's agricultural products to the mainland. The volume benefits of surface and some air transportation of tomatoes and other Ke-ahole crops would not be realized.

A P P E N D I X A - 2

REPORT OF FLORA AND FAUNA SURVEY

AT

KE-AHOLE, KONA, HAWAII

By

Beatrice Krauss

Prepared For

M&E Pacific, Inc.
August 1977

A P P E N D I X A - 2

REPORT OF FLORA AND FAUNA SURVEY AT KE-AHOLE, KONA, HAWAII

This survey was made on July 16, 17, and 18, 1977. The area surveyed on each day is indicated with dotted lines on sketch accompanying this report.

This survey of the 900-acre area under consideration was made by recording plants and animals in representative transects, the boundaries of which are shown with solid lines on the forementioned sketch. This type of survey-sampling is accepted by biologists all over the world.

In general, the choice of this particular area was a fortunate one since it has few native, i.e., endemic and indigenous, plants -- few in both numbers of species and specimens of each species; those that are present are not rare since they are found in other areas on the Island. Most of these native plants were found in the 35-meter transect along the Kailua-boundary of the area. Therefore, if this portion of the area under consideration is excluded in laying out the subdivision, the destruction of most of the native plants will be avoided.

The following are two lists, one of the flora and the other of the fauna found in the transects, and, as the survey team believes, is representative of the entire 900-acre area. The plant list has been divided into groups as follows: A. Native, i.e., endemic and indigenous; B. Probably brought by the early settlers from Polynesia; and C. Exotic i.e., introduced later. Among the last those that have been declared noxious are marked with an asterisk.

A. Native, i.e., endemic and indigenous plants

1. A'ali'i (Dodonaea eriocarpa)#
2. Alahe'e (Canthium odoratum)
3. Ilima (Sida fallax)
4. Kolea (Myrsine lanaiensis)
5. Kupukupu-lau-li'i (Nephrolepis duffii)
6. Lama (Diospyros ferrea)
7. Naio (Myoporum sandwicense)
8. 'Ohi'a-lehua (Metrosideros spp.)
9. 'Uhaloa (Waltheria americana)

B. Plants probably brought by early settlers from Polynesia

1. 'Ahuhu (Tephrosia purpurea)
2. Laua'e (Microsorium scolopendria)
3. Noni (Morinda citrifolia)
4. Pili (Heteropogon contortus)

C. Exotic, i.e., introduced plants; those considered noxious weeds are marked with an asterisk

1. Air plant (Kalanchoe pinnata)
2. Aroma (also called by its Hawaiian name klu (Acacia farnesiana))
3. Bitter melon (Momordica charantia)
- *4. Cactus or prickly pear (also called by its Hawaiian name panini) (Opuntia megacantha)
- *5. Cayenne verain (Stachytarpheta australis)
- *6. Christmas berry or Brazilian pepper tree (Schinus terebinthifolius)
7. Coat buttons (Tridax procumbens)
8. Common morning glory (Ipomoea purpurea)
9. Crimson or scarlet sage (Salvia coccinia)
- *10. Firetree (Myrica faya)

The Hawaiian name is given for the native plants, common names for all others. The authority for the scientific names is Harold St. John. 1973. The flowering plants of the Hawaiian Islands. Pacific Tropical Botanical Garden Memoir 1. Lawai, Kaua'i, Hawaii.

11. Garden spurge (Euphorbia hirta)
12. Indigo (Indigofera suffruticosa)
13. Japanese lovegrass (Eragrostes tenella)
14. Japanese tea (Cassia leschenaultiana)
- *15. Lantana (Lantana camera)
- *16. Natal redtop (Rhynchalytrum repens)
- *17. Panicum or California grass (Panicum spp.)
18. Pigweed or common purslane (Portulaca oleracea)
19. Prostrate spurge (Euphorbia prostrata)
- *20. Silky oak (Grevillea banksii)
21. Scarlet-fruited passion flower (Passiflora foetida)
22. Three-flowered beggarweed (Desmodium triflorum)
23. Vinca (Catharanthus roseus)
24. Wild tamarind (also called by its Hawaiian name haole koa)
(Leucaena leucocephala)

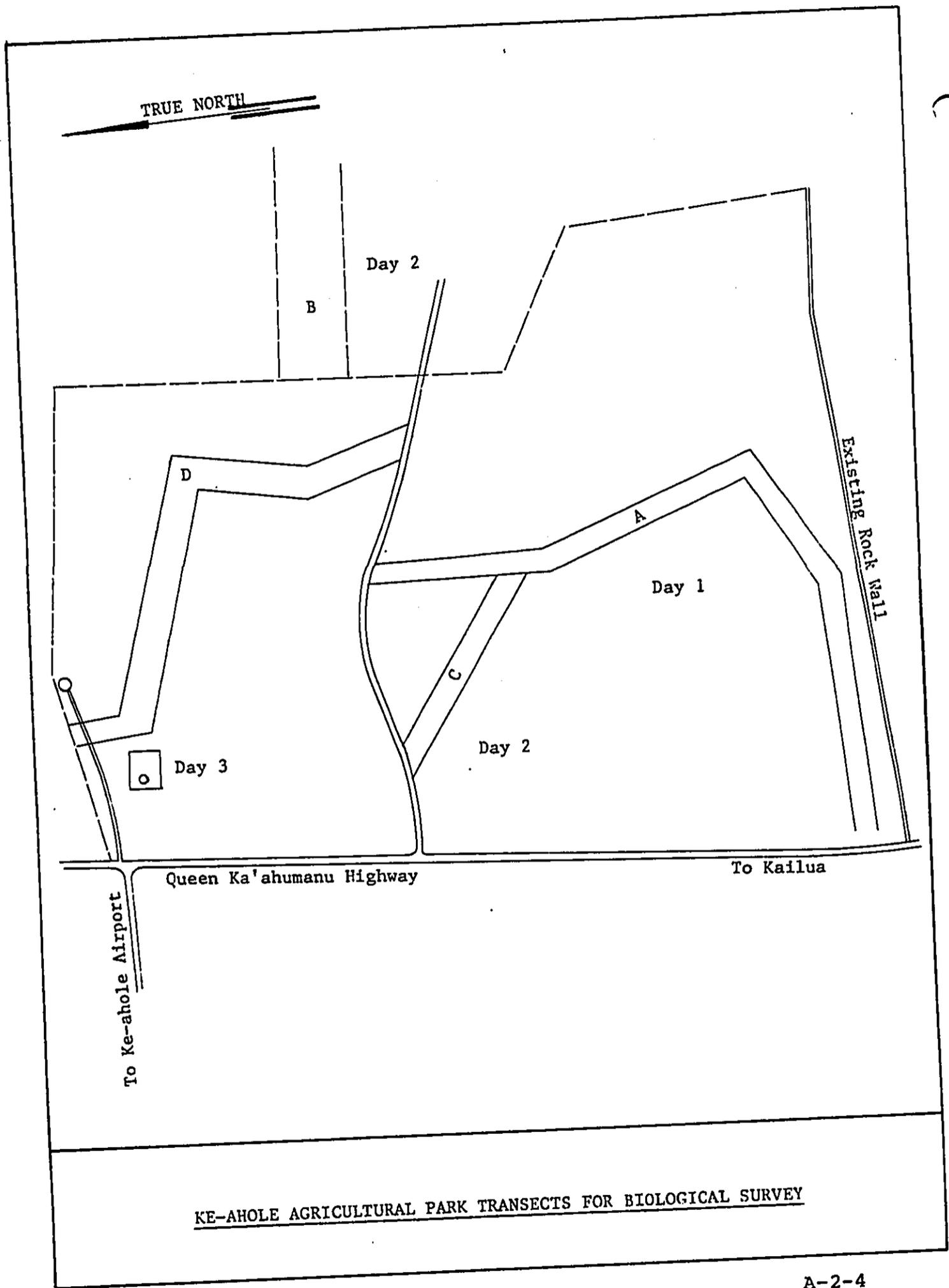
Fauna

Birds: No native birds were seen or heard except for one owl seen and the feces of others near a roosting place in a lava tube. Such owls, Pueo (Asio flammeus), according to Dr. Andrew Berger of the Zoology Department at the University of Hawaii, when frightened will take up abode elsewhere and therefore are not endangered.

Of exotic species, several flocks of white-eyes were seen, and cardinals were heard in the distance singing. Honking of pheasants was also heard.

Mongoose and mice: Feces of these animals were found but the animals themselves were not seen.

Goats: Feces and bones of goats were found in a lava tube.



TRUE NORTH

Day 2

B

D

A

Day 1

C

Day 2

Day 3

Existing Rock Wall

Queen Ka'ahumanu Highway

To Kailua

To Ke-ahole Airport

KE-AHOLE AGRICULTURAL PARK TRANSECTS FOR BIOLOGICAL SURVEY

A P P E N D I X A - 3

ARCHAEOLOGICAL SURVEY OF THE PROPOSED
AGRICULTURAL PARK AT KE-AHOLE

(from survey conducted by Archaeological
Research Center Hawaii, Inc., August 1977)

ARCHAEOLOGICAL SURVEY OF THE PROPOSED
AGRICULTURAL PARK AT KE-AHOLE,
NORTH KONA, HAWAI'I ISLAND

by

Bertell D. Davis

Prepared by

ARCHAEOLOGICAL RESEARCH CENTER HAWAII, INC.

ARCH Project 14-122

For

DEPARTMENT OF AGRICULTURE
STATE OF HAWAII

Contract No. 7952

Lawa'i

August 1977

ACKNOWLEDGEMENTS

The archaeological survey reported here was conducted for the Department of Agriculture (DOA), State of Hawaii. The author wishes to thank Mr. James Kirchhofer and Mr. Robert Miura of the DOA Planning Office for the courteous assistance in furthering the successful completion of this study.

It has also been the author's good fortune to have worked and lived with a capable field crew--Martha Yent, Bruce Kekuewa, John Malina and Richard Bordner. Without their effort and diligence, the results reported here would not have been possible. The author is greatly in their debt.

Not only is the field crew important, but also those in the office who help the researcher provide the finished product. To the staff of the Archaeological Research Center Hawaii, Inc.: Mr. Francis K.W. Ching, President; Dr. P. Bion Griffin, Vice-President and Editor; and to Rae L. Hiramoto and Barbara L. Bordner, typists, go a special thanks for their support.

On a final note, the author also wishes to extend his appreciation to Mr. Douglas Mukai, Production Manager, the cartography staff and the field survey team of R.M. Towill Corporation for their efforts regarding the coordination of the survey and the photogrammetry.

Again, to each and all, *mahalo*.

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ABSTRACT

The Department of Agriculture (DOA), State of Hawaii, proposes to develop an agricultural park in the Ke-āhole area of North Kona, Hawai'i.

Previous archaeological investigations catalogued numerous prehistoric cultural features on and near the coast; cursory visits to the desolate lava rocklands *mauka* noted the presence of substantial, modified lava-tube habitation caves. Continued research generated by the construction of the Queen Ka'ahumanu Highway recorded innumerable sites of a similar nature in equally bleak environments.

What became characterized as "Barren-Zone Occupation" has significant implications for the accepted *'ohana-'āina* model of prehistoric Hawaiian social organization. Rather than a dispersed community of permanently resident households, it was suggested that while the habitation sites may be permanent, residency may have regularly shifted on a seasonal round. Contract limitations on this work confined it to the seaward portion of the region. The necessary comparative material from the upland component was not collected.

The present study provided an opportunity to examine the uplands bordering the "Barren Zone". The marked vertical zonation of environments characteristic of the high Hawaiian Islands and the expected changes in the nature of the cultural remains were clearly evident in the project area. Although this study is by no means comprehensive, the fact that the transition from "Barren-Zone" to upland occupation occurred over a relatively short distance from the coast is suggestive indeed.

INTRODUCTION

Scope of Work

The Department of Agriculture (DOA), State of Hawaii, proposes to develop an agricultural park and ancillary facilities in the Ke-āhole area of North Kona on the island of Hawai'i.

Previous archaeological investigations catalogued numerous prehistoric cultural features on and near the coast. cursory visits made to the *mauka* (inland) areas recorded a large lava-tube cave containing cultural remains. Petroglyphs carved into one wall of the cave were found to have been partially buried by a stone platform built against the wall. Because of this association with its potential for determining when the petroglyphs were made, the cave was listed in the State Register of Historic Places (Site 262). Other cultural features were also reported to be in the vicinity, including a second lava-tube cave with similarly buried petroglyphs. A systematic archaeological survey, however, was not undertaken at the time.

It was anticipated that the final selection of a site for the proposed agricultural park would in part be determined by the presence of other significant archaeological remains in the area under consideration. DOA therefore requested the Archaeological Research Center Hawaii, Inc. (ARCH) to prepare and submit a proposal:

1. To conduct a cultural reconnaissance to determine if significant archaeological remains were present elsewhere in the project area; and,

2. To accurately plot on a project-area map the location and horizontal extent of those cultural features or feature complexes identified during the reconnaissance.

ARCH further offered to conduct limited test excavations in one of the lava-tube caves containing the partially buried petroglyphs if sufficient time were available following completion of the survey. This was to test the assumption that the petroglyphs were in fact buried by cultural debris, not just by natural post-abandonment deposition. Should this be confirmed by the excavations, it was expected that datable material would also be forthcoming. To date, the cultural deposit, and thus when the petroglyphs were buried, would set the latest possible date for when they were carved into the wall of the cave.

Fieldwork for the reconnaissance and mapping portion of this study, designated ARCH Project 14-122, was carried out over the period 11-22 July 1977, by the author and four (4) field assistants. On completion of the survey, the author and two (2) assistants then continued with selected test excavations for another three (3) days.

The following report will cover only the reconnaissance and the survey. Field results are summarized and presented together with pertinent recommendations for mitigating the potentially adverse impact the proposed development may have upon archaeological remains. Although the project area is an open, nearly treeless land, fieldwork at Ke-āhole was not without its peculiar set of problems. The terrain, the dense ground cover and the heat were all factors to be considered. Because of this, a somewhat more lengthy discussion of methods than is usual for contract reports is also presented.

The extreme environmental conditions presented in the project area are characteristic of the leeward Kohala-North Kona region. Such conditions obviously influenced the nature of human settlement in the region during prehistoric times, even as they do today. The concept of a "Barren-Zone Occupation", and its implications for the traditional *'ohana-'āina* model of prehistoric Hawaiian social organization (Handy and Pukui 1972), has been developed from studies elsewhere in the region (Rosendahl 1972b:82-99, 1973:60-67). The fact that these studies were conducted under public contracts, however, necessarily limited investigations to the seaward portions of the region covered by the contracts. *Mauka* studies in the region are limited to the Lapa-kahi area (Rosendahl 1972a; among others) and to the proposed Waimea-Kawaihae Road corridor (Barrera 1974). As such, the concept remains largely untested.

The current work at Ke-āhole now provides another excursion into the *mauka* areas. Although this paper can by no means claim to be definitive, the marked environmental zonation observed in the project area and the associated changes in the nature of the archaeological sites is certainly suggestive. Discussion of the regional and local environments is therefore an important component of this paper.

A report on the test excavations is not included as part of the present paper. Various laboratory analyses require additional time, particularly age determination of the carbon and volcanic glass samples. When results of these analyses are available, the present paper will be revised and expanded to include the excavations in an integrated archaeological report.

Definition of the Project Area

The project area is an approximately 370-hectare (915 acres)* tract located *mauka* of the Queen Ka'ahumanu Highway in the *ahupua'a* of Ka-laoa 1-4 and Ka-laoa-'O'oma, North Kona (See Figures 1 and 2, page 5). Development of the proposed agricultural park will incorporate 81 hectares (200 acres) of this tract.

The lower and larger section of the project areas extends over 344 hectares (850 acres): c. 2,440 m. (8,005 ft.) north-south along the highway and from c. 1,200-2,000 m. (3,937-6,540 ft.) *mauka* (See Figure 3, page 6). A stone wall (Site 6432, See Below) running *mauka-makai* defines both the southern limit of the study and the *ahupua'a* boundary between Ka-laoa-'O'oma on the north and 'O'oma 2 on the south. The existing reservoir for the Ke-āhole Airport marks the northern limit of the study.

Anticipating future growth of the agricultural park, a *mauka* corridor was included in the study to determine the potential for siting additional reservoir facilities. This upper section is 120 m. (394 ft.) wide and continues *mauka* for c. 1,700 m. (5,577 ft.) parallel to a recently constructed road joining the Queen Ka'ahumanu Highway with the older Māmalahoa Belt Road above. The corridor also marks the boundary between Ka-laoa 3-4, in which it is located, and Ka-laoa 5, which is not part of the present study.

* This figure, revised downward from that estimated in the original proposal, is based on a more accurate calculation from larger-scale base maps than were previously available.

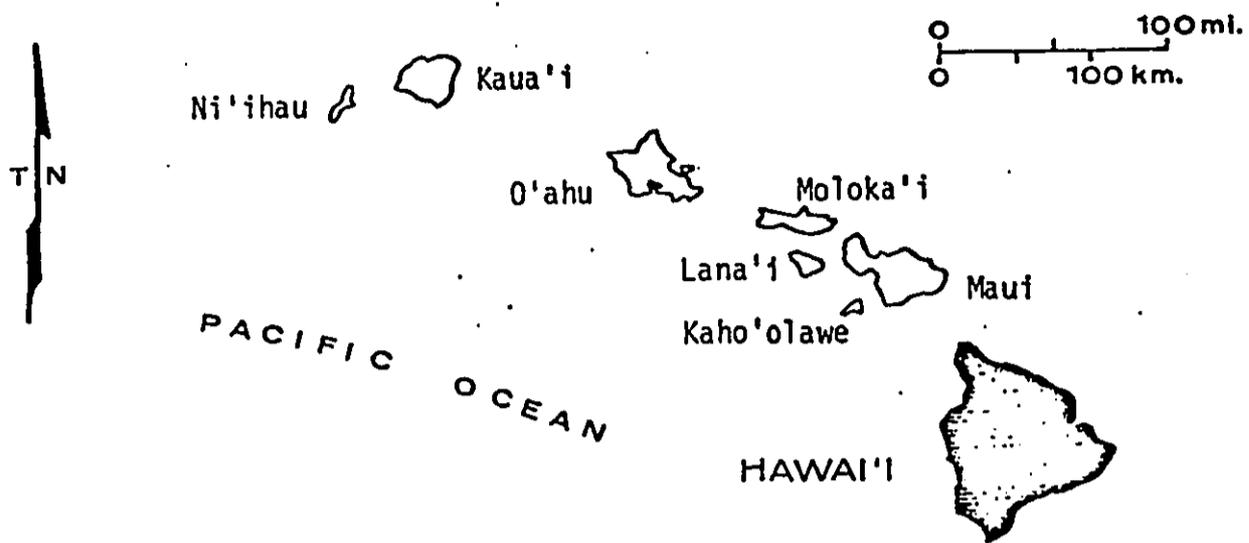


FIGURE 1. Hawaiian Islands.

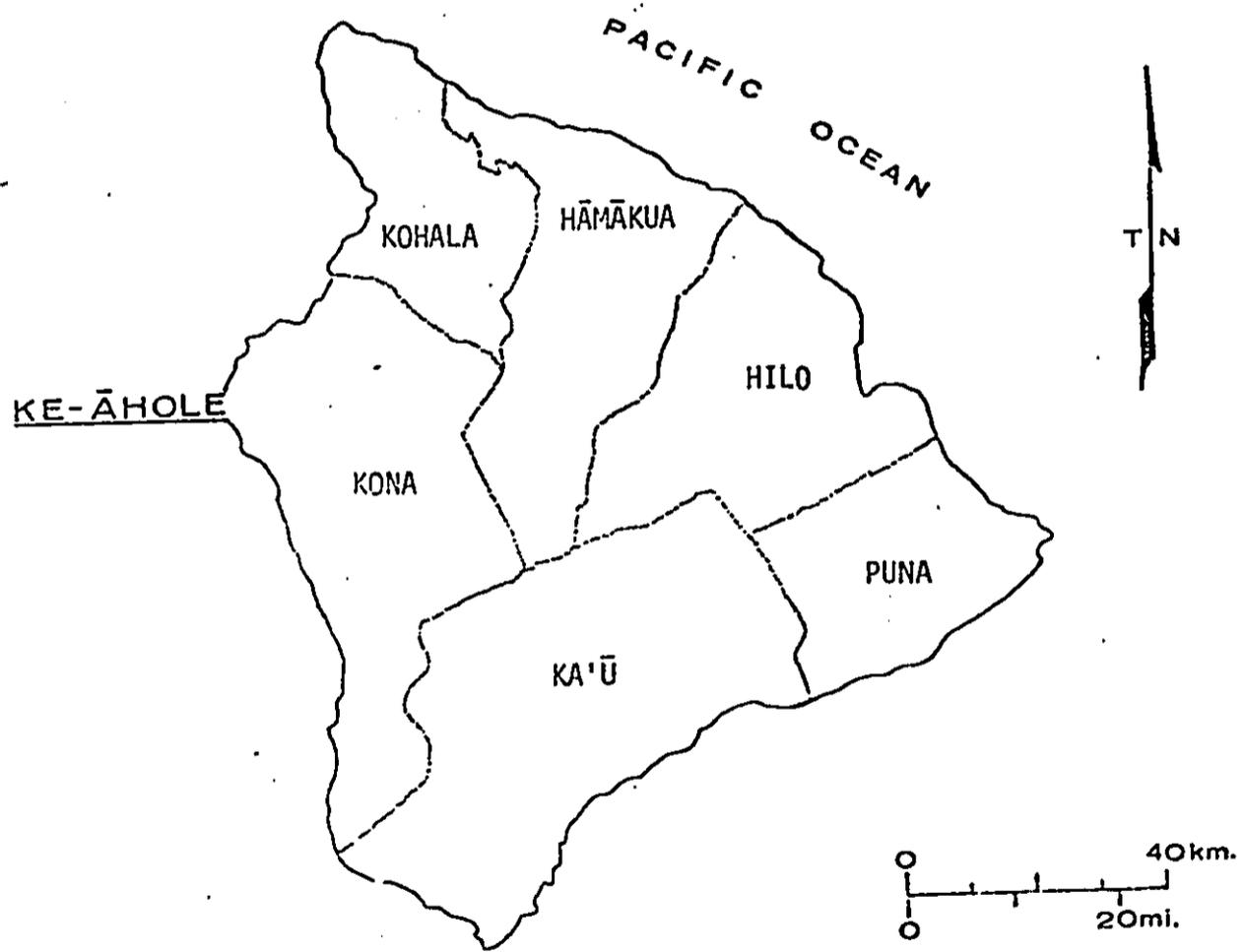


FIGURE 2. Location Map, Island of Hawai'i.

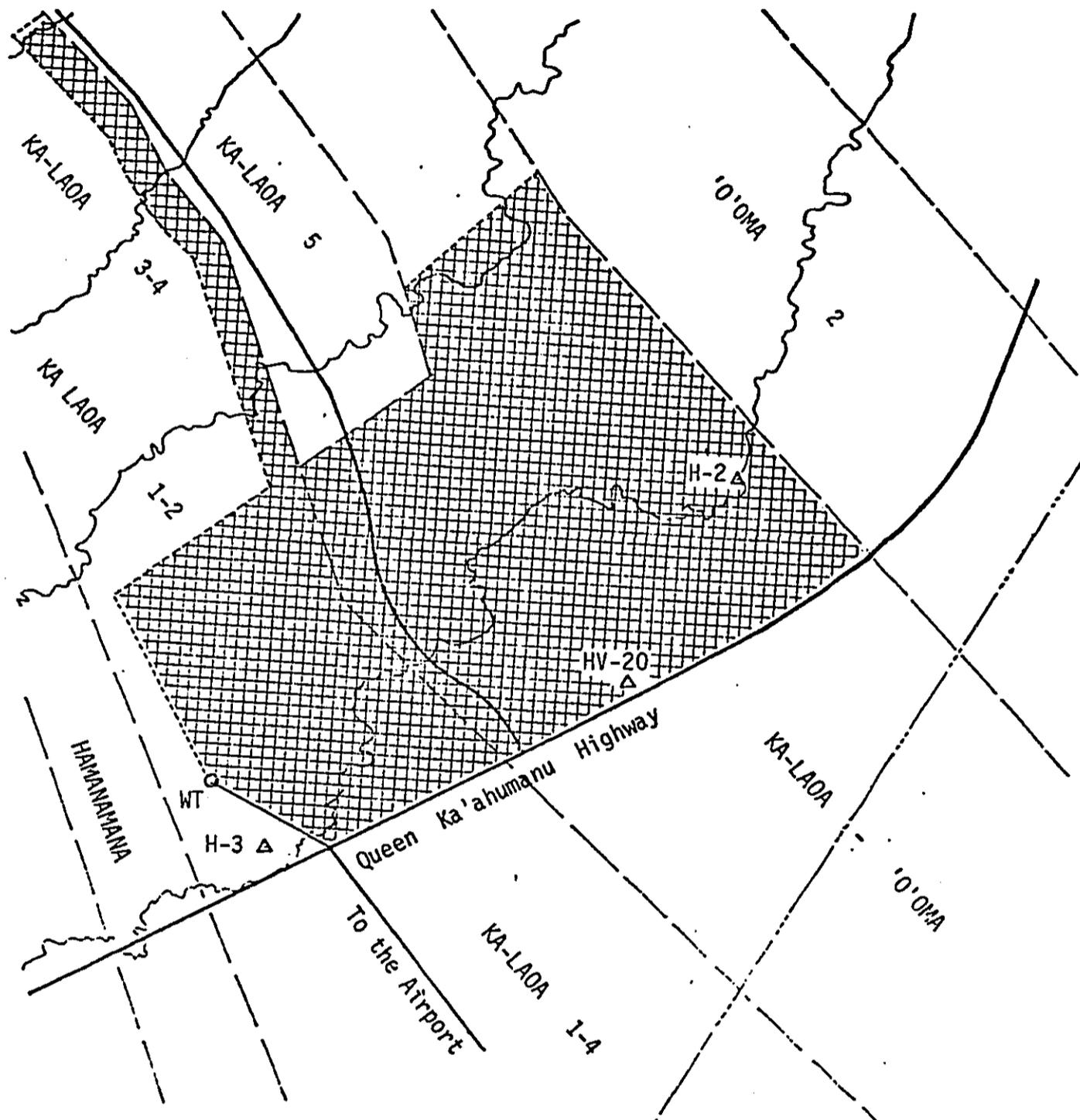
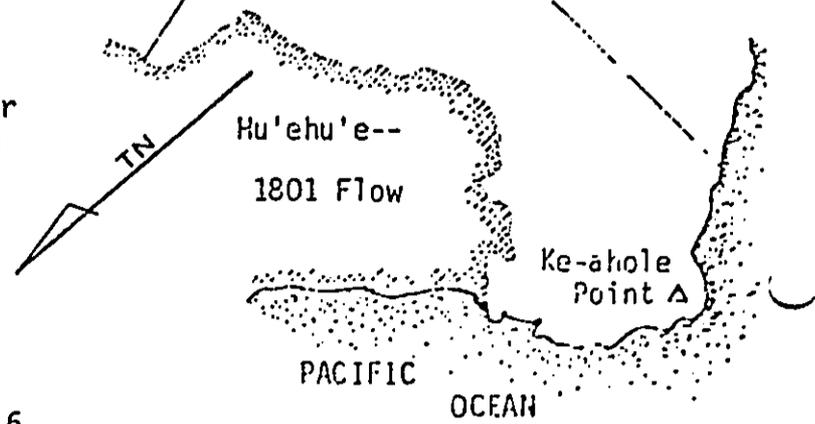


FIGURE 3.

Ke-ahole Project Area showing major triangulation stations used during the survey. Scale--1:24,000; Contour interval--200 ft.



In sum, the combined project area extends approximately 3,700 m. (2.3 mi.) from the 37-meter (121 feet) elevation up to the 244 meter (800 feet) elevation. Two points are relevant here. First, such wide differences in elevation over relatively short distances in the high Hawaiian Islands is characterized by significant variation in environments. Marked vertical zonation occurs and can be readily observed as one moves from the coast to the uplands. As introduced above, it may therefore be expected that the nature of the archaeological remains in the project will reflect these changes in local conditions. This aspect of the study will be discussed further.

Secondly, from an engineering concern, the 56-meter (184 feet) contour is about the maximum practical uphill limit of available water with the existing facilities. Without auxillary supplies, approximately 80 percent of the project area is precluded from serious consideration for siting the agricultural park. This will have direct bearing upon the archaeological remains in the lower areas which may be adversely impacted by the proposed development, and ultimately the necessity of mitigating this impact.

Strategy and Procedures

Field Conditions

Field problems were anticipated in terms of the kinds of cultural remains expected in the project area; the nature of the ground cover and how it might affect site visibility; and the overall size of the project area and how this would affect mapping within the capabilities of an optical transit.

Previous studies in connection with the development of the Ke-āhole Airport and the Queen Ka'ahumanu Highway (Ching 1971; Ching *et al.* 1968, 1969; Rosendahl 1972b, 1973) indicated that most of the sites in the project area would be decidedly low-profile features. These include modified lava-tube sinks and shelter caves, *ahu* (rock mounds and cairns), low stone platforms, low-walled shelters and/or "hunting blinds", and quarry areas for extracting scoria--a highly vesicular basalt used for the manufacture of abrading tools.

Except for the *mauka* corridor, much of the area is quite treeless. Ground cover, on the other hand, was reported to be dense with fountaingrass (*Pennisetum setaceum* [Forsk.] Chiov.) frequently growing to a meter (39 in.) or more in height. Therefore, except for perhaps the larger *ahu*, or for other structures built on more barren ground, most of the archaeological remains were expected to be hidden in the tall grass.

Once the cultural features were identified, to accurately map their locations over a large area with an optical transit would not be especially easy without additional support. Determination of horizontal distance by transit and stadia is reliable only to c. 120-150 m. (394-492 ft.) under favorable conditions. With heat distortion over the open grasslands and barren lava fields, this reliability is substantially reduced. Rough terrain further limits stadia work. To locate archaeological sites by transit and stadia over wide areas would therefore require time-consuming multiple set-ups for the transit between each site. Moreover, unless intermediate reference points are available, the more set-ups required to run a transit line the greater

the chance for accumulative error that cannot be crosschecked and corrected for.

Determinating location by triangulation does not require stadia and multiple set-ups between sites. Each site location can be triangulated independently, thereby isolating potential sources of error. However, the relative location of reference points and the resulting intersecting angles of triangulation do affect accuracy. Ideally, the intersecting angles should not be less than c. 45°. Seven triangulation stations had been established in the project area for construction of the Queen Ka'ahumanu Highway. If these could be relocated, they could be used as reference points for the archaeological survey. All were, of course, placed in the highway corridor and no triangulation points were known to be located in the *mauka* area. Thus, as work progressed further inland and away from the stations along the highway, the intersecting angles of triangulation would become more acute and potentially less accurate.

Strategy for Reconnaissance and Mapping

It was decided early in the planning stage that detailed contour maps and aerial photographs would provide the major base line for the Ke-āhole survey. DOA and the R.M. Towill Corporation provided the field team with 1.5-meter (5 feet) contour topographic maps of the project area and much of the surrounding lands. These were drawn to a scale of 1:2400 (1" = 200'). A recent aerial photograph of the lower section of the project area was also available at the same scale. Resolution of the aerial was sharp enough to show

all but the smallest lava-tube sinkholes, which at least minimized the problem of finding these potential sites. Later, upon careful re-examination of the aerial after ground reconnaissance had been completed, it was possible to pick out several of the larger archaeological features. This was ultimately of value for preparing the final archaeological location map for the project area (See Figure 4, page 11).

Although various problems were considered in advance, field strategy was not finalized until after the project area had been inspected. The plan called for a thorough reconnaissance of the area by transects, an initial mapping of site locations by triangulation, and the establishing of reference points on "X" panels in the *mauka* areas for aerial photogrammetry.

Reconnaissance: Total coverage of any large area with rugged terrain and/or dense ground cover is not generally feasible. A systematic reconnaissance conducted along closely spaced transects, however, would ensure ample coverage. In the present study, close spacing was particularly important since the estimated maximum visibility in the high fountaingrass was only about 15 m. (49 ft.).

Transit Mapping: Triangulation was considered the optimum method for locating archaeological sites on the project area map. Cultural features in the lower areas near the highway and up near two stations found later along the *mauka* road were well within the range of accurate triangulation. Features located in the *mauka* areas were to be triangulated from the existing stations to obtain preliminary locations.

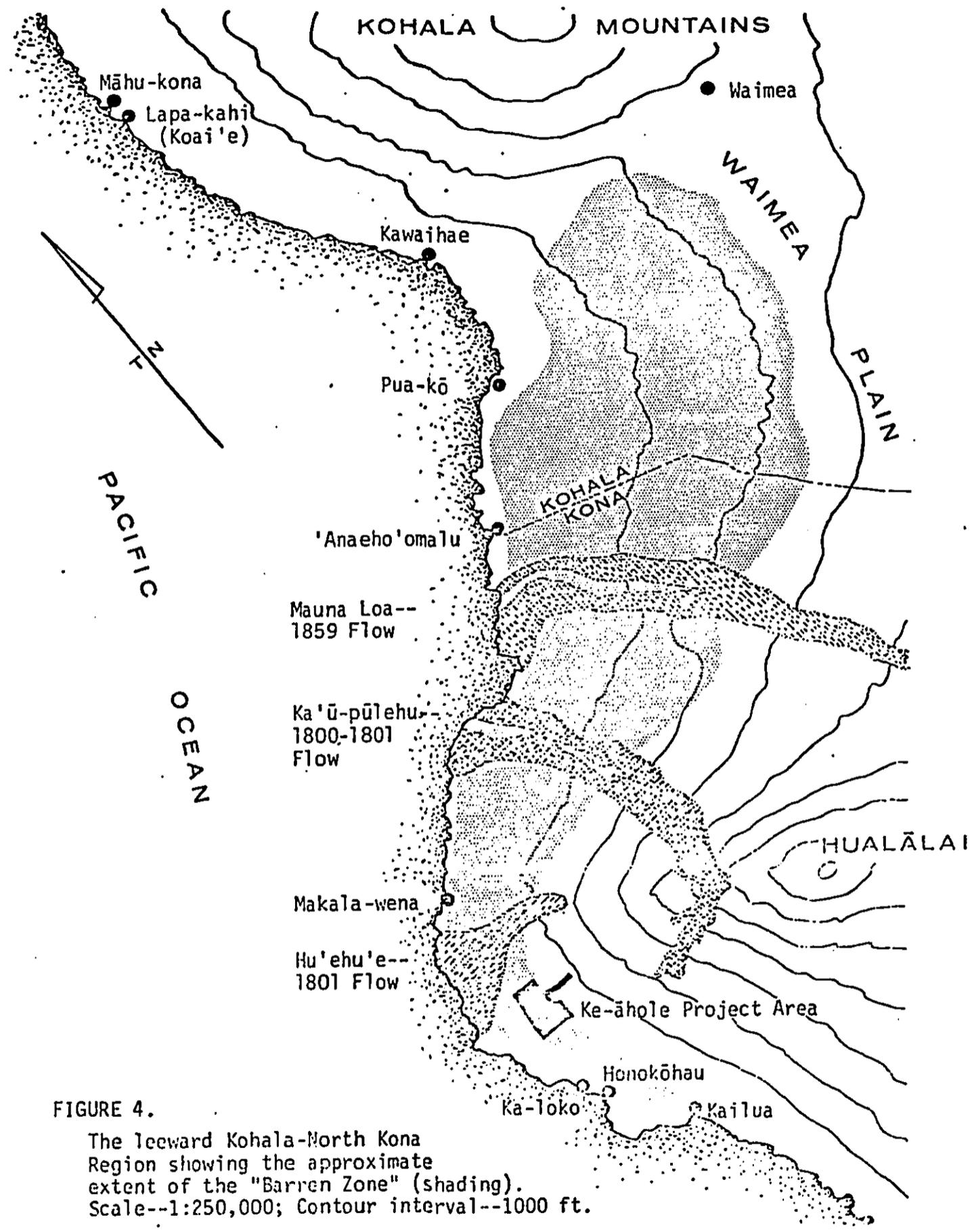


FIGURE 4.
 The leeward Kohala-North Kona
 Region showing the approximate
 extent of the "Barren Zone" (shading).
 Scale--1:250,000; Contour interval--1000 ft.

Aerial Photogrammetry: In coordination with the survey team from R.M. Towill Corporation, 10 foot "X" panels were to be laid out on the ground near sites in the *mauka* areas of the study. The nearby cultural features would then be tied into the panels by the ARCH field team and the R.M. Towill Corporation survey team would tie the panels into the existing stations near the highway. An aerial photograph would then be taken with the new panels in place from which new maps could be made and the preliminary location of sites in the *mauka* areas corrected.

Field Procedures

The first four (4) days in the field were devoted to the reconnaissance to locate and identify potential archaeological sites. Twelve north-south (parallel to ground contour) transects were made on foot in the lower section of the project area. Each transect was walked by the crew five-abreast and spaced at c. 30-meter (98 feet) intervals. Cultural features found in the transect were flagged with brightly colored surveyor's tape and their approximate locations noted so they could be relocated for transit mapping.

Reconnaissance in the *mauka* corridor required only one transect beginning at the *makai* (seaward) end and working uphill. At first, each site was flagged and recorded. Eventually, however, so many features were found that it was finally decided to treat the whole area as a single site complex.

Following the reconnaissance, work continued with transit mapping of the sites. When practical, a site datum with a State Site Number stamped on a brass washer was established for each site. Each datum and other

isolated archaeological features, generally *ahu*, were located by triangulation and plotted on the project area base map. Surface site complexes were transit mapped in detail using stadia and working from the datum for that site. Interior features of the modified lava-tube sinks and shelter caves were sketch mapped as appropriate. Only in Site 6418, where the test excavations were later conducted, were interior features transit mapped. This was necessary to accurately locate the test excavations and to establish a vertical reference point.

As work progressed inland, three "X" panels were laid out and provisionally tied into the other reference points by triangulation. Sites in the *mauka* areas were tied into the panels and to the existing stations near the highway. After plotting the location of these sites on the base map, the present estimated degree of error does not exceed 5 percent. This, however, will be crosschecked once the new aeriols are available.

All archaeological remains were noted in detail in a master field log. Additional information was recorded by individual field members and transferred into the master log at the end of the day. Various sketch maps were made as needed and a complete photo catalogue was maintained throughout the field session.

BACKGROUND

Previous Investigations

Archaeologically, leeward Kohala and North Kona is one of the most studied regions in the islands. Field investigations have run the full array from general reconnaissance to intensive surface survey and testing to full excavation, under both pure research conditions and through contracted salvage programs. A partial listing of these studies by locality would include among others: Lapa-kahi (Newman 1970; Rosendahl 1972a; Tuggle and Griffin 1973), Kawaihae-Waimea (Cluff *et al.* 1969, Barrera 1974), 'Anaeho'omalu (Barrera 1971; Pietrusewsky 1971; Bevacqua 1972), Ke-āhole (Ching *et al.* 1969), Ka-loko (Renger 1970; Kelly 1971), and Honokohau (Ladd 1968; Cluff 1971; Emory and Soehren 1971). In addition, limited regional studies were conducted along the Kailua-Kawaihae Road corridor (Ching and Rosendahl 1968; Ching 1971; Rosendahl 1972b, 1973).

An enormous body of information was generated from this work. For the most part, however, the focus was on the seaward portion of the region, Lapa-kahi, and potentially the Kawaihae-Waimea Road corridor, are notable exceptions which carried archaeological investigations into the leeward uplands. These investigations, combined with recent work in the arid lava rocklands between the coast and the uplands, are of particular interest for the current research.

Working in the leeward upland agricultural systems at Lapa-kahi, Rosendahl began to develop an alternative model for settlement-subsistence

patterns and prehistoric Hawaiian social organization. The original model was based upon the *'ohana-'āina* relationships described for Ka'u on the island of Hawai'i:

The fundamental unit in the social organization of the Hawaiians of Ka-'u was the dispersed community of *'ohana* or relatives by blood, marriage and adoption, living some inland and some near the sea but concentrated geographically in and tied by ancestry, birth and sentiment to a particular locality which was termed the *'aina* (Handy and Pukui 1972:2)..

With such a dispersed pattern of permanent residences, the unity of the *'ohana* was maintained by a system of reciprocity or obligatory exchange. Subsistence resources as well as other goods and services were regularly exchanged *mauka-makai*. Travel between households on the coast and in the uplands was constant, but residency was always permanent in one or the other of areas.

From his study of upland agriculture and associated domestic settlement patterns at Lapa-kahi, Rosendahl (1972a) suggested that the *'ohana-'āina* residence pattern may not have been a dispersed community of permanently resident households, but rather one of shifting residences on a seasonal round. Later investigations along the Ke-āhole-Kawaihae Road corridor in the arid lava rocklands between the coast and the uplands recorded numerous habitation sites and other cultural features pointing to the possibility of a considerably larger and perhaps more long-term population than had previously been suspected in what had become characterized as the "Barren Zone" (Ching 1971; Rosendahl 1972b, 1973). Although this work was limited to the seaward portion of the region by the nature of it being contract salvage research

the nature of these "Barren-Zone" sites fits well with the alternative model. Without the upland component to complete the picture, however, settlement-subsistence relationships between the coast and the uplands were never fully developed and tested.

At this point in time, the results of the recent work at Ke-āhole is of particular importance. The major portion of the project area is fully within the desolate "Barren Zone". As such, the nature of the cultural remains in the area were expected to be comparable to those along the highway corridor in the earlier studies, e.g. modified lava-tube sinks and shelter caves, *ahu* (rock mounds and cairns), low stone platforms, low-walled shelters and/or "hunting blinds", and quarry areas for extracting scoria--a highly vesicular basalt used for the manufacture of abrading tools (Ching 1971; Ching *et al.* 1968, 1969; Rosendahl 1972b, 1973). In fact this was true. Furthermore, the *mauka* corridor extended up beyond the "Barren Zone" into the lower reaches of the upland forest where the agricultural field systems were expected to begin (Rosendahl 1972a). This also proved to be the case.

Predictably, the nature of the archaeological sites changed as local environmental conditions changed. To understand and appreciate the significance of this phenomenon within the project area, it must be set into the regional context.

The Natural Setting

The Leeward Kohala - North Kona Region

Ke-āhole is part of a broad, moderately sloping leeward plain stretching from Māhu-Kona south to Kailua, and from the combined uplands of

Hualālai, Mauna Kea and the Kohala Mountains west down to the coast (See Figure 4, page 11). The following is based in part upon field observations, and in part abstracted from a number of published sources (Stearns and MacDonald 1946; Talliaferro 1959; Baker *et al.* 1965).

Leeward Kohala and North Kona presents an environmentally marginal region for human settlement and subsistence-resource exploitation during the prehistoric period. This is especially so regarding the limited availability of water and the poorly developed soil conditions.

The seaward portion of the region is an arid rockland composed of non-disintergrated lavas and dry scrub vegetation. Conditions in the uplands are more favorable with increased rainfall, thin to moderately deep soils, and mixed broadleaf forest vegetation. Although several seasonally intermittent gullies cut through the landscape near Kawaihae and Pua-kō, the plain is otherwise quite poorly dissected. Thus, without major drainages in the region, surface water is virtually non-existent. Furthermore, within the capabilities of traditional methods, ground water is accessible only at the immediate coast--and there largely as brackish basal water, although isolated fresh-water springs may occur depending upon *mauka* conditions.

This results from a combination of factors: a somewhat altered wind pattern, an accentuated rain-shadow effect from the above named mountains, and the high permeability of the geological substrate of much of the region.

Situated to the leeward of a high montane belt, most of the region, and especially the lower elevations, is cut off from the rains carried by the steady northeast trades during the summer months. In the winter, frequently strong southwesterlies again effectively limit rainfall to the higher elevations.

Here the annual precipitation may average 76 cm. (30 in.), suitable for cultivating such crops as sweet potato (*Ipomoea batatas*) and "dry-land" taro (*Colocasia Esculenta* [L.] Schott). In contrast, the coast and lower elevations often receive less than half that amount, and much of that may be within the brief span of a few winter *kona* storms.

Arid conditions are exaggerated further by the limited ability of the regional substrate to retain ground water at levels accessible by traditional native methods. To the north, thin to moderately deep soils have developed over Pleistocene Mauna Kea lavas. To the south, soil development is severely limited or non-existent. From the vicinity of Pua-kō down to Ke-āhole is an area of latest-Pleistocene and Recent volcanics. Three historic lava flows have been recorded here: the Hu'ehu'e Flow of 1801, the Ka'ū-Pūlehu Flow of 1800 - 1801 (both originating from Hualālai), and the Mauna Loa Flow of 1859.

The limited soils that do occur are either aeolian deposits of Pāhala Ash or alluvial outwashes from the seasonally intermittent gullies. Minor deposits of erosional materials do occur in the uplands, but without sufficient surface water, alluvial transport and redeposition is restricted. Therefore most of the upland soils consist of *in-situ* detritus from parent materials directly below. These soils, therefore, are loose, granular, poorly sorted materials with markedly low moisture retention capabilities. On the one hand, the loose soils allow for rapid transpiration of water at the surface, and on the other, the porous lava substrate permits the remaining water to percolate rapidly downward to basal levels.

The foregoing clearly shows an area of apparently less than favorable conditions for either a large or permanent human settlement, particularly along the coast and lower elevations. Despite this appearance, the entire region supported a considerable, if late, prehistoric population. Three generalized terrestrial zones which directly influenced this settlement and associated subsistence activities may be defined (See Figure 4, page 11):

1. The Coastal Zone--barren rocky shorelines, isolated bays with coralline beach formations, inland ponds, brackish basal water, localized fresh-water springs (dependent upon *mauka* conditions), and strand vegetation occurring in limited soil deposits.

2. The Transitional or "Barren" Zone--frequently bare non-disintegrated lavas, arid conditions, extremely limited dry scrub vegetation occurring in *kīpuka* surrounded by recent lavas, and virtually no soil development. This is somewhat mitigated further north where Pleistocene lavas have begun to breakdown into thin soils and where sufficient runoff is generated by *mauka* rains to feed seasonally intermittent washes.

3. The Upland Forest Zone--moderate soil development, variable but adequate moisture from rainfall, and well developed mixed - broadleaf forest vegetation.

On the higher elevations of Hualālai and Mauna Kea, the upland forests eventually give way to sub-alpine and alpine conditions. These were not settlement areas during the prehistoric period, but they were exploited for raw materials.

It should be noted that this environmental zonation is as responsive to differences in relative elevation as well as to distance from either the

coast or the mountains behind. Indeed, marked vertical zonation of local conditions over short distances is characteristic of high volcanic islands in the tropical Pacific. Except for the Waimea Plain between Mauna Kea and the Kohala Mountains and for the Humu'ula "saddle" between Mauna Kea and Hualālai, where the upland forests are more than 12 km. (7.5 mi.) from the coast, the forest elsewhere is rarely more than 3-4 km. (1.9-2.5 mi.) from the coast. This is especially important for considering the position of the Ke-āhole project area in a regional context, and for predicting the nature of the archaeological remains to be found in the study. Specifically, a *mauka-makai* transect from Ke-āhole Point to the uplands should reveal each of the generalized zones described above. It would also be found that in fact the project area straddles the interface of the Barren-Zone - Upland Forest-Zone boundary.

Local Environment of the Project Area

Field observations in the project area and along the coast below compare favorably enough with the above model to consider Ke-āhole as a "type area". The point itself is a totally barren piece of rocky headland, although Pa'a-ia fishpond was located in Hale-ohili *ahupua'a* before its destruction by the 1801-- Hualālai Lava Flow (Ching 1971:245).

Small bays and associated ponds do occur at Honokōhau and Ka-loko to the south and at Makala-wena on the north. Here moderately well developed strand conditions occur with coralline sand beaches at the head of the bays, brackish-water ponds behind the strand, and limited soil deposits supporting

coconut (*Cocos nucifera* L.), beach *naupaka* (*Scaevola* sp.) and sea grape (*Coccoloba uvifera* [L.] L.). This corresponds well with the definition of Zone 1--the Coastal Zone.

Zone 2--the Transitional or "Barren" Zone--begins between 300 and 600 m. (984-1969 ft.) from the coast at the 9-12-meter (30-39 ft.) contour. From here to about the level of the Queen Ka'ahumanu Highway, c. 37 m. (121 ft.), the landscape is that of a bare rockland nearly devoid of vegetation. From the highway up to c. 130 m. (425 ft.) the Barren Zone continues, but the vegetation steadily changes with the increasing elevation reflecting the increased available moisture. Near the highway there is a dense ground cover of fountaingrass. Some lantana (*Lantana camara* L.) and noni (*Morinda citrifolia* L.) shrubs occur in the hollows of the mixed *aa pāhoehoe* lavas.

Progressing uphill the fountaingrass steadily decreases and the lantana begins to flourish until by the 130-meter (425 ft.) level the "Barren Zone" ends and the Upland Forest Zone--Zone 3--begins with the appearance of substantial *koa haole* (*Leucaena leucocephala* [Lam.] deWit.) and Christmas berry (*Schinus molle* Raddi). Here also begins the lower margin of the upland agricultural field systems with extensive prehistoric site remains including house enclosures, stone platforms, high-stacked *ahu*, stone walls and the numerous stone mounds suggesting that the local crop was largely sweet potato. This zone continued right up to the *mauka* end of the project area and beyond. Above this point, larger forest species could be seen with increasing frequency.

SUMMARY OF RESULTS AND RECOMMENDATIONS

Twenty-two site complexes and isolated archaeological features, including the previously registered lava-tube cave (Site 262), were found in the Ke-āhole project area. These are in part plotted on a general location map (See Figure 5, page 23); a series of aerial photographs showing site locations was also prepared for DOA and provided under separate cover (See Figure 6, Jacket, back cover).

A listing of cultural features found in the lower section of the project area includes: major habitation caves in collapsed lava-tube sinks (12); minor shelters in lava bubbles (2); surface shelters or wind breaks (1); large *ahu* of stacked lava rock, some of which appear to mark possible trail alignments (24); stone platforms, not including those in the habitation caves (5); stone platforms and well-defined pavements, each supporting a well-stacked *ahu* (3); walled enclosures, one of which appears to be a historic homestead (6); and free-standing, core-filled rock walls (1)--a historic *ahupua'a* boundary wall.

All of these are comparable to those found in the "Barren Zone" elsewhere in the region as described above (See page 16), therefore confirming the pattern of archaeological sites expected to be found in this section of the project area. The numerous "hunting blinds" and the scoria quarries, reported from elsewhere in the region, were not found within the Ke-āhole project area. This, however, does not change the overall pattern. Moreover, the entire *mauka* corridor was found to be part of an extensive upland agricultural and residential system (Site 6433). Features observed in the *mauka* corridor included house enclosures; platforms; large, well-stacked *ahu*; terraces; miscellaneous wall

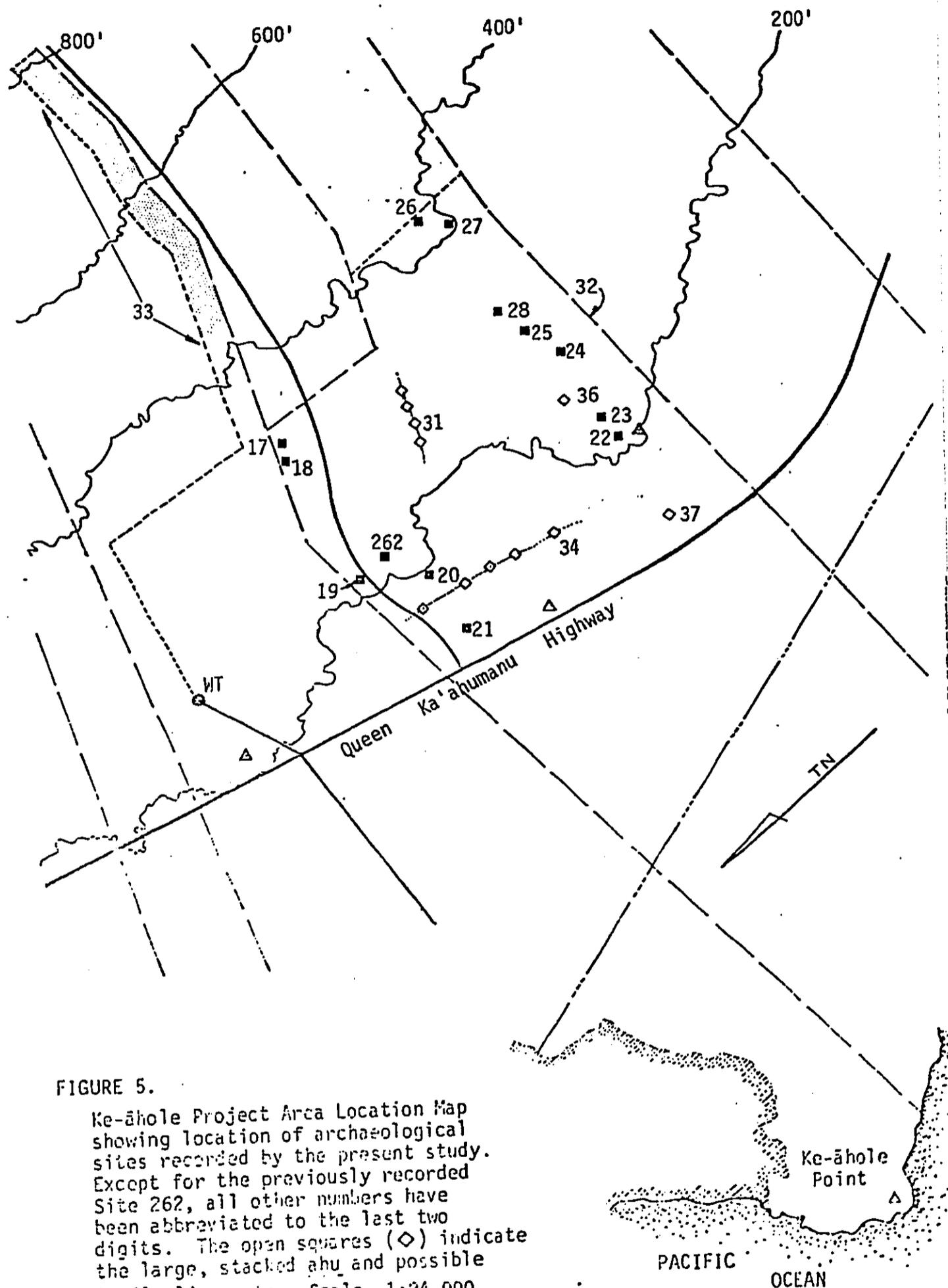


FIGURE 5.

Ke-āhole Project Area Location Map showing location of archaeological sites recorded by the present study. Except for the previously recorded Site 262, all other numbers have been abbreviated to the last two digits. The open squares (◇) indicate the large, stacked ahu and possible trail alignments. Scale--1:24,000.

sections and numerous clusters of rock mounds all suggesting that the local crop was probably sweet potato. These remains proved to be so extensive that no time was available for more than cursory observations as to the general extent and complexity of the features in the corridor. No feature location map was prepared because of this.

Anticipating a more complete treatment of the site remains and specific recommendations below, a few broad comments are appropriate here.

First of all, it can be seen that the area to the north of the new *mauka* road is almost completely clear of archaeological remains. Three site complexes including a possibly historic homestead (Site 6417), a lava-tube shelter cave (Site 6418) and an enclosed complex of stone platforms and *ahu* (Site 6419) completes the inventory for this area. It is therefore suggested that this area would be most suitable, archaeologically, for locating at least a portion of the proposed agricultural park. Considering the present restriction on available water to the 56 meter (185 feet) contour, the immediate development of the park should have no adverse impact upon Site 6417 and 6418 as these are located up in the *mauka* portion of the project area. Should later growth require that the agricultural park expand uphill, the affect of this expansion on these two sites would have to be evaluated. As for Site 6419, this is situated immediately above the 56-meter (184 feet) contour. At present, the site is easily accessible from the *mauka* road; however, it is not especially conspicuous and thus does not seem to have been disturbed. Development of the agricultural park will not substantially increase accessibility to the site, but the large spatter cone on which it is located

would be a tempting refuse dump for neighboring farmers. This site would also be a convenient source of loose stone for landscaping. Since people were observed removing stone from other areas along the *mauka* road, it is expected that this may eventually happen to the site as well. It is therefore recommended that Site 6419 be systematically tested for subsurface deposits to determine the nature of these remains.

Secondly, since the development will have to include lands south of the *mauka* road, there will be an adverse impact upon the archaeological remains located near the highway here. These include three lava-tube habitation caves (Sites 6420, 6421 and 6422) and a complex of *ahu* and small lava-bubble shelters which apparently are strung out along a north-south trail (Site 6434). Two of the habitation caves (Site 6420 and 6421) are located near the intersection of the *mauka* road with the highway. Several of the *ahu* of Site 6434 are also in the vicinity. It is expected that these features cannot be avoided by the development. To determine the nature of the occupation in the two habitation caves is important in terms of the research concerns outlined above. Therefore, full salvage excavation of these sites is recommended. As for the *ahu* of Site 6434, there is always the possibility that human burials may be associated with these features and thus they should be dismantled to determine if burials are present. In the event that burial remains are recovered, arrangements would then have to be made either for reinterment or for transport to a designated repository.

A third point of concern regards the potentially adverse impact the development may have upon the registered site, Site 262. As with Site 6419, it is above the immediate development area, but accessibility will be magnified

manyfold. The fact that it is open sink invites use as a refuse pit. Moreover, once people begin living and/or working in the adjacent area, the opportunity for looting by vandals or just the curious will ultimately be a detriment to the site. To provide security would be one solution, but one hard to maintain. Test excavations at the very minimum, but preferably full salvage excavations should be considered.

Finally, with the current restriction on development because of the availability of water with the existing facilities, the remainder of the sites located in the *mauka* areas need no further work at this time. Should the proposed agricultural park expand, however, these sites must be re-evaluated to mitigate any potentially adverse impact the expansion may have upon these resources.

SITE DESCRIPTIONS

Site 262*: A large habitation cave located in a lava-tube sink near the subdivision road. Extensive modification in the three chambers of this cave have been previously recorded (Ching 1971:100-111) and the site has already been listed in the State Register of Historic Places. This is one of two shelter caves in the study area in which petroglyphs carved on the walls of the caves were found to be partially buried by later structural features. The site is therefore considered to be potentially significant for dating when the petroglyphs were buried, and thus setting a terminal date for when they were carved on the wall of the cave. Recommended salvage of this site has been discussed above.

Site 6417: An extensive complex of low, stacked-stone walls, two small stone-wall enclosures, a probable house enclosure and several small platforms and planting areas. A wooden post was built into one corner of the house enclosure; a fragment of a square-shank iron nail was found imbedded in the post. It is thus likely that this complex may be a historic homestead. The contemporaneity of all the features is, however, still far from certain. Mapping of this complex has been completed. No further work is recommended at this time. As mentioned above, should the agricultural park (or other State use of the land) expand in this area, the potential impact upon this site must be re-evaluated.

*All site numbers used in this report are State Historic Register accession numbers. Each site number is unique for the region and is prefixed by the code 50-10-27-, designating the State of Hawaii (50), the island of Hawaii (10) and the North Kona region, covered by the Ke-āhole Quadrant (27) of the U.S.G.S. topographic series.

Site 6418: A large habitation cave located in a lava-tube sink. The open sink area, the remaining portions of the overhanging ledges and the entrances to the two chambers have been extensively modified in this site with stacked-stone walls around the rim along one side of the sink, four platform levels and walls partially closing the entrances to the two small chambers. As in Site 262, petroglyphs carved on the walls of the sink were partially buried by one of the later platform structures. Thus, the possibility for dating these petroglyphs is also good in this site. Test excavations were conducted in this site and a report of this work is pending completion of the laboratory analyses. As with Site 6417, no further work is recommended at this time unless the results of the excavations should indicate otherwise.

The *mauka* chamber of this sink connects with a second, smaller sink located in Site 6417. Two *ahu* were constructed below the opening of the sink on the rubble of the collapsed ceiling. One *ahu* was a large, well-stacked structure of lava blocks topped off with a rather large slab. The height of the *ahu* compared to the rim of the sink indicates that this was likely a "step" on which a ladder was set or from which a climbing rope could be reached to get out of the sink. Finally, the south end of the rubble pile had been levelled out to a platform paved with small stones (but not 'ili'ili) and divided into two areas by a single-course stone alignment. It seems likely that these were marked off as separate sleeping areas. Again, no further work in this site is recommended at this time.

Site 6419: A complex of natural lava outcroppings modified into platforms and miscellaneous paved areas, a low-wall enclosure below the

platforms, and a large stacked *ahu* built to one end of the platformed area. These were all located on *makai* slopes of a prominent spatter cone; however, no structural remains were seen within the crater of the cone. This site is on the north side of the *mauka* road. Recommendations for continued work in this site have been presented above.

Site 6420: Is a large habitation cave located in a lava-tube sink which contains two large chambers connected through to other sinks *mauka* and *makai*. In following the *mauka* chamber, ash and midden deposits were observed along the floor up to where the ceiling collapsed near Site 262. Ash, charcoal and midden were also found in what is assumed to be the continuation of the same chamber into Site 262 suggesting that not only were the sinks and the entrances to the chambers occupied, but also the deep interiors as well.

This use apparently was not consistent, however, since many sinks showed no evidence of human activity. In these instances, the connecting chambers were also barren of cultural debris.

In addition to the ash, charcoal and midden, other cultural remains included several pavements, two small platforms, walls constricting the entrance to the chambers and one fireplace. Recommendations: See Site 6421 below.

Site 6421: A large habitation cave located in the lava-tube sink near the intersection of the *mauka* road and the highway. Structural modifications included small platforms or paved areas and some walling off of the entrance to the chamber below, all generally less extensive than in Site 6420. Both of the sites are expected to be directly affected by the

proposed development. Complete salvage excavations have been recommended (See Above).

Site 6422: A lava-bubble shelter cave and two large, circular *ahu*, well-made of stacked lava slabs. This site is located near the south boundary wall. No further work is recommended at the time.

Site 6423: An extensive complex including a small lava-tube shelter cave, a low enclosing wall of upright lava slabs, a large circular platform or "elevated" pavement with an *ahu* located in the approximate center, several small platforms and pavements and six rock mounds of varying size. A cultural deposit was found in the shelter cave, but no midden was seen elsewhere suggesting that most of the activity in this site was limited largely to the shelter cave proper. Only one of the rock mounds appeared to be stacked; the rest were merely heaped up. It has been suggested that the mounds may be burials. If this is so, then given the apparent confinement of cultural debris to the cave area proper may indicate that this site served a specialized function related to the disposal of the dead.

Because this and other sites (listed below) are located at the far south end of the project area, the initial development should have little impact. Again, however, should the agricultural park expand, these sites would have to be re-evaluated. At present, it is expected that Site 6423 would require complete salvage.

Site 6424: A habitation cave located in a deep sink connected by a high-vaulted lava tube with Site 6425 further *mauka*. As in Site 6418, a

large *ahu* of stacked lava blocks topped off with a slab was built below the opening of the sink. Also, ash, charcoal and midden was found scattered through the length of the connecting lava tube. Recommendations: See Site 6423 above.

Site 6425: A large lava-tube habitation cave located in the sink at the *mauka* end of the tube extending up from Site 6424. This site contained several small platformed areas. An *ahu* was built at the far end of the *mauka* chamber of this site where it was closed off by collapse of the ceiling. It was difficult to determine with certainty, but ash and charcoal were found along the length of the chamber and appeared to be buried by the fallen rubble. Recommendations: See Site 6423 above.

Site 6426: Is an outcrop of lava modified for a platform and a large, well-stacked *ahu*, both located by a moderate-sized spatter cone at the far *mauka* end of the study area near the *ahupua'a* boundary wall. No further work is recommended at this time.

Site 6427: Is a habitation cave located in a large lava-tube sink. This site was inaccessible, however, both ends of the sink were walled off from the underground chambers by massive walls of stacked lava blocks so that only rather narrow openings remained at the top by which to enter the chambers behind. Goats were seen in the sink during the survey. The rim of the sink was much too high for them to have entered over the top indicating that one of the chambers must have opened to the surface elsewhere, but the entrance was not located. Recommendations: See Site 6423 above.

Site 6428: Two large, well-stacked *ahu*. No further work recommended at this time.

Site 6429: A small lava-bubble shelter cave in the *mauka* portion of the study area south of the subdivision road. Structural modification was limited to a levelled paving and a single alignment of lava slabs. The scattered remains of apparently a single human burial (?) were found at the back of the cave. Only the vertebrae, several tarsals and ribs, and the scapulae were present. The skull, the pelvis and the long bones were conspicuously missing raising some question as to the status of these remains. If it had been a secondary burial, those are among the bones--particularly the long bones--that should have been present. It is possible, however, that the burial may have been vandalized, but at present, this cannot be determined. One final point, this individual apparently suffered from osteo-arthritis of the spine since several of the lumbar vertebrae were fused by bony growths. No further work recommended at this time.

Site 6430: Is a small lava-bubble shelter cave without structural modification. A little midden deposited around the entrance and a sheet iron skillet inside the cave was the only cultural remains observed. No further work required.

Site 6431: A very large, well-stacked *ahu* and three somewhat smaller *ahu*, apparently in a line running *mauka-makai*. These features are tentatively designated as one site since they may either indicate the boundary markers of a smaller land division within Ka-laoa *ahupua'a* or they may have served to mark off a *mauka-makai* trail, which today is no longer

evident. No further work recommended at this time. It should be anticipated that these *ahu* may contain human burials and should therefore be tested before any future development is undertaken in this area.

Site 6432: Is the stone boundary wall between Ka-laoa-0'oma and Ka-laoa *ahupua'a*. Given the fact that this wall is nearly transit-line straight and is constructed of core-filled masonry, it is likely a historic feature. No further work is recommended.

Site 6433: An extensive complex of agricultural and residential features with house enclosures, natural lava outcrops modified into platforms, large *ahu*, and numerous low rock mounds. The vegetation was so dense with lantana and Christmas berry, and the terrain was so rough that it was impossible to either get an accurate count or even an approximate location of the many features identified. Provisionally this area is treated as an Archaeological Area and is interpreted to have been a dry-land agricultural area, probably for sweet potato.

Site 6434: An extensive complex of eight rather large *ahu* of stacked lava slabs, a low platform with a smaller *ahu* on top, a small shelter cave, and a possible surface shelter or wind break extending nearly in-a-row over 330 m. (1,083 ft.) south from the *mauka* road just above its intersection with the highway. The alignment of at least six of these features is even more suggestive of a trail than it is with Site 6431. One problem, however, is that this alignment apparently does not continue on to the north side of the *mauka* road. Recommendations concerning at least the north end of this site nearest the road have already been presented above. Most of the *ahu* should be tested

for the presence of human burials, as should the platform with the small *ahu*. Beyond that, no further work seems necessary at this time.

Site 6435: An *ahu* of stacked lava rock--built rather narrow for its relative height. As such, it is possible this could in fact be historic if not rather recent. No further work is recommended.

Sites 6436 and 6437: Two widely separated, rather well-constructed *ahu* of stacked lava rock. Site 6436 is well *mauka* of the highway and Site 6437 is considerably closer, but both are south near the rock wall and thus unlikely to be affected by the immediate development. No further work is recommended at this time.

GLOSSARY

<i>aa</i>	Geological term; a type of lava flow consisting of rough chunks of cinders or "clinkers".
<i>ahu</i>	Heap, pile collection; in Hawaiian archaeology, usually a stacked rock cairn, but also include other rock mounds for burials, cultivation, etc.
<i>ahupua'a</i>	Land division of the <i>moku</i> (district), usually extending from the upland to the sea.
<i>'āina</i>	The land, earth.
Hamanamana*	<i>Ahupua'a</i> of North Kona, Hawai'i Island.
Hawai'i	Largest island of the Hawaiian chain.
Hilo*	A traditional Hawaiian <i>moku</i> (district) on the windward east side of Hawai'i Island.
Honokōhau	<i>Ahupua'a</i> of North Kona, Hawai'i Island. Lit., bay drawing dew.
Hualālai*	Large volcano in North Kona, Hawai'i Island. Last eruption in 1801.
Hu'ehu'e	Last flow from the Hualālai eruption in 1801. Lit., overflowing.
Humu'ula	<i>Ahupua'a</i> of Hilo, Hawai'i; also generally refers to the "saddle" region between Mauna Loa and Mauna Kea. Lit., jasper stone.
Ka'ahumanu	Queen consort and favorite of Kamehameha I, first king of the unified Hawaiian Kingdom. Lit., the bird [feather] cloak.
Kailua	Coastal settlement in North Kona, Hawai'i Island. Lit., two seas (probably currents, especially on Hawai'i).
Ka-laoa	Five combined <i>ahupua'a</i> (Ka-laoa 1-5) of North Kona, Hawai'i Island. Lit., the choker (as a stick for catching eels).
Ka-laoa-'O'oma	<i>Ahupua'a</i> of North Kona, Hawai'i Island.

*Literal meaning uncertain.

Kā-loko	<i>Ahupua'a</i> of North Kona, Hawai'i Island, also the name for a large fishpond. Lit., the pond.
Kā'ū	A traditional Hawaiian <i>moku</i> on the south and southeast part of Hawai'i Island.
Ka'ū-Pūlehu	<i>Ahupua'a</i> of North Kona, Hawai'i Island. Also a lava flow from 1800-1801 eruption of Hualālai.
Kawaihae	<i>Ahupua'a</i> of South Kohala, Hawai'i Island. Lit., the water [of] wrath.
Ke-āhole	A coastal headland north of Kailua, North Kona, Hawai'i Island. Lit., the <i>āhole</i> fish.
kī-puka	Variation or change of form...especially a clear place or oasis within a lava bed where there may be vegetation.
Koai'e	Ancient coastal settlement, the <i>ahupua'a</i> of Lapa-kahi, North Kohala, Hawai'i Island. Lit., the <i>Acacia koaia</i> [tree].
Kohala	A traditional Hawaiian <i>moku</i> on the north end of Hawai'i Island.
Kona	A traditional Hawaiian <i>moku</i> on the leeward west side of Hawai'i Island. Lit., leeward.
Lapa-kahi	<i>Ahupua'a</i> of North Kohala, Hawai'i Island. Lit., single ridge.
Māhu-Kona	<i>Ahupua'a</i> of North Kona, Hawai'i Island. Lit., leeward stream.
<i>makai</i>	Toward the sea.
Makala-wena	<i>Ahupua'a</i> of North Kona, Hawai'i Island. Lit., release [of] glow.
Māmalahoa	The former "King's Trail" along the Kona Coast, Hawai'i Island.
<i>mauka</i>	Toward the mountains.
Mauna Kea	Highest peak on Hawai'i Island, a dormant volcano forming the northern half of the island. Lit., white mountain.
Mauna Loa	Second highest peak on Hawai'i Island, a recently active volcano forming the southern half of the island. Lit., long mountain.

' <i>ohana</i>	Family, relative, kin group.
' <i>O'oma</i>	<i>Ahupua'a</i> of North Kona, Hawai'i Island. Lit., concave.
Pāhala	<i>Ahupua'a</i> of Ka'u. Name used geologically to refer to the ash beds which are in part the parent materials for the North Kona and South Kohala soils. Lit., cultivation by burning mulch.
pāhoehoe	Geological term; a type of lava flow consisting of smooth, unbroken surfaces, contrasting with <i>aa</i> .
Pua-kō	<i>Ahupua'a</i> of South Kohala, Hawai'i Island. Lit., sugarcane blossom.
Waimea	<i>Ahupua'a</i> of South Kohala, Hawai'i Island. Lit., reddish water (as from erosion of red soil).

- APPENDIX -

NOTES ON TABLES I THROUGH II

Tables I through II are organized according to feature type. For example, all Habitations Structures, etc., are presented together and are listed numerically by feature number and *ahupua'a*. The Tables are to be read across the page from left to right.

- Column 1 - Feature Number
The permanent feature number assigned in the field.
- Column 2 - Reference Number
The closest control point used to establish the location of the feature.
- Column 3 - Classification
The feature designation as defined in the Hawaii Register of Historic Places.
- Column 4 - *Ahupua'a*
The *ahupua'a* within which the feature is located.
- Column 5 - District
The district within which the feature is located.
- Column 6 - Photographs
The catalogue number for photographs stored in the Archaeological Research Center Hawaii, Inc. laboratory.
- Column 7, 8 and 9 - Length, Width, Height
The general measurements of the feature.
- Column 10 - Description
A brief description of the feature.

* Interior structures of Habitation Cayes not described in detail or individually designated.

** Demensions given only for the size of the open sink.

TABLE I HABITATION STRUCTURES - House Complex					
FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6417	At Panel "B"	1-1	Kalaoa-O'oma	North Kona	---
6417A	At Panel "B"	1-1-4-5	Kalaoa-O'oma	North Kona	---
6417B	At Panel "B"	1-1-4-6	Kalaoa-O'oma	North Kona	---
6417C	At Panel "B"	1-1-4-6	Kalaoa-O'oma	North Kona	---
6417D	At Panel "B"	1-1-4-8	Kalaoa-O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
91.44 m.	83.82 m.	---	Probable historic complex of walls, enclosures, pavings and planting (?) areas. Historic petroglyph found in this complex; built on a large spatter cone.
8.00 m.	6.00 m.	61.00 to 78.00 cm.	Partially collapsed, stone-wall, house enclosure; wooden post built into one corner - square-shank iron nail indicates probably historic structure; floor well developed deposit with shell midden.
63.00 m.	37.00 m.	50.00 to 70.00 cm.	Large, irregular, stone-wall enclosure (wall not continuous) built around rim of spatter cone and extending off to the west side enclosing feature 6417A; constructed of roughly stacked <i>a'a</i> and varying from 50.00-70.00 cm. high and 30.00-50.00 cm. wide.
3.10 m.	2.25 m.	50.00 to 120.00 cm.	Small, stone-wall enclosure built against inside wall of spatter cone - function unknown.
3.00 m.	3.00 m.	---	Small circular depression ca. 120.00 cm. deep; inside walled with <i>a'a</i> to reinforce walls; well developed humic and fine clay-silt deposit inside; outside partially paved level; possible planting area.

TABLE I continued - House Complex

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6417E	At Panel "B"	1-1-4-8	Kalaoa-O'oma	North Kona	---
6417F	At Panel "B"	1-5-1-2	Kalaoa-O'oma	North Kona	---
6417G	At Panel "B"	1-12-2	Kalaoa-O'oma	North Kona	---
6417H	At Panel "B"	1-1-4	Kalaoa-O'oma	North Kona	---
6417I	At Panel "B"	---	Kalaoa-O'oma	North Kona	---
6417J	At Panel "B"	1-1-4-5	Kalaoa-O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
2.00 m.	2.00 m.	---	Small, circular depression ca. 80.00 cm. deep; similar to above but paving more extensive and divided into two levels by stone facing ca. 65.00 cm. high.
17.50 m.	1.50 m.	---	Probable path along inside of enclosure wall 6417B, paved with small <i>a'a</i> stone.
---	---	---	Historic (likely recent) petroglyph in English spelling "HOHA" located at end of path 6417F.
4.00 m.	3.50 m.	50.00 cm.	Small rectangular, stone-wall enclosure ca. 9.00 m. north of 6417C (outside the larger enclosure); walls collapsed ca. 50.00 cm. wide; possible doorway in north wall.
55.00 m.	30.00 to 60.00 cm.	30.00 to 70.00 cm.	Straight, roughly stacked wall of <i>a'a</i> clinker; built along edge of sharp drop-off into gully ca. 40.00 m. north of main enclosure 6417B; may extend into next <i>ahupua'a</i> (Kalaoa 3-4) or may mark the boundary (?).
3.20 m.	2.00 m.	75.00 cm.	Small, rectangular, stone-wall enclosure built against north side of wall 6417I which forms one side of this enclosure; opening thru wall 6417I may be doorway into the enclosure; walls in fair condition ca. 50.00 cm. wide.

TABLE I continued - House Complex

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6433	See Fig. 5	1-1	Kalaoa 3-4	North kona	---
6434	At HAD-1	1-1	Kalaoa- O'oma	North Kona	---
6434A	At HAD-1	1-6	Kalaoa- O'oma	North Kona	---
6434B	At HAD-1	1-1-2	Kalaoa- O'oma	North Kona	---
6434C	At HAD-1	1-6	Kalaoa- O'oma	North Kona	---
6434D	At HAD-1	1-6	Kalaoa- O'oma	North Kona	---
6434E	At HAD-1	1-6	Kalaoa- O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
1524.00+ m.	121.92+ m.	---	A vast complex of dry-land agriculture field systems and habitation areas including house sites, enclosures, platform, modified lava outcrops, large <i>ahu</i> and rock mounds. This was an area for reconnaissance only, no mapping done.
---	---	---	An extensive complex of scatter features which appear to in-part form a north-south association based along a possible trail (?), including <i>ahu</i> , shelter cave, pavement and possible surface shelter.
1.50 m.	1.50 m.	ca. 50.00 cm.	Collapsed, circular <i>ahu</i> at south end of complex.
ca. 3.00 m. floor	ca. 2.00 m. floor	ca. 100.00 cm. ceiling	Small shelter cave without modifications; midden scattered at entrance; ca. 45.72 m. north of <i>ahu</i> 6434A.
2.00 m.	2.00 m.	ca. 100.00 cm.	Square, well-built <i>ahu</i> of <i>pāhoehoe</i> slabs and <i>a'a</i> ; ca. 137.16 m. north of cave 6434B.
2.00 m.	2.00 m.	ca. 60.00 cm.	Square <i>ahu</i> , partially collapsed; ca. 15.24 m. north of <i>ahu</i> 6434C.
2.00 m.	1.50 m.	ca. 60.00 cm.	Rectangular <i>ahu</i> ; ca. 114.30 m. northwest of <i>ahu</i> 6434D.

TABLE I continued - House Complex

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6434F	At HAD-1	1-6	Kalaoa-O'oma	North Kona	---
6434G	At HAD-1	---	Kalaoa-O'oma	North Kona	---
6434H	At HAD-1	---	Kalaoa-O'oma	North Kona	---
6434I	At HAD-1	1-1-4-4	Kalaoa-O'oma	North Kona	---
6434J	At HAD-1	1-6	Kalaoa-O'oma	North Kona	---
6434K	At HAD-1	1-6	Kalaoa-O'oma	North Kona	---
6434L	At HAD-1	1-6	Kalaoa-O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
2.30 m.	2.00 m.	ca. 100.00 cm.	Square, well-built <i>ahu</i> of <i>pāhoehoe</i> slabs and <i>a'a</i> ; ca. 114.30 m. north from <i>ahu</i> 6434D.
3.00 m.	2.00 m.	---	Roughly oval area of <i>a'a</i> pebbles; ca. 30.48 m. north of <i>ahu</i> 6434F.
4.50 m.	3.00 m.	40.00 to 50.00 cm.	A rectangular platform of <i>pāhoehoe</i> slabs and <i>a'a</i> clinker on a rise of ground just east of HAD-1 and ca. 91.44 m. north of <i>ahu</i> 6434F; small <i>ahu</i> of <i>a'a</i> (ca. 150.00 cm. diameter X ca. 30.00 cm. high) built on south half of platform; possible C-shape shelter (ca. 170.00 cm. diameter X ca. 30.00 cm. high) located 3.20 m. south of platform; no midden observed.
1.50 m.	1.00 m.	50.00 to 60.00 cm.	An apparently cleared area with a make-shif wall of large lava slab set on edge with some added stone at the base and the ends; oriented to provide shelter against prevailing wind down from the mountain to the east; possible wind break; no midden observed; ca. 60.96 m. north from platform 6434H.
1.50 m.	1.00 m.	ca. 30.00 cm.	Collapsed <i>ahu</i> ca. 76.20 m. northwest of platform 6434H.
1.50 m.	1.50 m.	ca. 300.00 m.	Small partially collapsed <i>ahu</i> ; ca. 91.44 m. northeast of platform 6434H.
1.50 m.	1.50 m.	ca. 50.00 cm.	Square <i>ahu</i> of <i>pāhoehoe</i> and <i>a'a</i> at north end of complex; ca. 266.70 m. north of platform 6434H.

TABLE I continued - Habitation Cayes

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFI- CATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
262A*	883.92 m. from HAD-3	1-1	Kalaoa- O'oma	North Kona	---
262B	60.96 m. from 262A	1-6	Kalaoa- O'oma	North Kona	---
262C	45.72 m. from 262A	1-6	Kalaoa- O'oma	North Kona	---
6418A*	60.96 m. north from Panel "B"	1-1-1	Kalaoa- O'oma/ Kalaoa 3-4	North Kona	---
6418B*	Within site 6417	1-1-1	Kalaoa- O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
21.34 m.**	13.72 m.**	---	A large dwelling cave with three chambers - all entrances walled off to restrict access; extensive interior modification including <i>ahu</i> , platforms and petroglyphs (on north wall of <i>mauka</i> chamber); well developed floor deposits with midden and ash; <i>opihi</i> scrapers, basalt flakes and coral abraders found on surface (not collected).
4.25 m.	3.00 m.	80.00 to 175.00 cm.	Large, partially collapsed <i>ahu</i> on bluff above habitation cave.
2.60 m.	2.10 m.	70.00 to 110.00 cm.	Large, partially collapsed <i>ahu</i> on bluff above habitation cave.
18.29 m.**	12.19 m.**	---	A large habitation cave with at least two chambers, one of which extends <i>mauka</i> and opens again in site 6417 (now blocked by roof fall); extensive interior modification including walls to restrict chamber entrances. Wall sections around opening of sink; platforms and petroglyphs on north wall of sink; well developed floor deposits with midden and ash.
7.00 m.**	3.00 m.**	---	Surface opening of chamber extending <i>mauka</i> from main sink 6418; interior modified with two platforms and two <i>ahu</i> ; floor deposits with midden and ash; <i>opihi</i> scrapers and basalt flakes found on floor (not collected).

TABLE I continued - Habitation Caves

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFI- CATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6420*	609.60 m. from HAD-3	1-1	Kalaoa- O'oma	North Kona	---
6421*	335.28 m. southeast from HAD-3	1-1	Kalaoa- O'oma	North Kona	---
6422A	103.63 m. northeast from H-2	1-1-2	Kalaoa- O'oma	North Kona	---
6422B	103.63 m. northeast from H-2	1-6	Kalaoa- O'oma	North Kona	---
6422C	103.63 m. northeast from H-2	1-6	Kalaoa- O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
22.86 m.**	15.24 m.**	---	Large habitation cave with two chambers; entrance to chambers walled to restrict passage; other modifications include pavements, two platforms and a fireplace; floor deposits fair with midden, charcoal, burned wood fragments and ash; charcoal and ash found extending into deep interior - as much as 243.84-304.80 m. into the <i>mauka</i> chamber.
18.29 m.**	9.14 m.**	---	Habitation cave with one accessible chamber; entrance partially walled-off; other modifications include several platforms or pavings; little floor deposit - some midden and ash.
4.00 m. floor	2.00 m. floor	100.00 cm. ceiling	A small shelter cave in a <i>pāhoehoe</i> lava blister; moderate floor deposit with midden and ash; no interior modifications; two <i>ahu</i> built over this blister.
1.80 m.	1.80 m.	75.00 cm.	One of two large, well-built, circular <i>ahu</i> built above shelter cave; constructed with <i>pāhoehoe</i> slabs and <i>a'a</i> clinker fill.
1.80 m.	1.80 m.	90.00 cm.	One of two large, well-built, circular <i>ahu</i> built above shelter cave; constructed with <i>pāhoehoe</i> slabs and <i>a'a</i> clinker fill.

TABLE I continued - Habitation Cayes

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFI- CATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6424A*	518.16 m. from H-2	1-1	Kalaoa- O'oma	North Kona	---
6424B	45.72 m. from 6424	1-6	Kalaoa- O'oma	North Kona	---
6425*	701.04 m. from H-2	1-1	Kalaoa- O'oma	North Kona	---
6427*	121.92 m. southwest from Panel "A"	1-1	Kalaoa- O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
6.10 m.**	3.05 m.**	---	Large habitation cave with two chambers - <i>makai</i> chamber opens to surface through another sink ca. 15.24 m. to the west and <i>mauka</i> chamber extends ca. 182.88 m. to join site 6425; large <i>ahu</i> (ca. 160.00 cm. high) built under opening of sink - this is the only access other than through 6425; well developed floor deposits with midden and charcoal.
1.00 m.	1.00 m.	55.00 cm.	Circular, stacked <i>a'a</i> structure built on outcrop of <i>pāhoehoe mauka</i> of site 6424.
15.24 m.**	6.10 m.**	---	Large habitation cave with two chambers - <i>makai</i> chamber connects with cave 6424 as described above and <i>mauka</i> chamber blocked by roof fall; interior modifications include several platform areas and an <i>ahu</i> at the fall in the <i>mauka</i> end; moderate to well developed floor deposits with midden and ash.
12.19 m.**	7.62 m.**	---	Large habitation cave with two chambers-both partially closed off by large, stacked <i>a'a</i> walls; interior of sink inaccessible but walls indicate cultural use at one time.

TABLE I continued - Habitation Caves

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFI- CATION	AHUPUA 'A	DISTRICT	PHOTOGRAPHS
6429	152.40 m. south from Panel "C"	1-1-2	Kalaoa- O'oma	North Kona	---
6430	228.60 m. south from Panel "C"	1-1-2	Kalaoa- O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
7.62 m. floor	3.05 m. floor	ca. 125.00 cm. ceiling	Small, lava-blister shelter cave with two probable platform areas; limited floor deposit with some midden; possible fire box to one side of the opening -- human skeletal remains (scapulae, rib, vertebrae) scattered about inside - disturbed burial (?).
3.00 m. floor	2.00 m. floor	ca. 100.00 cm. ceiling	Small, lava-blister shelter-cave; no interior modifications; some midden around entrance; iron skillet found to one side under the overhang of the entrance.

C

TABLE II
MISCELLANEOUS - Independent Walls

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA 'A	DISTRICT	PHOTOGRAPHS
6432	182.88 m. south from H-2	---	Kalaoa- O'oma/ O'oma 2	North Kona	---
MISCELLANEOUS - <i>Ahu</i>					
6428A	121.92 m. northeast from site 6425	1-6	Kalaoa- O'oma	North Kona	---
6428B	121.92 m. northeast from site 6425	1-6	Kalaoa- O'oma	North Kona	---
6431	Between HAD- 1 and Panel "C"	1-5	Kalaoa- O'oma	North Kona	---
6431A	Between HAD- 1 and Panel "C"	1-5-2	Kalaoa- O'oma	North Kona	---
6431B	Between HAD- 1 and Panel "C"	1-6-2	Kalaoa- O'oma	North Kona	---

C

LENGTH	WIDTH	HEIGHT	DESCRIPTION
1920.24 m.	1.52 to 1.83 m.	100.00 to 120.00 cm.	Very large and very straight wall of core-filled construction indicating it is most probably a historic wall; location on boundary of Kalaoa-O'oma and O'oma 2 <i>ahupua'a</i> suggests boundary wall built since the <i>Mahele</i> of 1848.
2.40 m.	2.40 m.	70.00 cm.	Badly collapsed, circular <i>ahu</i> of <i>a'a</i> clinker built on <i>pāhoehoe</i> outcrop; function uncertain.
1.80 m.	1.80 m.	45.00 cm.	Badly collapsed, circular <i>ahu</i> of <i>a'a</i> clinker built on <i>pāhoehoe</i> outcrop; function uncertain.
335.28 m.	---	---	A <i>mauka-makai</i> alignment of four <i>ahu</i> probably marking either a trail or possibly a boundary line.
1.50 m.	1.00 m.	75.00 cm.	Large, partially collapsed, rectangular <i>ahu</i> of stacked <i>a'a</i> clinkers.
3.00 m.	2.00 m.	ca. 175.00 cm.	Very large, rectangular <i>ahu</i> of <i>a'a</i> clinker and <i>pāhoehoe</i> slabs; ca. 91.44 m. west from 6431A.

TABLE II continued - *Ahu*

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6431C	Between HAD-1 and Panel "C"	1-6-2	Kalaoa-O'oma	North Kona	---
6431D	Between HAD-1 and Panel "C"	1-6-2	Kalaoa-O'oma	North Kona	---
6435	182.88 m. northeast from Panel "C"	1-6	Kalaoa-O'oma	North Kona	---
6436	152.40 m. northeast of site 6423	1-6	Kalaoa-O'oma	North Kona	---
6437	129.54 m. north of HAD-2	1-6	Kalaoa-O'oma	North Kona	---
MISCELLANEOUS - Unknown					
6419	152.40 m. north from site 262A	1-1	Kalaoa-O'oma	North Kona	---
6419A	152.40 m. north from site 262A	1-6	Kalaoa-O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
1.00 m.	.75 m.	75.00 cm.	Small, roughly rectangular <i>ahu</i> of <i>a'a</i> clinker; ca. 91.44 m. west from 6431B.
2.60 m.	2.00 m.	100.00 to 150.00 cm.	Large, rectangular <i>ahu</i> of <i>a'a</i> clinker, partially collapsed; ca. 167.64 m. west from 6431C.
.80 m.	.80 m.	ca. 125.00 cm.	High, narrow-based <i>ahu</i> of <i>a'a</i> clinker.
2.00 m.	2.00 m.	80.00 cm.	Round, well-built <i>ahu</i> of <i>pāhoehoe</i> slabs with pebble fill; this could possibly be a burial.
2.00 m.	1.50 m.	50.00 cm.	Partially collapsed <i>ahu</i> .
35.00 m.	35.00 m.	---	A complex of pavings, platforms, <i>ahu</i> and enclosures built against the outer slopes of a large spatter cone - function undetermined; no midden observed.
2.00 m.	2.00 m.	85.00 cm.	Square, well-built <i>ahu</i> of <i>a'a</i> clinker.

TABLE II continued - Unknown

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6419B	152.40 m. north from site 262A	---	Kalaoa- O'oma	North Kona	---
6419C	152.40 m. north from site 262A	---	Kalaoa- O'oma	North Kona	---
6419D	152.40 m. north from site 262A	---	Kalaoa- O'oma	North Kona	---
6419E	152.40 m. north from site 262A	1-6	Kalaoa- O'oma	North Kona	---
6419F	152.40 m. north from site 262A	---	Kalaoa- O'oma	North Kona	---
6419G	152.40 m. north from site 262A	1-1-4-6	Kalaoa- O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
4.00 m.	2.50 m.	---	Paving to level natural depression on south side of naturally level outcrop of <i>pāhoehoe</i> lava; paved with <i>a'a</i> pebbles.
10.00 m.	5.50 m.	---	Paving to level natural depression on east side of naturally level outcrop of <i>pāhoehoe</i> lava; paved with <i>a'a</i> slabs.
6.25 m.	5.50 m.	---	Same as other pavings above; paved with <i>a'a</i> pebbles. These pavings combine with the <i>pāhoehoe</i> outcrop to form a large, somewhat irregular and uneven-surfaced platform.
1.20 m.	1.20 m.	25.00 cm.	Small, circular <i>ahu</i> of <i>pāhoehoe</i> and <i>a'a</i> lava; built in approximate center of paving 6419C.
3.00 m.	3.00 m.	---	Small circular paving on the north side of the spatter cone - not connected with 6419B, 6419C and 6419D.
18.00 m.	13.00 m.	30.00 to 50.00 cm.	An irregular enclosure on lower slope of spatter cone below platform described above (6419B, 6419C and 6419D); enclosing wall of roughly stacked <i>a'a</i> joins base of <i>pāhoehoe</i> outcrop but does not completely close with paving 6419D.

TABLE II continued - Unknown

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6419H	152.40 m. from site 262A	1-1-4-5	Kalaoa- O'oma	North Kona	---
6419I	152.40 m. from site 262A	1-6	Kalaoa- O'oma	North Kona	---
6423	205.74 m. northeast from H-2	---	Kalaoa- O'oma	North Kona	---
6423A	205.74 m. northeast from H-2	---	Kalaoa- O'oma	North Kona	---
6423B	205.74 m. northeast from H-2	1-1-2	Kalaoa- O'oma	North Kona	---
6423C	205.74 m. northeast from H-2	---	Kalaoa- O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
3.00 m.	3.00 m.	30.00 cm.	Small, square enclosure of stacked <i>a'a</i> ca. 6.00 m: west of enclosure 6419G; no doorway was observed.
.60 m.	.60 m.	90.00 cm.	Small, well-built square <i>ahu</i> of stacked <i>a'a</i> and <i>pāhoehoe</i> ca. 91.44 m. northeast of enclosure 6419G.
95.00 m.	40.00 m.	---	An extensive complex including a small shelter cave, a low-walled enclosure, an "elevated" paving, platforms, pavings, <i>ahu</i> and rock mounds. Overall function of this site has not been determined.
9.00 m.	7.25 m.	10.00 to 25.00 cm.	Large, roughly oval "elevated" pavement or low platform of small <i>a'a</i> clinker; feature is especially conspicuous against the <i>pāhoehoe</i> on which it is built; curbing stones somewhat larger than paving stones; small, circular <i>ahu</i> of stacked <i>a'a</i> (110.00 cm. diameter X 35.00 cm. high) located by north edge of paving.
ca. 8.00 m. floor	ca. 8.00 m. floor	100.00 to 200.00 cm. ceiling	A moderate-sized shelter cave in a lava bubble; forward portion of cave floor leveled with some paving; moderate floor deposits with midden and ash.
5.00 m.	4.00 m.	85.00 cm.	A triangular platform built at the front of the cave outward to fill a natural depression and slightly restrict the entrance; <i>a'a</i> clinker fill held by <i>a'a</i> facing wall across opening of cave.

TABLE II continued - Unknown

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6423D	205.74 m. northeast from H-2	1-1-4-6	Kalaoa-O'oma	North Kona	---
6423E	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6423F	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6423G	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6423H	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6423I	205.74 m. northeast from H-2	1-6	Kalaoa-O'oma	North Kona	---
6423J	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
40.00 m.	16.00 m.	20.00 to 35.00 cm.	Large, very irregular enclosure extending west and north from the cave and enclosing the large platform 6423A; enclosing wall discontinuous; built largely of single <i>pāhoehoe</i> slabs set on edge with some sections of low roughly piled <i>a'a</i> clinker.
3.00 m.	2.00 m.	30.00 cm.	Small rectangular platform of <i>a'a</i> clinker built against a <i>pāhoehoe</i> outcrop.
2.50 m.	2.50 m.	---	Filled in depression; <i>a'a</i> clinker fill
3.50 m.	2.50 m.	---	Filled in depression; <i>a'a</i> clinker fill.
3.50 m.	2.00 m.	---	Filled in depression; <i>a'a</i> clinker fill.
2.00 m.	1.00 m.	60.00 cm.	Partially collapsed, rectangular <i>ahu</i> of stacked <i>pāhoehoe</i> and <i>a'a</i> clinker ca. 45.00 cm. northwest from platform 6423A; possibly a burial feature (?).
1.40 m.	1.30 m.	50.00 cm.	Low piled <i>a'a</i> mound; possibly a burial feature.

TABLE II continued - Unknown

FEATURE NUMBER	REFERENCE NUMBER	CLASSIFICATION	AHUPUA'A	DISTRICT	PHOTOGRAPHS
6423K	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6423L	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6423M	205.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6423N	207.74 m. northeast from H-2	---	Kalaoa-O'oma	North Kona	---
6426A	At Panel "A"	---	Kalaoa-O'oma	North Kona	---
6426B	91.44 m. from Panel "A"	1-6	Kalaoa-O'oma	North Kona	---

LENGTH	WIDTH	HEIGHT	DESCRIPTION
1.10 m.	.70 m.	40.00 cm.	Low piled <i>a'a</i> mound; possibly a burial feature?
1.30 m.	1.20 m.	40.00 cm.	Low piled <i>a'a</i> mound; possibly a burial feature?
2.00 m.	1.30 m.	40.00 cm.	Low piles <i>a'a</i> mound; possibly a burial feature?
1.40 m.	1.30 m.	35.00 cm.	Low mound of piled <i>a'a</i> ; possibly a burial feature?
3.05 m.	1.52 m.	75.00 to 100.00 cm.	Lava blister filled with <i>a'a</i> clinker to level out as a platform.
1.52 m.	1.52 m.	90.00 cm.	Large, square, well-built <i>ahu</i> of stacked <i>pāhoehoe</i> slabs with <i>a'a</i> clinker fill; still in good structural condition.

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