



EXECUTIVE CHAMBERS

HONOLULU

GEORGE R. ARIYOSHI  
GOVERNOR

July 12, 1984

Ms. Letitia N. Uyehara  
Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Based on the recommendation of your office, I am pleased to accept the revised environmental impact statement for the Kahuku Agricultural Park as a satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

This environmental impact statement will be a useful tool in deciding whether this project should be allowed to proceed. My acceptance of the statement is an affirmation of its adequacy under applicable laws and does not constitute an endorsement of the proposal.

When the decision is made regarding this action, I expect the proposing agency to carefully weigh the societal benefits against the environmental impact which will likely occur. This impact is adequately described in the statement, and, together with the comments made by reviewers, provides a useful analysis of alternatives to the proposed action.

With warm personal regards, I remain,

Yours very truly,

  
George R. Ariyoshi

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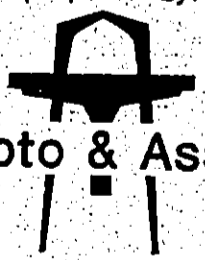
# Revised ENVIRONMENTAL IMPACT STATEMENT

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## Kahuku Agricultural Park

State of Hawaii • Department of Agriculture

prepared by:



Wilson Okamoto & Associates, Inc.



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ENVIRONMENTAL IMPACT STATEMENT  
FOR

KAHUKU AGRICULTURAL PARK

Kahuku, Oahu, Hawaii

Tax Map Key: 5-6-05:09 (por.)  
5-6-06:19 (por.)  
5-6-08:02 (por.)

This Environmental Document is Submitted Pursuant to  
Chapter 343, HRS

Proposing Agency: Department of Agriculture  
State of Hawaii

Responsible Official:

Jack K. Suwa  
Jack K. Suwa  
Chairman of the Board of Agriculture

May 30, 1984  
Date

Accepting Authority: Governor  
State of Hawaii

Prepared by: Wilson Okamoto & Associates, Inc.  
1150 South King Street, Suite 800  
Honolulu, Hawaii 96814

FOREWORD

This Environmental Impact Statement has been prepared to disclose information on the proposed Kahuku Agricultural Park (sometimes hereinafter referred to as "KAP"), situated in Kahuku, on the Island of Oahu, and more particularly described in Figure 1.

The preparation of this document is pursuant to Hawaii Revised Statutes, Chapter 343, Environmental Quality Commission and Environmental Impact Statements, and the Environmental Quality Commission Rules and Regulations. Any project that involves State lands or funds is subject to HRS Chapter 343.

## SUMMARY

PROPOSED PROJECT Kahuku Agricultural Park  
PROPOSING AGENCY Department of Agriculture  
State of Hawaii  
PROJECT LOCATION TMK: 5-6-05: portion 9,  
5-6-06: portion 19 and  
5-6-08: portion 2  
Kahuku, Oahu, Hawaii

### PROJECT DESCRIPTION

The State Department of Agriculture proposes to develop approximately 210 acres of a 555-acre parcel of land leased from Campbell Estate. There will be approximately sixteen 10-acre farm lots for truck crops and orchards, and eight 5-acre lots for nursery operations.

Access to the Agricultural Park will be provided off of Kamehameha Highway via a 26-foot wide access road. A limited access maintenance road will service the proposed 0.1 million gallon water tank.

Irrigation water will be provided from an existing source known as the Pump Number 1 source. It is estimated that about 0.98 million gallons of irrigation water will be required daily. Conditions of the master lease restrict residential dwellings and therefore potable water will not be provided.

Surface run-off from the Agricultural Park will be controlled by a series of drainage basins.

Total capital cost is estimated to be \$3.18 million and the annual operations and maintenance cost will be approximately \$93,900 per year.

The Department of Land and Natural Resources will be responsible for the administration of the Agricultural Park as well as the maintenance of the water system.

The tenant farmers will be organized into a Tenants' Association. The association will be responsible for the maintenance of the access roads and drainage system.

### DESCRIPTION OF EXISTING ENVIRONMENT

The proposed Kahuku Agricultural Park is located within the Kahuku area of the Koolauloa District of the Island of Oahu, Hawaii. The soils have been determined to be suitable for the proposed agricultural uses by the U.S. Soil Conservation Service, the State Department of Agriculture and the University of Hawaii, Land Study Bureau. Most of the area proposed for development was, at one time, used for sugar cane cultivation.

A botanical survey of the project site was conducted and three native species were found. However, these native species are located outside of the area proposed for development.

The James Campbell National Wildlife Refuge is located about a mile seaward of the project site. A number of endangered birds inhabit the area and it is possible that these native species could frequent the project site.

An archaeological survey identified three archaeologically sensitive areas within the 555 acre parcel. These areas, however, are outside of the areas proposed for development.

#### POTENTIAL IMPACTS

Ambient air quality could be impacted due to increased agricultural activities. Abnormal wind conditions could carry fugitive dust, odors or other airborne particles to nearby residences. Commonly applied farming practices and prevailing tradewinds, however, should minimize this impact.

Surface run-off from the Agricultural Park could carry agricultural chemicals and sediments to downstream areas like the wildlife refuge. The proposed drainage system will be designed such that existing flooding problems will not be aggravated. Chemicals used within the Agricultural Park will be applied in accordance with accepted agricultural practices.

#### ALTERNATIVES

A number of alternatives were considered including various agricultural uses, like livestock and aquaculture, and various improvement alternatives for the water, roadway and drainage systems. Due to economic and environmental considerations, these alternatives were considered less feasible than the proposed project.

#### UNRESOLVED ISSUES

Potential contamination of the wildlife refuge from chemicals used by surrounding agricultural operations remains an unresolved issue. Also, current flooding and siltation problems in the low-lying areas are not expected to be eliminated or reduced. The proposed drainage system is designed to accommodate any additional surface run-off generated within the project site.

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I. INTRODUCTION

## I. INTRODUCTION

### A. Background

The State Agricultural Park program was established by the State Legislature in 1972 to promote the development of diversified agriculture by providing appropriately sized agricultural lots at reasonable rent and long-term tenure. The intent is to aid both established farmers expanding their operations as well as new farmers. For example, one of the purposes of the program is to provide land security to Oahu's livestock industry, which has been relocated many times in the past due to urban encroachment. Another purpose is to provide room for expansion of growing diversified agricultural industries such as flower, foliage and nursery products.

The State desires to preserve agriculturally suited lands from urban encroachment, and develop master plans for areas such as Kahuku that were formerly under sugar cane cultivation and have since ceased operations. These lands, although not presently productive, still represent a valuable natural resource to the State of Hawaii.

### B. Project Location

The proposed Kahuku Agricultural Park, which consists of a total of approximately 555 acres (Figure 1), is located on the northern portion of the Island of Oahu, between Kawela and Malaekahana Bays, in the Koolauloa District. Kahuku Town and existing farms form the makai boundary of the agricultural park.

### C. Land Ownership

The land for the Kahuku Agricultural Park is presently owned by Campbell Estate. The State of Hawaii acquired the master lease for the project site on July 21, 1983 and will develop the Kahuku Agricultural Park. Farm tenants will then sublease the farm lots from the State.

### D. Existing Land Uses

In the past, Kahuku Sugar Plantation cultivated sugar cane over much of the project site and the surrounding lands. When the sugar mill ceased operations in late 1971, some of the cane fields were converted to truck crops and orchards. The remainder of the cane fields were abandoned and have since been overgrown with vegetation.

Today, only a fraction of the surrounding area mauka of Kamehameha Highway is agriculturally or aquaculturally productive (Figure 2). Most of this study area remains vacant.

Amorient Aquaculture International, Inc. which leases the largest area within the vicinity of the project site, has about 450 acres cultivated in feed corn. This represents almost one-third of the total area mauka of the highway leased by Amorient. The Kahuku Agriculture Company, with the next largest total acreage, has about 200 acres or approximately one-fourth of their leased lands planted in orchards and truck crops. A fruit processing plant that produces frozen fruit puree for export is also operated by Kahuku Agriculture Company. The Kahuku Farmers Association has about 175 acres cultivated in truck crops and orchards which represents about two-thirds of their leased area. The 50 acres of land leased by the Smith Prawn Farm are entirely developed in aquaponds. Approximately 13 acres, of the area leased by T. Nakamura are cultivated and 6 acres leased by M. Pacheco are used for cattle raising. Farming operations within the study area and acreages are described in Figure 1 and Table 1.

Table 1  
STUDY AREA LANDS  
Kahuku Agricultural Park

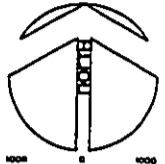
<u>Tenant</u>	<u>Tax Map Key</u>	<u>Total Area (acres)*</u>
Amorient Aquaculture Int. Inc.	5-6-05: 1, 2, 5, 7 and 5-7-01:21	1,614**
Kahuku Agriculture Company	5-6-06: por. 4, por. 6 and 5-6-07: 3, 4	885**
Kahuku Farmers Association	5-6-05: por. 9 and 5-6-06: por. 6	249
Smith Prawn Farm	5-6-06: por. 6	50
T. Nakamura	5-6-06: por. 6	13
M. Pacheco	5-6-06: por. 6	6
Kahuku Agricultural Park	5-6-05: por. 9, 5-6-06: por. 19 and 5-6-08: por. 2	555
	TOTAL	3,372

\* Campbell Estate, March 1981

\*\* The U.S. Army subleases a portion of these lands.

# 1. Project Location

NOTE: Also indicated are existing lessees of surrounding lands.

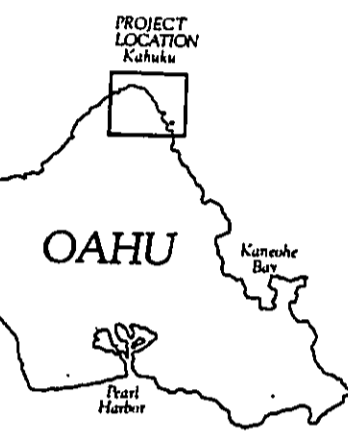
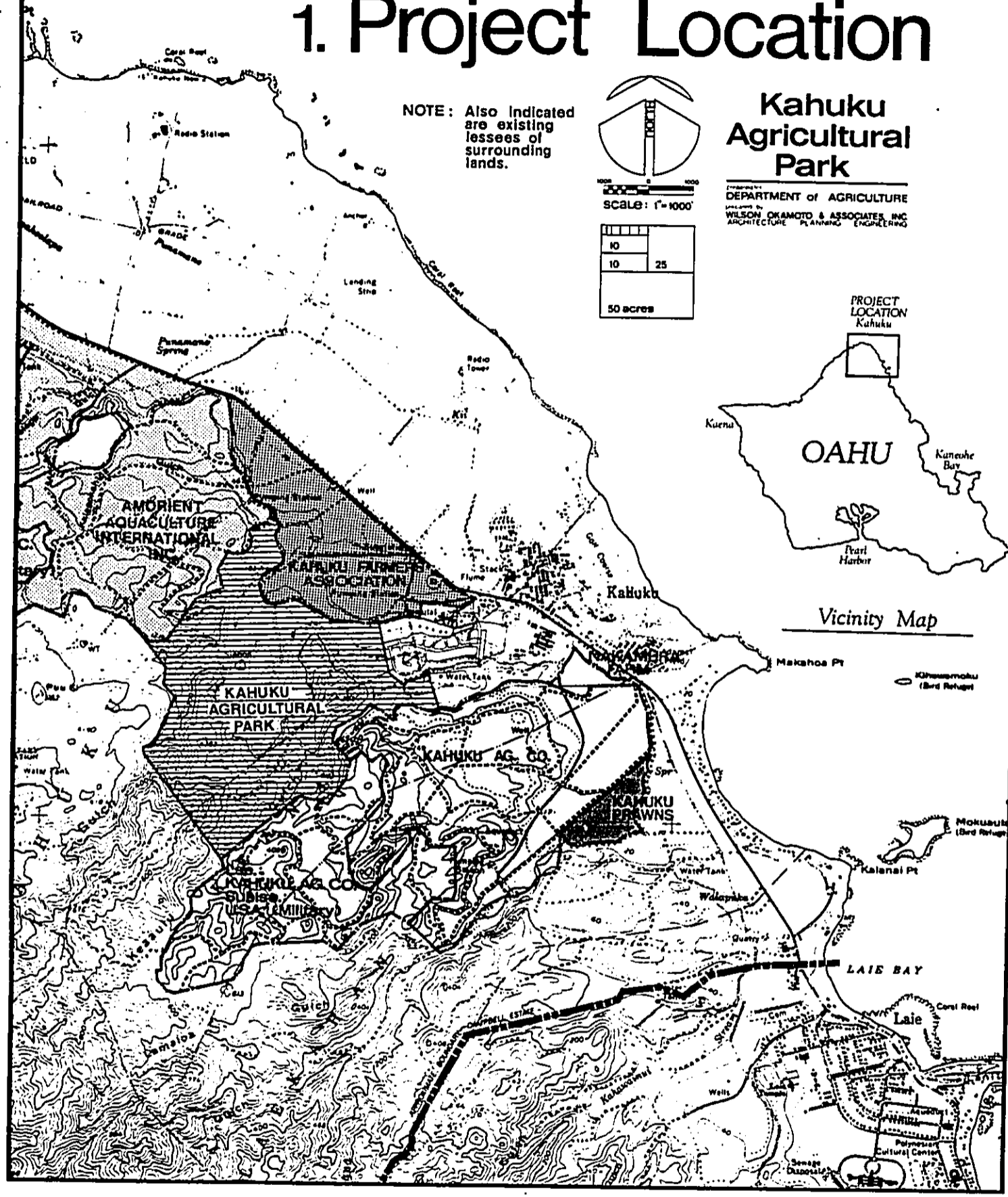


SCALE: 1"=1000'

10	25
50 acres	

## Kahuku Agricultural Park

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Designed by  
WILSON OKAMOTO & ASSOCIATES, INC.  
ARCHITECTURE PLANNING ENGINEERING



Vicinity Map

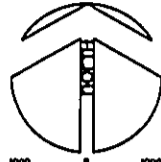
Mokuauia (Bird Refuge)

Mokuauia (Bird Refuge)

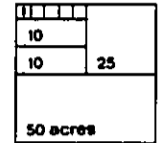
# 2. Existing Land Use

## Kahuku Agricultural Park

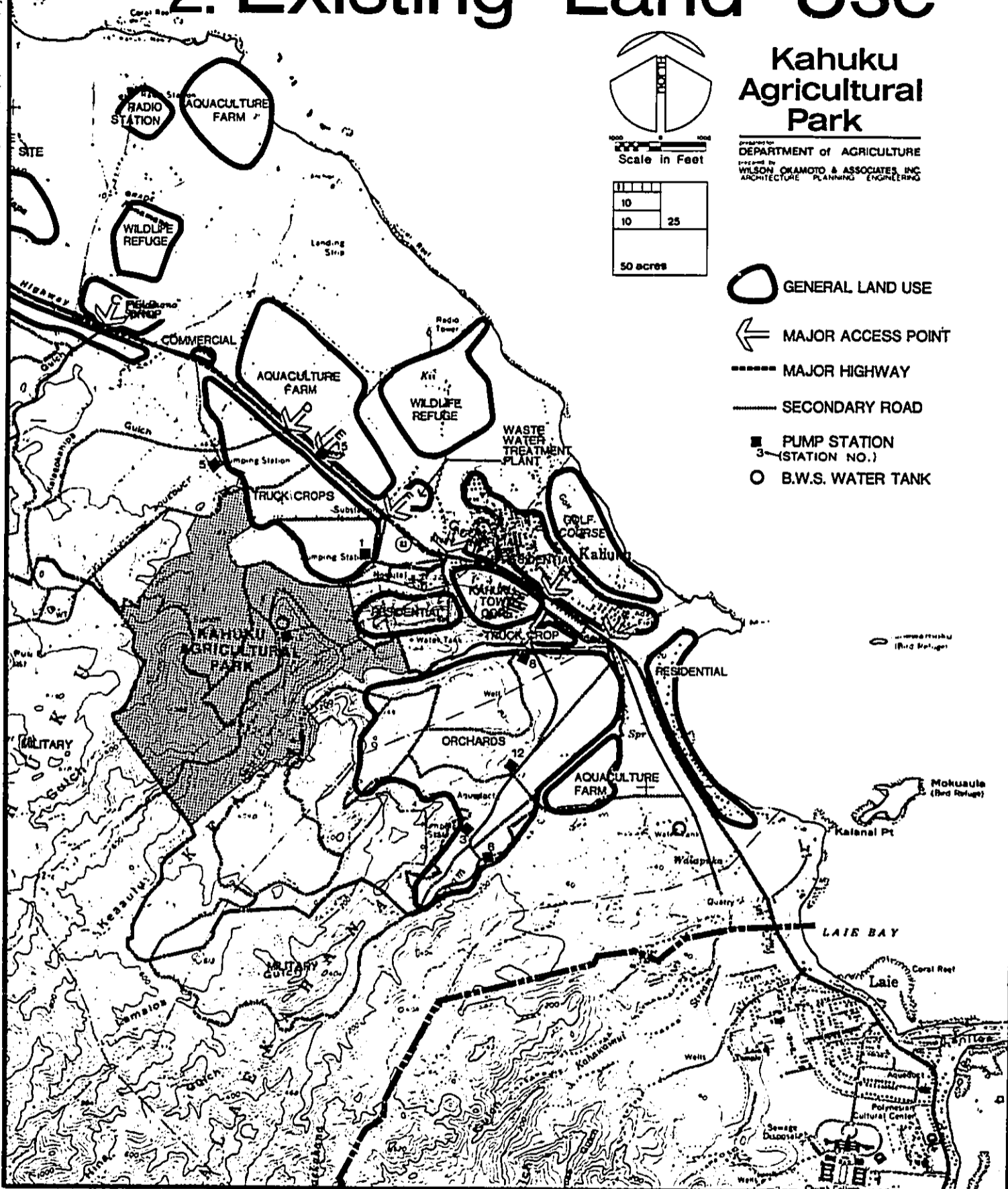
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 ARCHITECTURE PLANNING ENGINEERING



Scale in Feet



- GENERAL LAND USE
- MAJOR ACCESS POINT
- MAJOR HIGHWAY
- SECONDARY ROAD
- PUMP STATION (STATION NO.)
- B.W.S. WATER TANK



Other land uses outside of the study area include the U.S. military which conducts training exercises in the mountainous region to the south. The Turtle Bay Hilton Resort, Kahuku Town, several aquaculture operations, and a wildlife refuge are located north of the project site.

E. Project Demand

The Department of Agriculture has compiled a list of prospective tenants for the Kahuku Agricultural Park. Table 2 presents a breakdown of this list by land use and provides some indication of the minimum lot size desired by the applicants. There is substantial demand in the land use categories for which the proposed project will be developed. The recommended lot sizes are as follows: truck crops (minimum 10 acres); orchards (minimum 10 acres); nursery (minimum 5 acres).

Table 2

INTEREST FORM DATA

<u>Land Use</u>	<u>Oahu</u>			<u>Acreage per Farm</u>	
	<u>Location Unspecified</u>	<u>Kahuku</u>	<u>Total*</u>	<u>Min.</u>	<u>Max.</u>
Truck Farm	14	45	59	5	100
Nursery	7	13	20	5	20
Orchids	4	3	7	2	10
Orchard	5	11	16	5	15
Swine	6	2	8	5	10
Poultry	2	0	2	5	10
Aquaculture	0	2	2	10	100
Grazing	0	3	3	50	500
Hydroponics	0	1	1	--	10

\* Additional applications have specified a preference for other Oahu agricultural park locations, such as Waimanalo and Waianae.





## II. PROJECT DESCRIPTION

The Kahuku Agricultural Park (see Figure 3) will consist of 555 acres that are not presently under cultivation. The State will have control over the subdivision and facilities development of the Agricultural Park. Future plans of the present tenants within the 2,815 acre study area surrounding the project site have been considered in the preparation of the overall land use plan for the Kahuku Agricultural Park.

### A. Land Use Plan

The northern portion and the central valley of Kahuku Agricultural Park adjacent to the Kahuku Farmers Association land, has been designated for truck and orchard crops. This area is about 160 acres, and is classified as prime agricultural land with less than 10 percent slopes. Lot size will be approximately 10 acres. The proposed crops are compatible with the adjacent Kahuku Farmers Association uses.

A narrow strip of land is designated for nursery lots on the southwest slopes of the hill on which the BWS well site is located. The area consists of approximately 50 acres which will be subdivided into 5-acre nursery lots. Although these lands are not "Prime Agricultural Lands" they are still classified as "Other Important Agricultural Lands". Slopes in this area are more varied due to the location along the base of the hill. Nursery operations are less dependent on soil conditions since most of the farms use potted plants. The smaller lot size and use of potted plants make nursery operations more adaptable to the slope conditions of the hillside.

The western periphery of the Kahuku Agricultural Park, about 345 acres, is considered marginal development area. This area was formerly in sugarcane cultivation, and with adequate irrigation, could provide for future expansion. Although these lands will not be developed, they are included in the master lease, at very little additional cost, to preserve the agricultural potential. Future conditions may justify the feasibility of developing these lands into productive farm lots. For the present, however, this area will serve as a buffer zone.

A parcel within the Kahuku Agricultural Park could be used by the proposed Tenants Association (see page II-8) for common elements such as Association office, storage of common equipment or supplies, security office, well or pump site, storage of harvested products, processing facilities, or cooperative market area. The State DLNR would collect lease rent for this parcel from the Association. The Association could also sub-lease this parcel, or a portion of it, to an

Association member or qualified applicant. If the Association chooses not to assume the responsibility of the common parcel, it could revert back to the State for lease to a qualified applicant.

Pursuant to the terms of the State's master lease with Campbell Estate, no residential dwellings will be permitted in the agricultural park except for security purposes.

## B. Proposed Improvements

The improvements proposed for the Kahuku Agricultural Park include roads, drainage facilities, water system, and electrical and telephone service. The following sections discuss the proposed improvements in greater detail.

### 1. Roadway Improvements

The proposed road system, shown in Figure 3, utilizes and improves, to the extent practicable, the existing road system in the Kahuku Agricultural Park. Access from Kamehameha Highway will be limited to one location, to optimize safety and security. The proposed road system consists of approximately 11,700 linear feet of access roads and approximately 2,500 linear feet of maintenance road.

Access roads will provide for two-way traffic on two lanes of crushed coral pavement 26 feet wide (see Figure 4). The maintenance road will be a single lane A.C. paved road within a 15-foot right-of-way. It will be used to service the proposed 0.1 mg concrete reservoir and access will be limited to authorized maintenance personnel.

The initial capital cost for road construction is estimated to be \$1.38 million. It is estimated that maintenance cost will be approximately \$4,000 annually.

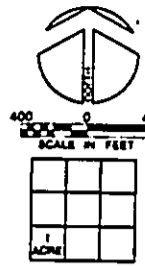
### 2. Drainage Improvements

The U.S. Department of Agriculture Soil Conservation Service's method for computing peak discharges was applied to the drainage basin in which the Kahuku Agricultural Park is located. The peak discharge for this drainage basin at Kamehameha Highway for a 50-year, 6-hour design storm was calculated to be 2,180 cubic feet per second (cfs) for existing land use conditions, and 2,230 cfs for land use conditions proposed for the Kahuku Agricultural Park. This increase in peak discharge of 2% should, however, be reduced due to the increased

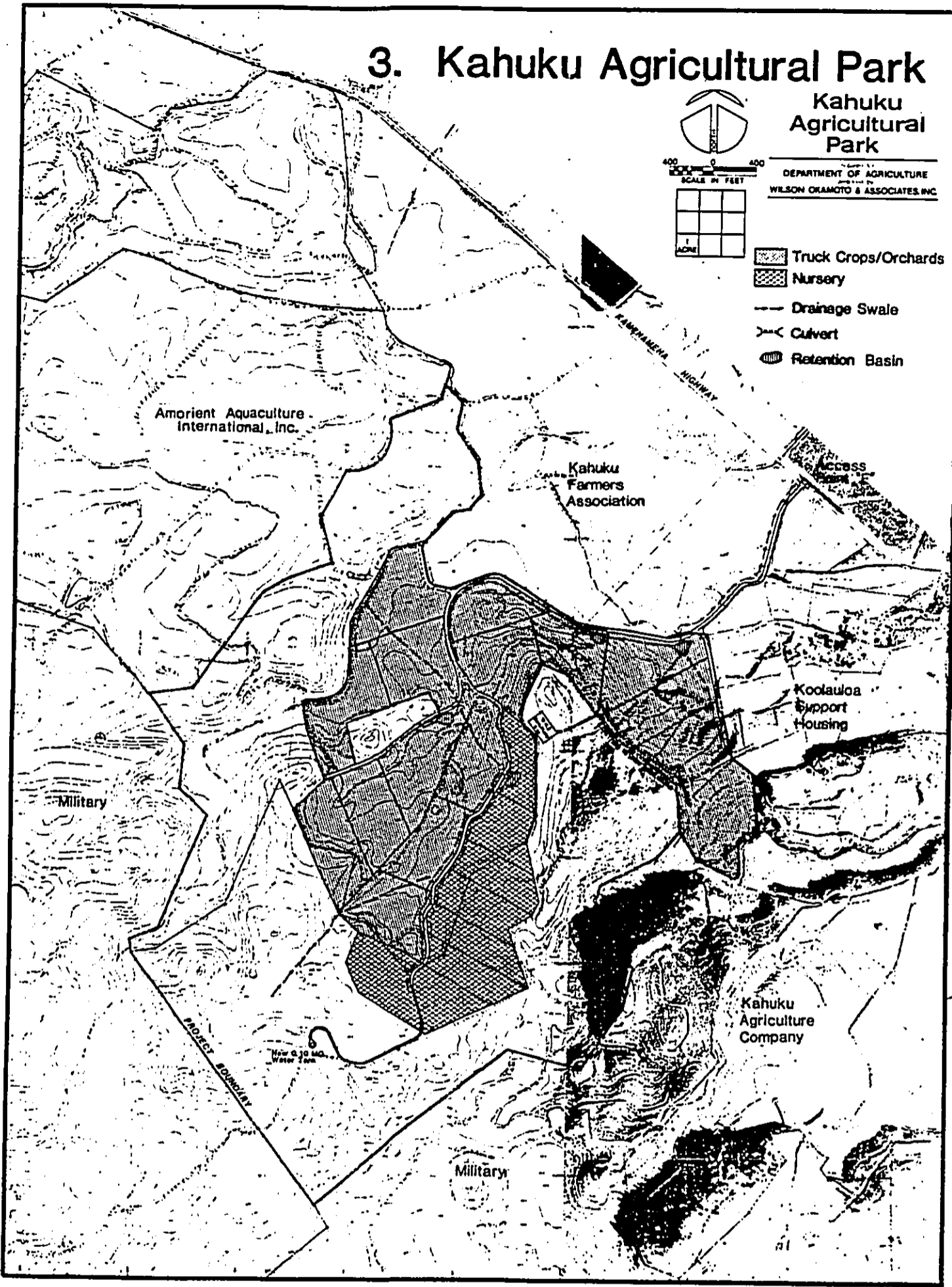
# 3. Kahuku Agricultural Park

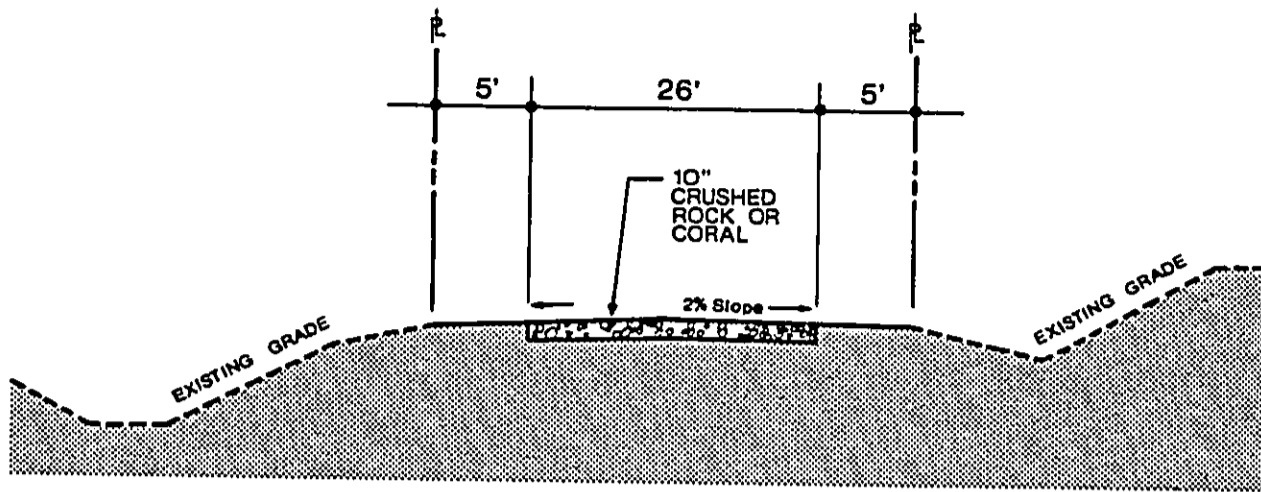
Kahuku  
Agricultural  
Park

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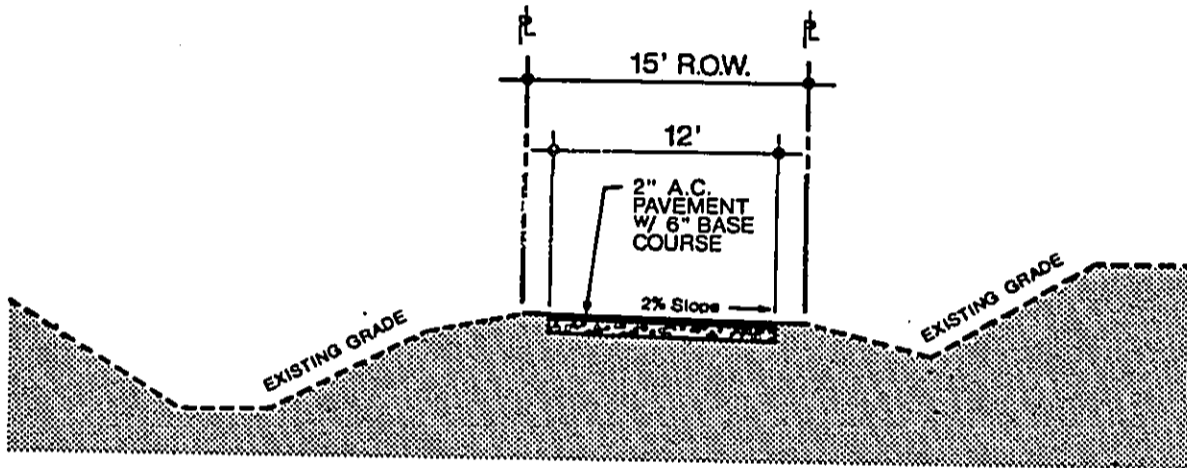


- Truck Crops/Orchards
- Nursery
- Drainage Swale
- Culvert
- Retention Basin





**Typical Section Access Road**  
(NOT TO SCALE)



**Typical Section Maintenance Road**  
(NOT TO SCALE)

## 4. Typical Road Sections

Kahuku  
Agricultural  
Park

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detention times resulting from the siltation basins to be constructed. Therefore, the proposed agricultural uses are not anticipated to increase the peak discharge for the drainage basin.

Additional drainage improvements over and beyond the existing drainage works would be limited to 15,400 linear feet of drainage ditches and five (5) roadway culverts in the Kahuku Agricultural Park (Figure 3). In-place costs for the ditches and culverts are \$385,000 and \$52,500, respectively. Additionally, drainage courses must be properly maintained to prevent ponding and flooding.

Four (4) siltation basins (Figure 3) are proposed to minimize silt deposition along Kamehameha Highway where flooding generally occurs. Minimizing silt in storm runoff will help to maintain the water quality of Kii Pond, which is the destination of runoff generated in the Kahuku Agricultural Park prior to discharge into the ocean. The four siltation basins are estimated to cost \$87,600. Total cost of all drainage related improvements is estimated to be \$0.53 million.

Estimated cost for maintaining the drainage system is approximately \$6,900 annually.

### 3. Water System

The proposed water system (Figure 5) is designed to meet a demand of 0.98 mgd. This demand is based on consumption rates of 6,000 gallons/acre/day for nursery use and 4,000 gallons/acre/day for truck and orchard crop use. These maximum daily rates are considered reasonable for the Kahuku area based on the Kahuku Farmers Association's existing consumption rate of 4,343 gallons/acre/day for truck crops and orchard cultivation. The irrigation system shall provide a minimum pressure of 20 psi to allow for both sprinkler and drip irrigation methods. Potable water will not be provided due to the lease restrictions prohibiting dwelling units.

The Pump No. 1 source supplied an average of 3.8 mgd and a maximum of 6.1 mgd of irrigation water to the Kahuku Sugar Plantation. In 1971, the plantation closed down and the Pump No. 1 source was used to provide about 0.9 mgd for domestic consumption to Kahuku Town, and about 0.8 mgd for irrigation to the Kahuku Farmers Association. In 1983 domestic use of Pump No. 1 was discontinued since the Board of Water Supply installed a new well to serve Kahuku Town. The combined withdrawal

of the proposed agricultural park (0.98 mgd) and the existing users (0.8 mgd) is well below the 3.8 mgd historical average withdrawal from the Pump No. 1 source.

Water quality at Pump No. 1 has never posed any significant problem. As mentioned in the preceding paragraph, water from this source was at one time used for domestic supply. Tests on water samples taken during this domestic use period are included in Appendix C of this report. During the operation of the sugar plantation, water from Pump No. 1 was used to dilute brackish water from other sources, to be used for irrigation.

The well at the Pump No. 1 site was selected as the water source for the irrigation system. The selection was based on an inventory and evaluation of existing sources with respect to capacity, water quality and location. In addition, the feasibility of new source development was also considered in the source selection process. Improvements proposed at the Pump No. 1 site include the installation of two new vertical turbine pumps, and the construction of a new pump control building. Use of the Pump No. 1 site will not affect existing operations of the pumps servicing the Kahuku Farmers Association.

The transmission system will include a total of approximately 14,200 linear feet of pipeline installed within the new access roadway corridors. The proposed system will consist of approximately 3,460 feet of 8-inch pipe and 10,740 feet of 12-inch pipe. A concrete reservoir providing a capacity of 100,000 gallons will be situated at the mauka-most portion of the Kahuku Agricultural Park.

Total capital cost for the proposed system is estimated to be \$1.10 million. Annual operating and maintenance costs for the proposed irrigation system is estimated to be \$83,000.

#### 4. Sewage Improvements

There will not be any sewage treatment facilities within the Kahuku Agricultural Park. Only individual, on-site collection systems (i.e., holding tanks) will be permitted for occasional use by the farmers. These systems will be privately owned and operated. Any such systems must comply with all applicable State Department of Health and Board of Water Supply requirements.

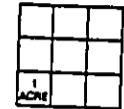
# 5. Proposed Water System





## Kahuku Agricultural Park

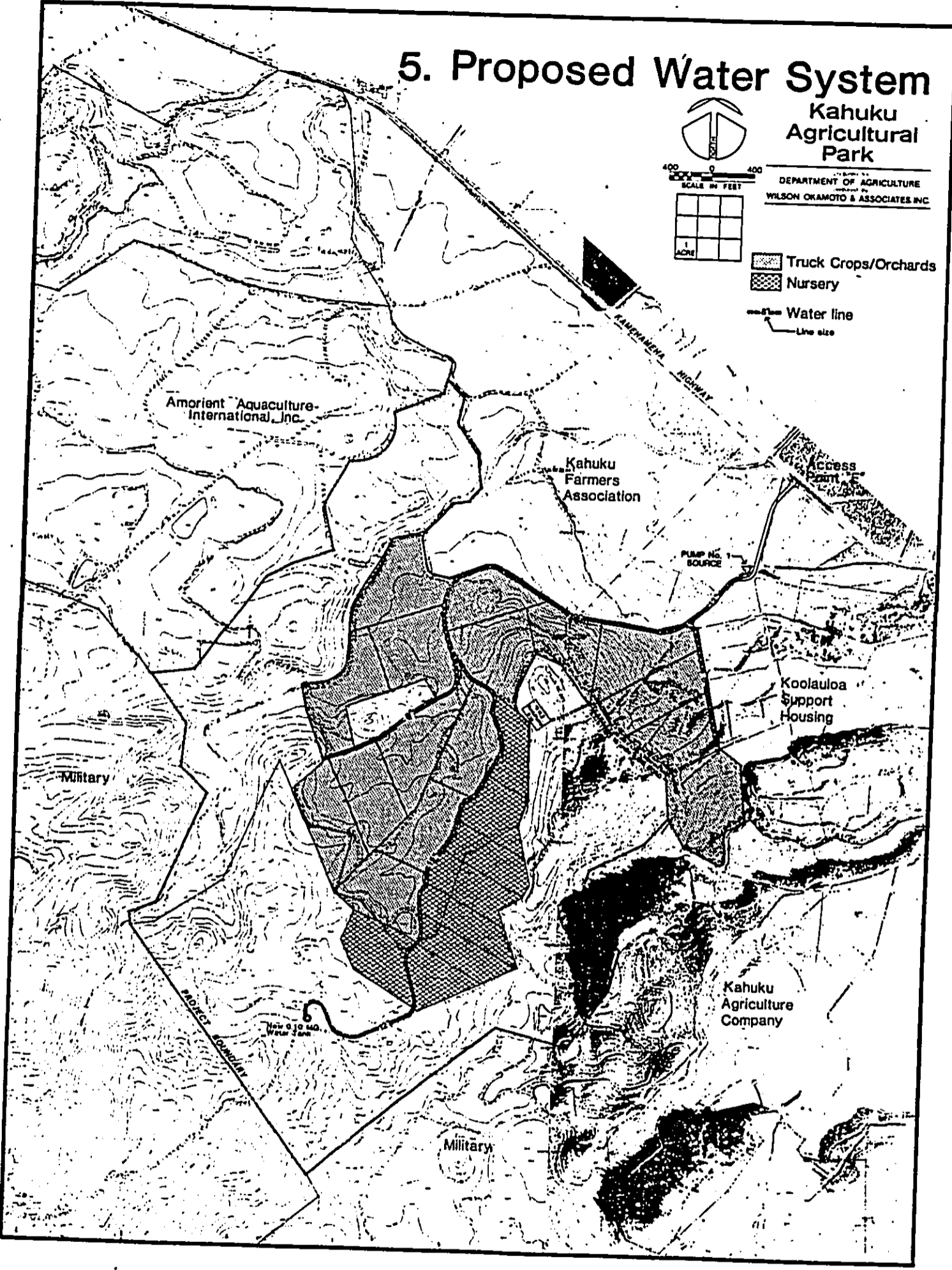
DEPARTMENT OF AGRICULTURE  
WILSON OKAMOTO & ASSOCIATES, INC.



400 0 400  
SCALE IN FEET



-  Truck Crops/Orchards
-  Nursery
-  Water line
-  Line size





5. Electrical and Telephone Systems

Provision of future electrical and telephone service to new subscribers in the agricultural park will be accomplished through extension of existing lines or by connection to the main transmission line which runs along Kamehameha Highway. Utility poles shared by Hawaiian Telephone and Hawaiian Electric will follow the proposed road system to serve individual subscribers.

The total capital costs for installing new telephone and electrical lines are estimated to be \$170,000 if all lots were to be served. However, this cost may be reduced since the Hawaiian Electric Company provides for a credit of roughly 60 months' revenue towards the initial capital cost.

6. Cost Summary

The total estimated capital cost for the proposed improvements is approximately \$3.18 million, with an annual operations and maintenance cost of about \$93,900 per year. The following table shows the summary of costs for the agricultural park improvements.

Table 3

COST SUMMARY

<u>Improvements</u>	<u>Capital Cost</u>	<u>O &amp; M Costs</u>
Roads	\$1.38 million	\$ 4,000
Drainage	0.53	6,900
Water	1.10	83,000
Elec./Tele.	0.17	--
<b>TOTAL</b>	<b>\$3.18 million</b>	<b>\$93,900</b>

C. Tenant Selection

The State Department of Land and Natural Resources, will lease the newly developed farmlots to qualified farmers. Prospective tenants will be screened, with lessees to be selected from the list of qualified applicants in accordance with procedures established by the Board of Land and Natural Resources in consultation with the Department of Agriculture. The leases will be monitored by the Department of Land and Natural Resources.

Applications are scored on a point system, based on the items listed below:

- o Minimum qualification
- o Agricultural experience
- o Financial capability
- o New farmer or displaced farmer status

Although the selection method may vary from project to project, usually the applicant scoring the highest total points is given the first choice of the available lots, the applicant with the next highest number of points is given the second choice, and so on. This sequence of selection is repeated until all available lots are disposed.

To meet the minimum qualification, applicants must satisfy one of the requirements under 1 or 2 as well as 3 and 4 below:

1. Applicant shall be a Bona Fide Farmer who:
  - a. Has not less than two year's experience as a full-time farmer; or
  - b. Was an owner-operator of an established farm conducting a substantial farming operation and who has for a substantial period of his life resided on a farm or depended on a farm income for his livelihood; or
  - c. Has been a farm tenant or farm laborer or other individual who has for the two years last preceding his application obtained the major portion of his income from farming operations; or
  - d. Has a college degree in agriculture; or
  - e. By reason of ability, experience and training as a vocational trainee, is likely to successfully operate a farm; or
  - f. Has qualified for and received a commitment for a loan under the Bankhead-Jones Farm Tenant Act, as amended, for the acquisition of a farm; or
  - g. Is displaced from employment in an agricultural production enterprise; or
  - h. Is a member of the Hawaii Young Farmer Association or is a Future Farmer of America graduate with two years training with farming projects.

2. Or applicant shall be a New Farmer who:
  - a. Is a person displaced from employment in an agricultural production enterprise; or
  - b. Is a college graduate or community college graduate in agriculture; or
  - c. Is a member of the Hawaii Young Farmer Association; or
  - d. Is a Future Farmer of America graduate with farming projects; or
  - e. Is a person who has not less than two years experience as a part-time farmer; or
  - f. Is a person who has been a farm tenant or farm laborer; or
  - g. Other individuals who for two years last preceding the application obtained the major portion of their income from farming operations, who are likely to successfully operate a farm, and who otherwise meet the eligibility requirements for loans under Section 155-10, Hawaii Revised Statutes.
3. And applicant shall be an adult resident of the State of Hawaii at any time for at least three years.
4. And applicants shall be persons who are not in arrears in the payment of taxes or other obligations to the State of Hawaii or to any of its political subdivisions.

Other important considerations in seeking an agricultural park lease are that the lessee must derive the major portion of his total annual income from his activities on the land he leases. In other words, the income produced on the agricultural park lot must be greater than the combined total income of all other income the lessee may have.

The lessee must also show financial capability and show evidence of net liquid assets of \$10,000 or more. This serves as an indication of the sincerity of the lessee's intentions and the lessee's ability to absorb initial "start-up" costs.

D. Lease Conditions

The Kahuku Agricultural Park lands are owned by the Estate of James Campbell. The State of Hawaii has acquired the master lease for the property and will, in turn, sublease the farm lots to qualified farmers.

The term of the master lease runs for 30 years or until termination of the Campbell Trust Estate, which may occur no sooner than 20 years from the effective date of the lease.

According to the conditions of the master lease the property is to be used for agriculture, excluding livestock and aquacultural operations. The annual lease rent to be paid to Campbell Estate will be \$50.00 per acre per annum for arable land and \$1.00 per acre per annum for waste land. An amount equal to 10% of the gross annual rent due the Lessee (State) from subleases will also be paid to Campbell Estate. Escalation of lease rental will be based on the Consumer Price Index, United States City Average, all items unadjusted for seasonal variations, published by the Bureau of Labor Statistics. Sublessee's rent shall be computed on the "fair market rental" agreed upon in writing between the State and Campbell Estate, based on agricultural use.

Each year the State must furnish Campbell Estate with a written report of the amount of water pumped; and a complete financial report covering lessee's operations. In addition, the State shall, during the full term of the lease, make every reasonable effort to utilize the arable lands and shall be responsible for the maintenance of the drainageways and road. Dwellings will be allowed for security purposes only.

Upon completion of the agricultural park, the State will sublease the farm lots to qualified farm tenants. The term and conditions of the subleases will be governed by the underlying master lease from Campbell Estate. The lease rent will be determined by appraisal based on fair market rental, plus a percentage of the gross earnings. The farmer must utilize the land for agriculture and related purposes in accordance with the schedule provided in the sublease, and shall within a predetermined period, attain and maintain throughout the remainder of the lease term a level of agricultural operation that generates more than fifty (50) percent of his total annual income.

E. Operations and Maintenance Program

Most existing State agricultural parks have roadway and water systems that are dedicated to the County, which frees the State and the tenant farmers of the responsibility of maintenance. In the case of Kahuku Agricultural Park, the improvements will not be dedicated to the County due to conditions of the State's master lease with Campbell Estate that require the removal or surrender of all improvements upon termination of the lease.

The proposed operations and maintenance program would be run in much the same manner as a condominium. Each of the tenants would be a member of the Tenants' Association, with voting rights proportionate to their share of the total development.

As recommended in the Development Plan for the Kahuku Agricultural Park, the duties and responsibilities of the proposed Tenants' Association would be as follows:

1. The Association will adopt a set of bylaws.
2. The Association will be responsible for the operation and proper maintenance of the common elements consisting of roads and drainage system. This can be accomplished through joint effort of the tenants or by the hiring of private contractors.
3. The Association will be empowered to assess an appropriate maintenance fee from each tenant to cover the operations and maintenance costs for common utilities, common element improvements, and miscellaneous costs.
4. The Association should serve as a vehicle for the promotion of a cooperative effort among its members to pool their resources in helping to solve problems especially in the areas of marketing and field technology.
5. The Association will be empowered to contract a property management agent to handle maintenance if necessary.
6. The Association will be responsible for the preparation and distribution of a monthly financial statement, summarizing revenues generated, and costs incurred. An annual budget will also be prepared for the forthcoming year.

As recommended in the Development Plan, the State Department of Land and Natural Resources (DLNR) would have to approve of all actions proposed by the Association. In addition, DLNR would have other duties and responsibilities which would include:

1. DLNR is to establish criteria for tenant selection, review all applications and select qualified tenants, in cooperation with the DOA.
2. DLNR is to monitor tenant actions to ensure compliance with the conditions of the lease.
3. DLNR is to collect the sublease rent from the tenants, and pay the master lease rent to Campbell Estate.

4. DLNR is to organize the tenants into an Association. DLNR and DOA should have a non-voting representative present at association meetings to: 1) advise; and 2) be informed of association problems and decisions.

5. DLNR is to operate and maintain the irrigation system, which is being designed and will be constructed to standards and specifications approved by DLNR.

Tenants who install private on-site waste holding tanks must do so in accordance with DOH regulations. The proper installation, operation and maintenance of the private systems will be the responsibility of the individual tenants.

III. DESCRIPTION OF THE EXISTING ENVIRONMENT

### III. DESCRIPTION OF EXISTING ENVIRONMENT

#### A. Regional

##### 1. Climate

The outstanding features of Hawaii's climate include mild and equable temperatures year round, moderate humidities, persistent northeasterly trade winds, remarkable differences in rainfall within short distances, and infrequency of severe storms.

The climate in the Kahuku region is mild and generally uniform throughout the year. The Kahuku area includes three of the seven climatic sub-regions in Hawaii, described by Blumenstock, 1961, Climates of the States-Hawaii. Coastal lowlands on the east and north sides are "windward lowlands", where rainfall is moderate and tradewind showers are frequent. Higher parts on the crest of the range at the southeastern end, are "rainy windward mountain slopes", where cloud cover is persistent and rainfall is heavy throughout the year. Higher parts at the north and west sides are "lower leeward mountain slopes," where rainfall is greater than on windward lowlands and generally less than on rainy windward slopes.

##### a. Rainfall

Mean annual rainfall ranges from about 75 inches in the upper elevations to about 30 inches near the coast. The mean annual rainfall near the town of Kahuku is 38.8 inches. Distribution of mean annual rainfall is shown in Figure 6.

Most of the rain results from rapid cooling of warm, moist trade-wind air as it is orographically lifted. Trade-wind rainfall is heaviest near the mountain crest and decreases rapidly downslope. This type of rainfall occurs throughout the year, but is most frequent during the summer, when trade winds are strongest.

According to Chang, 1962, Microclimate of Sugar Cane, pan evaporation from a U.S. Weather Bureau Class A pan located near the town of Kahuku at an altitude of 25 feet is about 85 inches per year. The mean annual rainfall and temperature at this site is about 40 inches and 75°F, respectively. There is no pan-evaporation data available for the high-rainfall areas. According to Stearns and



Vaksvik, 1935, Geology and Groundwater Resources of the Island of Oahu, Hawaii, pan evaporation has been measured at about 18 inches per year at the Kaukonahua Station in leeward Oahu at an altitude of 1,250 feet where the mean annual rainfall is about 185 inches.

b. Wind

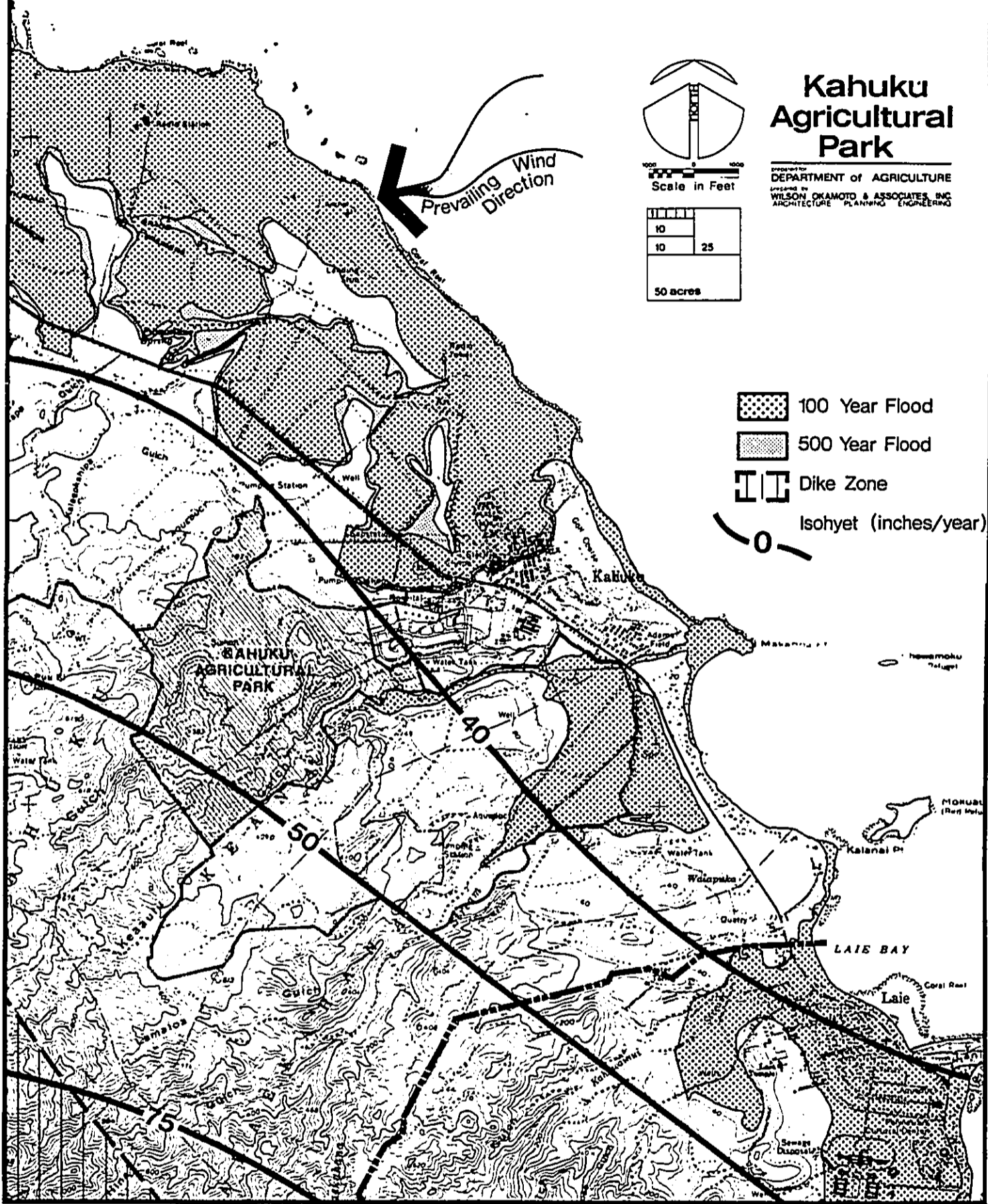
Northeasterly tradewinds prevail throughout the year. In general, the trades are more persistent in summer than in winter (frequencies average 90 and 50 percent, respectively) and stronger in the afternoon than at night. The effects of terrain on the wind are varied and profound, so that even neighboring localities can differ widely in their protection from or exposure to winds from particular directions. Winds moving over crests, around headlands, or through saddles or narrow gorges become stronger and more turbulent.

Throughout the coastal and lower elevations of the Kahuku area, gentle northeasterly trades up to 14 miles per hour predominate. Wind speed and consistency of wind increases with elevation. A wind farm is proposed by Windfarms, Ltd. at selected sites throughout the mountains behind of the agricultural park, for the purpose of generating electric energy.

c. Temperature

Hawaii's equable temperatures reflect the small seasonal variation in the energy received from the sun and the tempering effect of the surrounding ocean. Almost everywhere in Hawaii the warmest and coolest months differ, on the average, by only 9°F or less. In contrast, the daily range in most areas exceeds the seasonal range, confirming the observation that "night time is the winter of the tropics." Windward coasts exposed to trade wind air off the sea have the least variation in temperature between day and night. The average temperature difference between day and night at Kahuku Town is 12°F. The day's highest temperatures occur at about 2 p.m., and the lowest near sunrise when air and ground have been cooling longest. The average annual temperature near the town of Kahuku is 75°F, with an average annual relative humidity of about 70 percent.

# 6. Climate and Flood Hazard



2. Population and Housing

The Agricultural Park is wholly within Census Tract (CT) 101 which includes the area between Malaekahana Bay and Waimea Bay. The resident population for CT 101, according to the 1980 Census, was 4,491, with substantial growth occurring within the census tract between 1980 and 1979. During this period, population increased by 28 percent. Average density, or persons per acre in 1980 was 0.2, which translates to about 5 acres for each individual. The population projection for 1985, contained in the 1980 State of Hawaii Data Book, is 5,632 which reflects an average annual growth rate of about 2.4 percent between 1979 and 1985, considerably less than the rate for the 1970-1979 period.

According to the 1982 State of Hawaii Data Book, Kahuku Town encompasses a 566 acre area, with a 1980 population of 935. The 1970 population for the same area was 917, which indicates that although the population of the town itself remained approximately the same over the past 10 years, the surrounding lands have experienced population increases.

In 1980, 1,496 households were recorded and reported in the 1982 State of Hawaii Data Book for Census Tract 101. There were approximately 1,117 housing units in 1970.

3. Economics

Agriculture and tourism are the major employment industries in Kahuku. Since the closing of Kahuku Sugar Plantation and mill in the early 1970's, diversified agriculture has been steadily expanding.

Tourist destination areas within the Koolauloa District, providing major sources of employment, are the Turtle Bay Hilton resort area, Polynesian Cultural Center, and the Mormon Temple.

Other sources of employment include BYU-Hawaii, retail goods and services, and government.

4. Geology/Hydrology

The Kahuku area includes the northern part of the Koolau Range and its bordering coastal plain. This part of the range is less deeply eroded than the other parts, and except for long, narrow valleys and cliffs near shore, it has retained the general shape of the volcanic dome at its greatest stage of growth.

The coastal plain occupies most of the area between the shore and the steep wave-cut cliffs. It is widest at the north end (1.5 miles), where it contains extensive marshes. Isolated calcareous dunes, conspicuous in a flat terrain, also occupy this part of the coastal plain. Although the plain constitutes only a small part of the Kahuku area, it includes more than half of the agricultural land.

The principal water bearing rock is the basaltic lava forming the Koolau Range. Numerous, nearly vertical dikes less permeable than the lava flows are found in the interior of the range. The dike impounded water is referred to as high-level or dike water. Near the coast, water levels in basaltic rock a few feet to a few tens of feet above sea level is called basal water. Basal water is recharged from dike water and percolation from rains and streams.

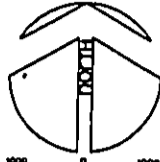
#### 5. Drainage

The Kahuku Agricultural Park site is drained by three primary drainage courses as shown by Figure 7. Each drainage basin is characterized by steep slopes in the upper reaches and flat terrain in the lower reaches. Drainage areas for the basins are relatively small, ranging between 0.64 to 2.94 square miles. Most of the agricultural park site is within the Kahuku 1 drainage basin which has an area of about 2.94 square miles, or 1,882 acres. Other drainage basins that contribute flows to the lowlying plain include Kahuku 2 (1.08 sq. mi.), and Kahuku 3 (0.64 sq. mi.). As a result of these characteristics, floods are typified by sharp peaks of short duration.

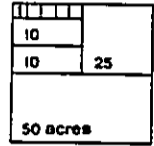
There are several natural springs, ponds, and swampy areas between Kawela Bay and Kahuku on the makai side of Kamehameha Highway. The U.S. Fish and Wildlife Service has established two units of the James Campbell National Wildlife Refuge (see Figure 2) makai of the highway. Kii Pond and Punamano Spring are habitat areas for a variety of waterbirds including several native species.

The Kahuku area has experienced recurring flood problems makai of Kamehameha Highway and over some of the mauka area. Lower-lying areas are susceptible to flooding because of the relative flatness of the coastal plain. If highly concentrated rainfall over a long period occurs in the mountainous areas, flooding may occur along the stream beds in the lower coastal regions.

# 7. Major Drainage Basins











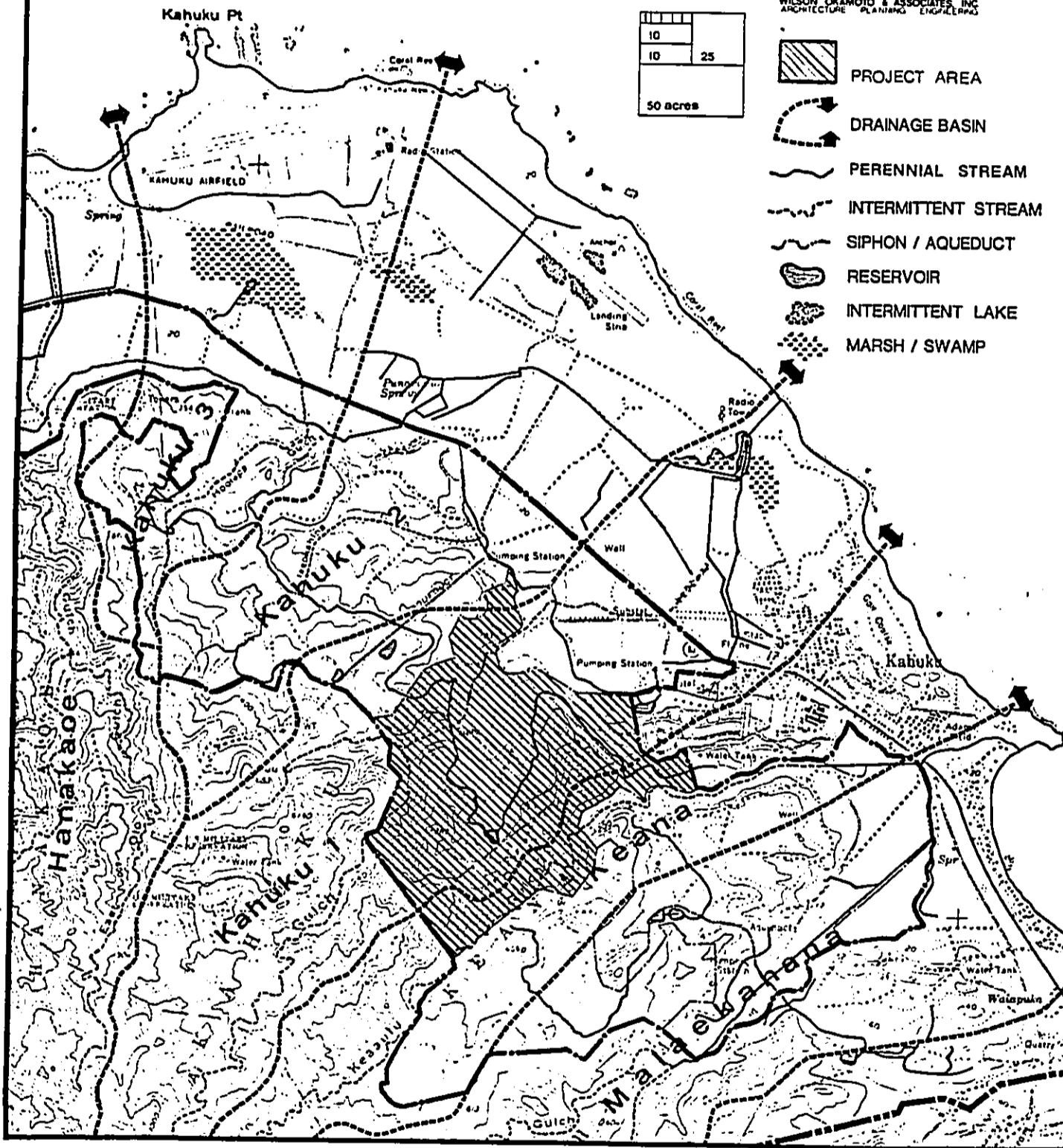
Scale in Feet



## Kahuku Agricultural Park

DEPARTMENT of AGRICULTURE  
 prepared by  
 WILSON OKAMOTO & ASSOCIATES, INC.  
 ARCHITECTURE PLANNING ENGINEERING

-  PROJECT AREA
-  DRAINAGE BASIN
-  PERENNIAL STREAM
-  INTERMITTENT STREAM
-  SIPHON / AQUEDUCT
-  RESERVOIR
-  INTERMITTENT LAKE
-  MARSH / SWAMP



Lowland flooding also occurs when groundwater reaches the surface in the form of artesian springs. These springs become part of the surface drainage system, contributing to the already limited drainage capacity.

The tsunami inundation zone generally follows the 20-foot elevation contour in the Laie-Hauula area. In the Kahuku area, the potential inundation zone extends inland as much as a half mile. The Corps of Engineers has determined the project site is within Zone D, area of undetermined, but possible, flood hazard, and Zone C, area of minimal flooding.

6. Public Facilities

a. Education

Kahuku High and Elementary School is located in Kahuku Town, less than a quarter of a mile from the proposed agricultural park.

b. Parks and Recreational Facilities

Various State, County, and private recreational facilities are located within the Koolauloa District. The closest facilities include the Kahuku Golf Course (0.9 miles away), Malaekahana State Recreational Area (1.5 miles) and Turtle Bay Hilton Golf Course (2.3 miles).

c. Fire/Police Protection

Fire protection for the Koolauloa District consists of a permanent engine company at Hauula with two trucks; a temporary facility at Kahuku with one truck; and an existing engine station at Waimea with helicopter facilities.

A new Fire/Police Station is planned for Kahuku adjacent to the school complex.

There are no existing police stations in the Koolauloa District. The closest stations serving the region would be primarily the Kaneohe District Station and secondarily, the Wahiawa District Station.

d. Health Care

The Kahuku Community Hospital is a 26-bed facility with 24-hour emergency service. The nearest

hospitals outside of the Koolauloa District are Wahiawa General Hospital and Castle Memorial in Kailua.

A private ambulance service under contract with the City and County is stationed at the Kahuku Community Hospital.

e. Transportation

1) Highways

The Koolauloa District can be reached from Honolulu by way of the Pali or Wilson tunnels and Kamehameha Highway (Route 83), or through Wahiawa via Kamehameha Highway (Routes H-1, H-2, 99, and 83). By the former route, Kahuku is about 32 miles from downtown Honolulu; the distance via Wahiawa is about 40 miles.

Kamehameha Highway is the major arterial linking Kahuku to the rest of the Island. Between Waimea Bay and Kaaawa, Kamehameha Highway is a two-lane highway with the paved surface varying in width from 20 to 21 feet situated within a 50-foot to 60-foot right-of-way.

The State of Hawaii, Department of Transportation, presently has no plans for either widening the existing highway or establishing a new highway corridor for this region.

2) Harbors

The Harbors Division of the State Department of Transportation maintains public boat harbor facilities at Kaneohe and Haleiwa. At the present time, no additional harbor facilities are contemplated in the project area.

3) Airfields

Kahuku airfield, located west of Kahuku Town near the northernmost point of Oahu is privately owned and no longer functions as an airfield. A number of aquaculture farms have used the runway surface as a foundation for their facilities. There are no future plans to reopen the airfield.

## 7. Infrastructure

### a. Water System

The Kahuku area is served primarily by basal water sources. Wells have been developed throughout the area to provide water for irrigation and domestic uses.

Domestic water for Kahuku Town was provided by a private well operated by the Kahuku Housing Corporation. Pump No. 1 was the source of this water supply.

Since 1983, withdrawal of domestic water from Pump No. 1 has ceased and water for Kahuku Town has been supplied by the Board of Water Supply's (BWS) new Kahuku Water Development Project which includes two new deepwells and pumps, a 0.5 million gallon reservoir, control building, and 12-inch transmission line. This new system will ensure an adequate supply of water for the City's Koolauloa Housing project and Kahuku Town. Within the Kahuku area, the Board of Water Supply has allocated 1.0 mgd of water for domestic purposes.

The existing study area irrigation system was originally installed and operated by the Kahuku Plantation Company for sugarcane cultivation. Within the Kahuku area, the Plantation's irrigation system consisted of seven subsystems drawing from various wells and a single surface water source.

Historically, the total draft from the irrigation and domestic systems averaged 22 mgd, with a maximum withdrawal of 53 mgd. The Department of Land and Natural Resources and the Board of Water Supply have estimated the sustainable groundwater yield of the Kahuku subarea to be 15 mgd, and 35 mgd for the Koolauloa Basal Aquifer.

Three major transmission systems are currently used for irrigation purposes. These are operated and maintained by Amorient Inc., on the west end of the study area; Kahuku Farmers Association, near the highway; and Kahuku Agriculture Company, on the southeast end of the study area.



With the exception of the Kahuku Farmers Association pumps, water drafted by Campbell Estate lessees is not metered. Since metered data are unavailable, existing consumption estimates were derived using kilowatt hour (KWH) consumption data for each pump in use. Board of Water Supply estimates or data provided by users were employed where KWH data or pump data necessary to calculate consumption estimates were unavailable. Estimates for calendar years 1980 and 1981 were developed and are shown in Table 4. The estimated 1980 and 1981 consumption was 12.90 mgd and 10.45 mgd respectively.

These estimates were developed for planning purposes only and do not reflect absolute determinations. Accurate consumption data would require implementation of a long-term metering and monitoring program for all irrigation systems in use.

Subsequent to the preparation of Table 3, Amorient Inc. provided updated pumpage figures. The reported average use was 1.5, 1.4, and 1.5 mgd in 1980, 1981, and 1982, respectively.

b. Sewer System

The Kahuku Sewage Treatment Plant is the only municipal sewage system serving the Kahuku area. The system is designed to handle an average daily flow of 0.2 million gallons per day expected to be generated by the new Koolauloa Housing Project, the Kahuku Hospital, the Kahuku School complex and approximately 80 users in Kahuku Town. The system is capable of being expanded to 0.8 million gallons per day. Ultimately, effluent will be used to irrigate the Kahuku Municipal Golf Course.

Approximately 170 households in Kahuku will continue to utilize their present individual cesspool systems.

c. Electrical and Telephone Systems

Electric and telephone services are provided to the Kahuku area by the Hawaiian Electric Company and the Hawaiian Telephone Company through jointly shared overhead lines. Two electrical substations, one located mauka of Kamehameha Highway across the Turtle Bay Hilton and the other in Kahuku Town, provide service for domestic and agricultural needs.

**Table 4**  
**ESTIMATED GROUND WATER USAGE FOR THE KAHUKU AREA**  
**1980-1981**

Lessee	(1) Acres in Irrigation	(2) Well # or Pump #	(3) Est. 1980 Consum. (mgd)	(4) Est. 1981 Consum. (mgd)	(5) Ave. Consum. (gal./acre/day)
Kahuku Farmers Association	175	1	0.69	0.83	4,343
T. Nakamura	13	8	0.11	0.13	4,800
Amorient Inc.	450	2	5.94	3.96	11,000
Kahuku Ag. Co.	200	12	1.18	1.17	5,875
Kahuku Prawns	40	12A	1.72	1.39	38,875
Amorient Aquafarms	NA	15	1.26 <sup>a</sup>	1.26 <sup>a</sup>	NA
MBJ Ranch	NA	6	0.41	0.14	NA
Beach Lots	NA	7	0.40	0.34	NA
Kahuku Housing Corp.	NA	11	0.88	0.92	NA
Turtle Bay Hilton Golf Course	NA	338	0.20 <sup>b</sup>	0.20 <sup>b</sup>	NA
Kahuku Sugar Mill	NA	335	0.01 <sup>b</sup>	0.01 <sup>b</sup>	NA
Kahuku Airfield	NA	339	<u>0.10<sup>b</sup></u>	<u>0.10<sup>b</sup></u>	NA
<b>TOTAL<sup>c</sup></b>			12.90	10.45	

**Notes:**

- a - Based on data received from Amorient Inc.
- b - BWS Estimates
- c - 1980 and 1981 consumption totals reviewed and determined acceptable by BWS.

Hawaiian Electric and Hawaiian Telephone's existing system capacities are adequate to meet future electrical and telephone requirements of the Agricultural Park.

8. Relationship to Public Land Use Policies and Controls

The proposed project addresses a number goals, objectives and policies stated in the Hawaii State Plan and State Agriculture Plan.

State Goals

- o Achieve "a strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations."

There is a high demand for affordable farm lots and new farmers are finding it increasingly difficult to find land.

The Kahuku Agricultural Park will provide tenant farmers with an economic opportunity that may not be available in the outside market for farm lots.

- o Achieve "a desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people."

Agriculture is the predominant land use in the Kahuku area and the agricultural park will be compatible with the surrounding area.

- o Achieve "physical, social, and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring and of participation in community life."

The economic opportunities created by the Agricultural Park will enhance the economic well-being of not only the farmers but also the community at-large, due to the multiplier effect of the agricultural industry.

Objectives and Policies for the Economy-Agricultural

- o "Continued growth and development of diversified agriculture throughout the State."

The Kahuku Agricultural Park will create about 24 farm lots on "Prime" agricultural lands that are presently unused. These new farm lots will be for the purpose of diversified agriculture.

- o "Foster attitudes and activities conducive to maintaining agriculture as a major sector of Hawaii's economy."

The agricultural park program has enhanced the role of agriculture in the State economy. The proposed agricultural park will work to maintain agriculture as a major sector of the State economy.

- o "Promote Hawaii's agricultural products locally, on the continental United States, and internationally."

Many of the products that could be produced in the Kahuku Agricultural Park have the potential to compete in any or all of the three market arenas. Hawaii's location and climate make it a strategic base for international agriculture.

- o "Enhance agricultural growth by providing public incentives and encouraging private initiatives."

The agricultural park program provides public assistance to new or relocated farmers to stimulate agricultural growth through private endeavors.

- o "Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs."

The proposed Kahuku Agricultural Park will assure the availability of its lands for agricultural use for at least the term of the master lease. Nearly one million gallons of water per day will be developed for the sole purpose of irrigation.

- o "Increase the attractiveness and opportunities for an agricultural education and livelihood."

The agricultural park program is designed to help the new farmer get started. Availability of good farm lots will encourage new farmers to remain and possibly attract new people into the industry.

- o "Expand Hawaii's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture and other potential enterprises."

The Kahuku Agricultural Park will provide farm lots for truck crops, orchards and nursery operations, thereby strengthening Hawaii's agricultural base.

- o "Promote economically competitive activities that increase Hawaii's agricultural self-sufficiency."

Most of the products that will be grown in the Kahuku Agricultural Park are presently being imported into the State. Local production of these crops will enhance Hawaii's agricultural self-sufficiency.

#### Priority Directions

- o "Assist small independent farmers in securing land and loans."

The agricultural park program is designed to provide small farmers with affordable land with long-term leases.

- o "Continue the development of agricultural parks."

The Kahuku Agricultural Park is one of several parks that are being or have been developed by the State.

#### Implementing Actions

- o "Complete agricultural park projects presently committed."

The State appropriated \$4.1 million in the 1983-85 biennium for on-site and off-site improvements for agricultural park subdivisions. An additional \$2.3 million was appropriated for agricultural water development projects in the 1983-85 biennium.

- o "Develop new, expanded, or improved water source and delivery systems in support of agriculture and aquaculture, as needed and economically feasible."

The Hawaii State Plan priority direction calls for increased support for research and development of alternative water sources. The feasibility of acquiring and upgrading former plantation irrigation systems should be given priority for evaluation.

The proposed Kahuku Agricultural Park is located within the State Land Use Agricultural District and is zoned by the

City and County of Honolulu for Agriculture, Ag-1. The State of Hawaii, Board of Land and Natural Resources is empowered to develop agricultural parks and make farm lots available to qualified applicants.

The Hawaii Revised Statutes Sec. 171-118 states that agricultural parks will be "exempt from all statutes, ordinances, charter provisions, and rules and regulations of any governmental agency relating to zoning, subdivision, construction and building standards, provided that:

- "(1) The development is situated within a State land use agricultural district;
- (2) The development does not contravene any safety standard or tariff approved by the public utilities commission for public utilities;
- (3) The Board of Land and Natural Resources shall have first presented the plans and specifications for the development to the legislative body of the County where the development is proposed, which shall have the right to approve or disapprove the development within forty-five days after presentment. If no action is taken by the legislative body involved within forty-five days after presentment, the development shall be deemed approved;
- (4) The final plans and specifications for the development approved by the legislative body of the County involved shall constitute the zoning, building, construction and subdivision standards for the development. No action shall be prosecuted or maintained against any County, its officials or employees, on account of actions taken by them in reviewing, approving or disapproving such plans and specifications. For purposes of sections 501-85 and 502-17, the chairman of the Board of Land and Natural Resources or the responsible County official may certify maps and plans of lands connected with the development as having complied with applicable laws and ordinances relating to consolidation and subdivision of lands, and such maps and plans shall be accepted for registration or recordation by the land court and registrar;
- (5) The State shall assume the responsibility of maintaining all roads within State sponsored agricultural parks."

B. Project Site

1. Topography

The elevation of the project site ranges from about 50 feet above sea level to nearly 600 feet at the extreme upper

reaches of the site. The topography consists mostly of rolling hills and gentle slopes in the areas proposed for development. Those areas not designated for development are steeper and not suitable for agriculture.

## 2. Soils

Soils within the Kahuku Agricultural Park have been classified by the Soil Conservation Service Soil Survey and include the Paumalu, Lahaina, Kaena, Haleiwa and Waialua series. These soil types represent a wide range of characteristics. The soils within the developed areas of the agricultural park are generally in the Lahaina, Haleiwa and Paumalu series. Erosion hazard and runoff are slight to moderate and slopes range from 2 to 25 percent.

Productivity ratings, as defined by the University of Hawaii, Land Study Bureau, range from A to C with Good or Moderate machine tillability. The selected Crop Productivity Ratings are generally "a" or "b" for the proposed crops in the Kahuku Agricultural Park.

Approximately half of the land within the project site is classified as Prime and Other Important Agricultural Land by the State Department of Agriculture (Figure 8). These soils are considered suitable for sugarcane, truck crops, orchards and pastures.

The remaining lands are steeper (Figure 9) and unsuitable for agricultural use.

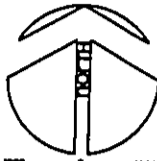
## 3. Biological

### a. Flora

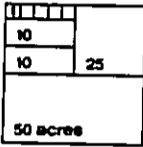
A botanical survey of the proposed Agricultural Park and the study area was conducted by Kenneth M. Nagata and Winona P. Char in June 1981, to map and describe vegetation types, to inventory the flora, and to search for plants on the proposed list of rare and endangered plants (Federal Register 1976, 1980). The complete botanical survey report is contained in Appendix A.

The project site vegetation is largely secondary and dominated by two species - sugarcane and haole koa. The extensive sugarcane fields, which once dominated the landscape, have been abandoned and are being replaced by thickets of haole koa. Few other species are found in these thickets. Other species commonly found in the uplands are Christmas berry, guava and

# 8. Agricultural Lands of Importance






Scale in Feet

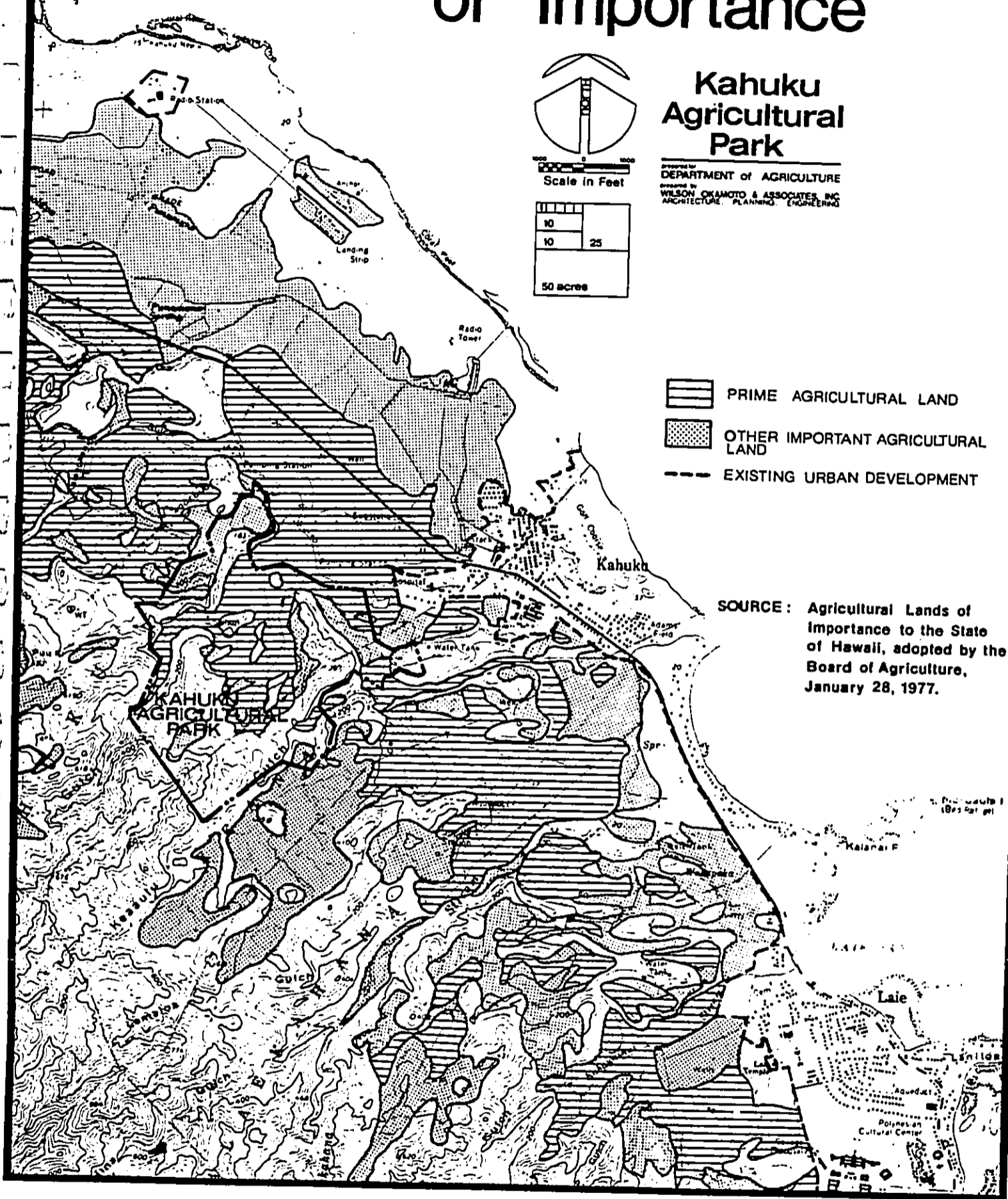


## Kahuku Agricultural Park

Prepared by  
DEPARTMENT of AGRICULTURE  
Reviewed by  
WILSON OKAMOTO & ASSOCIATES, INC.  
ARCHITECTURE PLANNING ENGINEERING

-  PRIME AGRICULTURAL LAND
-  OTHER IMPORTANT AGRICULTURAL LAND
-  EXISTING URBAN DEVELOPMENT

SOURCE: Agricultural Lands of Importance to the State of Hawaii, adopted by the Board of Agriculture, January 28, 1977.

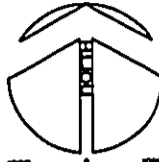




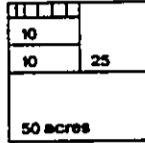
# 9. Slope

## Kahuku Agricultural Park

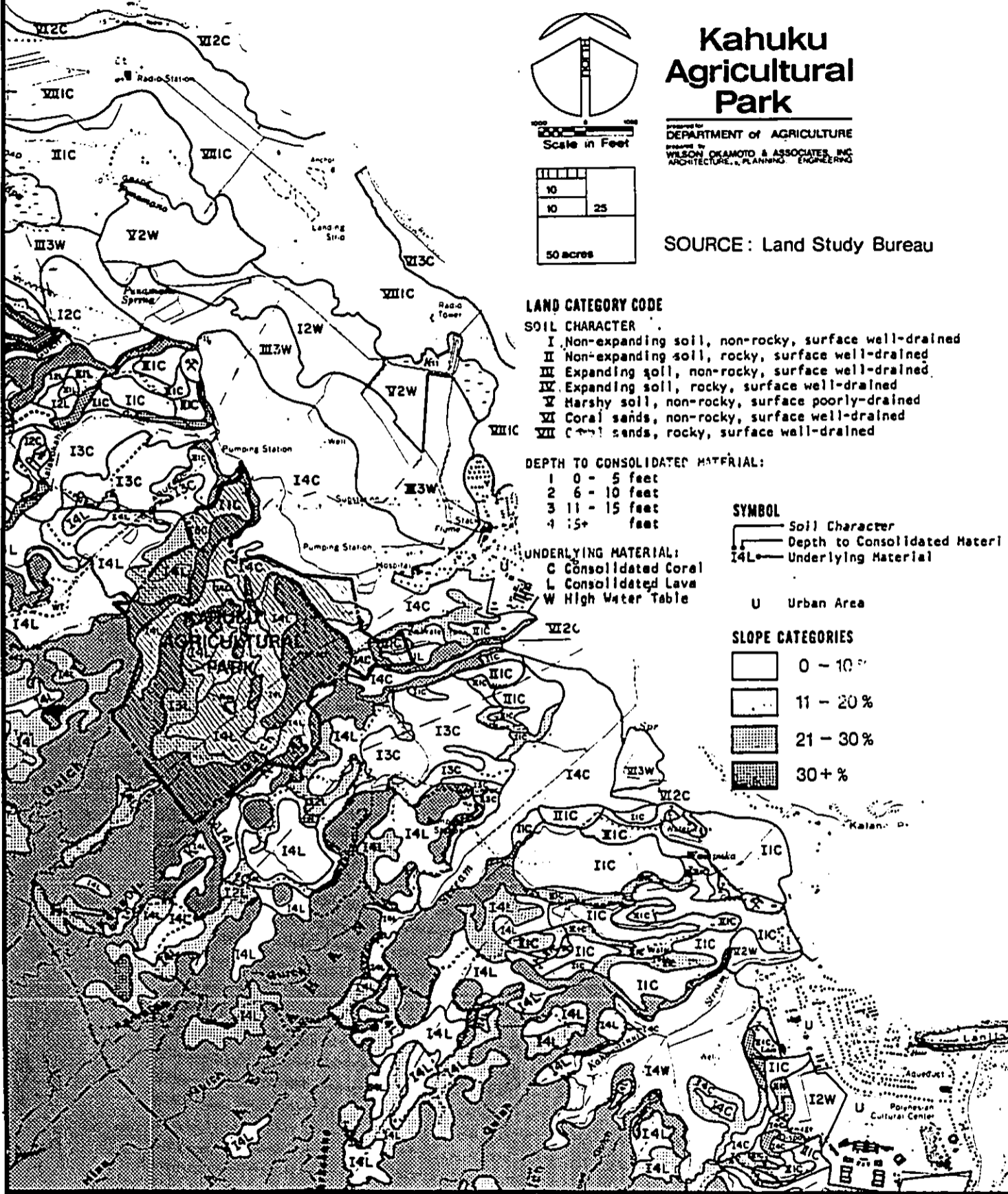
DEPARTMENT OF AGRICULTURE  
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Scale in Feet



SOURCE: Land Study Bureau



### LAND CATEGORY CODE

#### SOIL CHARACTER

- I Non-expanding soil, non-rocky, surface well-drained
- II Non-expanding soil, rocky, surface well-drained
- III Expanding soil, non-rocky, surface well-drained
- IV Expanding soil, rocky, surface well-drained
- V Marshy soil, non-rocky, surface poorly-drained
- VI Coral sands, non-rocky, surface well-drained
- VII Coral sands, rocky, surface well-drained

#### DEPTH TO CONSOLIDATED MATERIAL:

- 1 0 - 5 feet
- 2 6 - 10 feet
- 3 11 - 15 feet
- 4 15+ feet

#### UNDERLYING MATERIAL:

- C Consolidated Coral
- L Consolidated Lava
- W High Water Table

#### SYMBOL

- Soil Character
- Depth to Consolidated Material
- I4L Underlying Material

U Urban Area

#### SLOPE CATEGORIES

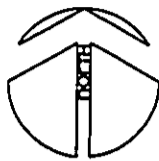
- 0 - 10%
- 11 - 20%
- 21 - 30%
- 30+%

# 10. Archaeological & Botanical Survey

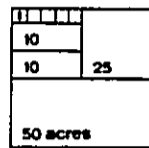
## Kahuku Agricultural Park




Prepared for  
DEPARTMENT of AGRICULTURE

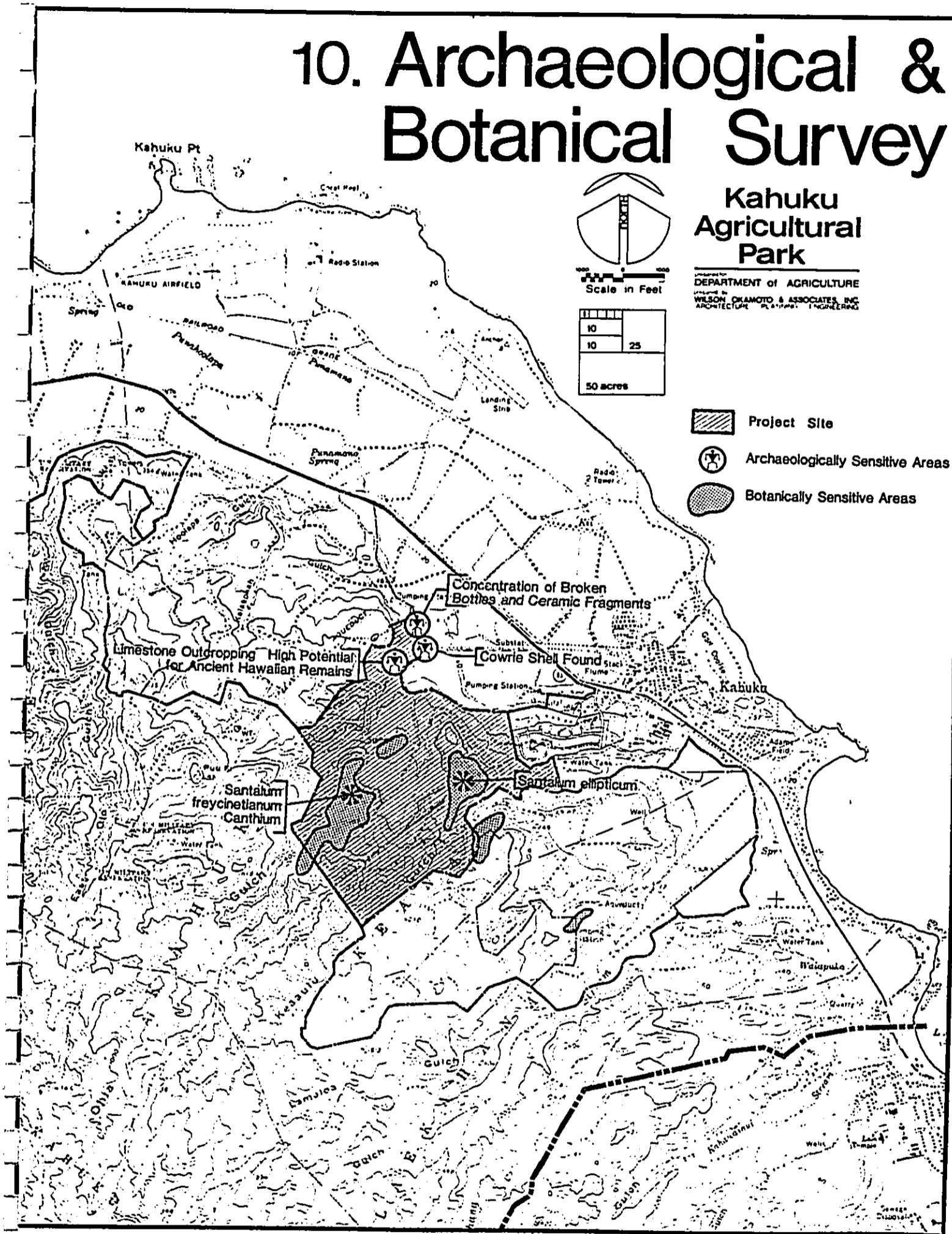
Prepared by  
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ARCHITECTURE PLANNING ENGINEERING



Scale in Feet



-  Project Site
-  Archaeologically Sensitive Areas
-  Botanically Sensitive Areas



ironwood. Common forbs include the ubiquitous Bidens pilosa var. minor, huehue-haole, sourgrass, paragrass, and vervain (Stachytarpheta jamaicensis). Macaranga tanarius, Java plum, Chinese banyan, Formosan koa and rattlebox are found occasionally.

Three native species are present in the project site. Approximately 24 individuals of Santalum ellipticum var. littorale ('ili-ahi-a-lo'e), which is on the State's proposed list of endangered species, were encountered at the summit of a hill behind Kahuku Village (Figure 10). Five individuals of Canthium ordoratum (alahe'e), a common native species, and two Santalum freycinetianum ('ili-ahi) trees were also found. Several other areas were identified as biologically sensitive areas due to their relatively undisturbed nature.

b. Fauna

The project site could provide habitat or could possibly be frequented by a variety of mammals known to exist in the region. These include feral pigs, feral cats, feral dogs, mongooses, rats, and house mice.

Existing birdlife in the project area has been determined using existing data and site observations. Common avifauna likely to be found in the project area are listed in Table 5.

The James Campbell National Wildlife Refuge is located about a mile seaward of the proposed agricultural park. Native waterbirds that inhabit the refuge include the Hawaiian stilt (Himantopus mexicanus knudseni), Hawaiian coot (Fulica americana alai), Hawaiian or Koloa duck (Anas wyvilliana), and the Hawaiian gallinule (Gallinula chloropus sandwicensis). These native waterbirds are Federally listed, and the Hawaiian owl (Asio flammeus sandwichensis) is listed by the State, as endangered. It is possible that these native species could frequent the project site.

4. Archaeological and Historical

a. Field Investigations

An archaeological reconnaissance survey was conducted on the project site and study area in June 1981, by Chiniago, Inc. The report prepared by the archaeologist is contained in Appendix B and the results are shown in Figure 10.

No structural remains were identified or discovered by the reconnaissance survey. The primary reason for the absence of structural remains is the extent of previous agricultural utilization by the Kahuku Sugar Plantation, over virtually the entire project site. Remains that were located within the project site consist of the following items:

- o A single shell of a cowrie (*Cypraea caputserpentis*), a favorite Hawaiian food species, on the inland side of a recently plowed field.
- o A concentration of broken bottles and ceramic fragments, most of which probably do not pre-date the 1930's, situated at the base of a limestone ledge amongst a stand of coconut trees.

Table 5

AVIFAUNA INHABITING OR FREQUENTING THE PROJECT SITE  
KAHUKU AGRICULTURAL PARK

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status</u>
Cardinal	<i>Richmondia cardinalis</i>	Introduced
Barred dove	<i>Geopelia striata</i>	Introduced
Spotted dove	<i>Streptopelia chinensis</i>	Introduced
Mockingbird	<i>Mimus polyglottos</i>	Introduced
Mynah	<i>Acridotheres tristis</i>	Introduced
Golden plover	<i>Pluvialis dominica fulva</i>	Indigenous
Pueo	<i>Asio flammeus sandwichensis</i>	Endemic
Rice bird	<i>Lonchura punctulata</i>	Introduced
House Sparrow	<i>Passer domesticus</i>	Introduced
White eye	<i>Zosterops japonica</i>	Introduced
Cattle egret	<i>Bubulcus ibis</i>	Introduced
Ring necked pheasant	<i>Phasianus colchicus torquatus</i>	Introduced
Erckel's Francolin	<i>Francolinus erckelii</i>	Introduced
Elepaio	<i>Chasiempis sandwichensis</i>	Endemic
Red-vented Bulbul	<i>Pycnonotus cafer</i>	Introduced

Source: City and County Department of Housing and Community Development and Department of Public Works. Revised Environmental Impact Statement for the Proposed Koolauloa Housing Project and Sewage Treatment Plant-Kahuku. 1977;

University of Hawaii, Department of Geography. Atlas of Hawaii, 1974; and

Site observations.

- o A limestone outcrop appears to be relatively undisturbed and the potential for in situ Hawaiian remains being present is high.

b. Literature Search

The site map for the Kahuku area on file at the State Historic Preservation Office indicates that there are no recorded sites within the project boundaries.

IV. POTENTIAL IMPACTS AND MITIGATIVE MEASURES

#### IV. POTENTIAL IMPACTS AND MITIGATIVE MEASURES

##### A. Short-Term (Construction Related)

###### 1. Air Quality

Exhaust from construction machinery and fugitive dust produced by site preparation work will affect ambient air quality. Trade winds will disperse airborne pollutants and particulate matter in a southwesterly direction. Air quality impacts attributable to construction activities will be incurred primarily during the phase of work requiring heavy machinery for grading. Urban areas are located away from the Kahuku Agricultural Park.

###### 2. Erosion and Water Quality

During the grading phase of this project, lands will become vulnerable to the natural elements and subsequent erosion. Water quality within the Agricultural Park drainage system and ultimately the receiving waters may be affected. This is a temporary situation, and all practical measures of mitigation shall be applied. Strict adherence to the City and County of Honolulu Grading, Soil Erosion, and Sediment Control ordinances should minimize adverse impacts.

###### 3. Traffic

Disruption to present traffic patterns in Kahuku during project construction is unavoidable. During site development, the movement of construction equipment and vehicles egressing and ingressing the site can be controlled by flag men or police officers.

###### 4. Safety

Standard construction practices will be followed, to maximize public safety during construction.

###### 5. Noise

The noise expected to be generated during construction may be annoying, particularly to immediate surrounding residences, Kahuku School, and to Kahuku Hospital. Attenuation of noise is a function of wind velocity and direction. Noise producing activities, however, should not extend beyond normal working hours and must comply with State Department of Health Community Noise Control for Oahu (Title 11, Chapter 43).

B. Long-Term

1. Natural Environment

a. Flood Hazard

Based on continued use of lands for agricultural purposes, peak discharges will remain unchanged, or in some cases, will be reduced due to better maintenance. The system of ditches, culverts and basins in the Kahuku Agricultural Park will ensure the proper conveyance of storm waters downstream. Maintenance of existing ditches and culverts will ensure that aggravation of flood prone conditions downstream are minimized.

The proposed drainage basins are designed according to City and County standards to attenuate the peak flow and thereby minimize flood impacts to downstream areas. The Kahuku Agricultural Park represents a relatively small percentage of the total area of the drainage basins that contribute to flooding in the wildlife refuge. The portion of the project site that will actually be developed (about 210 acres) represents about seven percent (7%) of the total drainage area. Therefore, the drainage improvements within the park will have little effect on current coastal flooding problems.

b. Air Quality

Odors and airborne particles from agricultural chemicals and activities could be generated within the proposed agricultural park. These could be from overspray of pesticides and fertilizers, or dust from fallow fields. The prevailing tradewinds will carry odors and airborne pollutants away from populated areas and Kamehameha Highway.

c. Water Quality

The project site is within a Board of Water Supply designated "No Pass Zone". However, the domestic groundwater supply will not be contaminated since there will not be any sewage disposal within the Kahuku Agricultural Park.

Development of the Kahuku Agricultural Park could affect surface water quality due to erosion. However, soil losses due to erosion under the proposed land uses are anticipated to be lower than



losses occurring under existing conditions. Factors which affect soil loss include rainfall, slope, soil erodibility, ground cover, and conservation management. Among these factors, cover and conservation management will vary, with other factors remaining constant.

Evaluation of cover and management factors as applied to the Soil Conservation Services Universal Soil Loss Equation was conducted to assess erosion impacts of the proposed land uses within the Kahuku Agricultural Park. This evaluation indicated that the existing natural cover may be slightly preferable over cover provided under agricultural uses. However, when conservation management factors (i.e., use of contour irrigation furrows) are considered, soil losses under the proposed land uses were reduced below existing conditions (no conservation management is provided under existing conditions).

Concerns have been raised regarding the use of chemicals within the agricultural park and the possibility of the chemicals contaminating surface flows and groundwater. Crops to be produced at Kahuku Agricultural Park include, but are not limited to: papayas, bananas, snap beans, corn, tomatoes, watermelon, and nursery and ornamental plants. Farmers who cultivate these crops have, in the past, used chemical insecticides, fungicides and herbicides to increase production and protect their investment.

The Environmental Protection Agency (EPA) has issued a list of chemicals that have been approved for use in agriculture. The chemicals that might be used at the Kahuku Agricultural Park include, but are not limited to, Lannate, Diazonon Ag 500, Vydate L, Sevin Dibrom, Malathion, Cygon, Tri Basic Copper, Dithan M45, Dithan Z-78, Sulfur, Bravo 500, Capton, Difolatan, Lasso, Sutan Plus, Dual, Atrazine (Atrex), Prefar, Alanap, Paraquat, Round Up, Karmex, and 2, 4 D.

Use of these and other chemicals in agriculture is regulated by the State Department of Agriculture and the Hawaii Pesticides Law. Farmers must be trained and pass a test before a pesticide applicator permit is issued. The farmer must use the chemicals only in accordance with label instructions and under proper conditions. Misuse of the chemicals could result in civil penalties.

The proposed Agricultural Park lies about one-third mile upstream from the James Campbell National Wildlife Refuge. A number of endangered native waterbirds inhabit the refuge. The use of chemicals in the proposed Agricultural Park could have an effect upon the waterbirds in the refuge. Current data on the long-term effects of chemicals on the environment and wildlife are limited. Tolerance levels in wildlife have not been well established. Chronic exposure of wildlife within the refuge to pesticides use within the Kahuku Agricultural Park is not expected to occur since there are no perennial streams within or near the Agricultural Park. Although chemicals could be applied to fields on a daily basis, opportunity for pesticides to reach the refuge will only occur during heavy rainfall. Additionally, many chemicals lose their toxicity with time and therefore the period between application and heavy rainfall will be a factor in the toxin levels in the storm run-off.

Acute exposure of refuge wildlife to pesticides is remote. As mentioned earlier, the only way for pesticides from the agricultural park to reach the wildlife refuge is via storm run-off. The amount of rainfall required to generate enough run-off to reach the refuge would also result in a large volume of water that would drastically reduce the concentration of toxins.

d. Biological

The botanical reconnaissance survey (Appendix A), conducted in June 1981, identified several areas within the Agricultural Park where vegetation has remained relatively undisturbed (Figure 10) and therefore might include endangered species. Adverse terrain and soil conditions have helped to keep these areas undisturbed. For these same reasons, the Kahuku Agricultural Park has excluded these areas from cultivation and development. Development of the agricultural park will not increase accessibility of these sites. Native waterbirds inhabit the nearby James Campbell National Wildlife Refuge, about a mile seaward of the project site.

e. Noise

Noise originating from the proposed Kahuku Agricultural Park is expected to be generated primarily by farm equipment such as tractors (77-96

dBa), front loaders (72-85 dBA), and trucks (83-94 dBA)<sup>1</sup>. The nearest impacted area is the City and County's Koolauloa Support Housing project adjacent to the eastern boundary of the Kahuku Agricultural Park. Due to the agricultural character of the area and the open spaces, noise is not expected to create any adverse impacts to the housing project or the Kahuku community. Noise generating activities are expected to be limited to daylight hours. Furthermore, prevailing winds will carry noise inland, and away from populated areas. All project-related noise must comply with the provisions of Title 11, Administrative Rules Chapter 43, Community Noise Control for Oahu.

## 2. Socio-Cultural

### a. Population and Housing

Conditions of the lease agreement between the State and Campbell Estate prohibit the development of any farm dwellings or residential units on the project site except for security purposes. This condition will not affect farmers who already have housing accommodations in the Kahuku area. Farmers relocating their farms to the Kahuku Agricultural Park would either commute or be responsible for securing housing on their own.

The proposed Agricultural Park will not result in a significant population change to the area.

### b. Community Character

The Kahuku area is basically a rural agricultural community, with the exception of the Turtle Bay Hilton. The community today retains much of the character developed when Kahuku Sugar Plantation was in operation. The rural atmosphere is reflected in the very low population densities for the area.

The proposed Kahuku Agricultural Park will serve to preserve the character of the region by promoting agricultural activities and protecting prime agricultural lands from urban encroachment.

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<sup>1</sup>Source: Noise from Construction Equipment and Operations Building Equipment, and Home Appliances, EPA, 1971.

c. Archaeological/Historical

The archaeological reconnaissance survey (Appendix B) conducted in June 1981, identified three specific areas in the vicinity of the project site as having potential archaeological significance (Figure 10). No structural remains were found, but evidence including seashells, and bottle and ceramic fragments were found, indicating the high potential for in situ Hawaiian remains.

The sites are located near the base of a limestone ledge in the park site. These sites are in areas that have not been cultivated due to adverse topographic and soil conditions. For these same reasons, the development plan has excluded these areas from cultivation or development. Development of the Agricultural Park will not increase accessibility of these sites.

In the event that archaeological remains or artifacts are uncovered during construction of the proposed Agricultural Park, work will be halted and the State Historic Preservation Officer will be notified.

3. Economics

a. Market Conditions

In August 1981, a market study was conducted by Raynard C. Soon to examine the feasibility of various crops in the Kahuku area. The market study concluded that Hawaii's farmers currently capture 40% of the local demand for fresh vegetables, 22% of the local demand for fresh fruits, 24% of the State's consumption of pork, and 23% of the State's consumption of chicken. With some commodities, the local farmers' share of the market has increased, but in the large majority, production has remained fairly constant or decreased, and therefore, the Hawaii farmers' share of the local market has declined. Many of the problems which have affected local production--limited reasonably priced water, limited land with long term availability, high capital costs, limited loan availability--can be addressed, in part, by the State's Agricultural Park Program.

Export markets are not available for the majority of Hawaii's agricultural commodities. However, for the select few that do export, the market in general is encouraging. Flowers and other nursery products have seen spectacular growth in the last five years and projections are for continued healthy growth.

Two major factors which affect demand are population increases and per capita consumption. The State's population is projected to increase by 15% over the 1980's. Oahu will continue to dominate the State in terms of population and will remain the primary market.

Over the research period, 1974 to 1979, there was substantial increase in per capita consumption of fresh vegetables, chicken and melons in Hawaii. Combined with the population growth, continued increase in per capita consumption would foretell substantial demand increases in these areas. The only two major areas where declines have been registered are in the consumption of milk and meats.

The following vegetable crops would appear to be reasonable selections for the Agricultural Park: snap beans, cucumbers, eggplant, mustard cabbage, green onions, Italian squash, sweet potatoes, sweet corn and tomatoes. Each of these crops has growth potential and is suitable for the Kahuku area. Bananas, papayas, and watermelons would appear to be wise fruit choices for farmers in the Park.

Among the flowers and nursery products, dendrobiums and ornamental potted plants have spectacular growth ahead if projections are accurate. These enterprises would be well suited to the resources available through the Agricultural Park project.

Table 6 presents the 1982 production acreage, value, and market share for those commodities listed above as being most suitable for the Kahuku Agricultural Park. The table also contains estimated production acreage and value for these commodities in 1990, on the assumption that the local market commodities would be produced to meet a 95 percent share of the 1990 market, and the export market commodities would be produced to meet demand projected according to recent trends. Statewide, a total of 3,782 additional acres would be required by 1990 for truck and orchard crops, including 1,013 acres for bananas and 2,030 acres for papayas; 201 additional acres

Table 6

ACREAGE, VALUE, AND MARKET SHARE OF SELECTED COMMODITIES  
Hawaii, 1982 and 1990

	1982 Acreage	1982 Value of Production (\$1,000)	1982 Market Share	1990 Additional Acreage	1990 Increase in Value (\$1,000)
<u>Local Market</u>					
Banana	940	\$ 1,645	45%	1,013	\$ 2,665
Beans, snap	130	796	81%	27	513
Cabbage, mustard	120	418	94%	5	124
Corn, sweet	170	187	60%	76	281
Cucumbers	225	1,353	68%	42	754
Eggplant	45	511	81%	27	334
Onions, green	115	674	59%	30	705
Potatoes, sweet	130	386	71%	33	203
Squash, Italian	34	141	19%	56	493
Tomatoes	260	2,707	48%	167	3,212
Watermelon	165	548	22%	276	1,459
<u>Export Market</u>					
Papaya	3,145	\$11,484	--	2,030	\$8,500
Ornamented potted plants	149	\$12,863	--	171	9,200
Dendrobium orchids	41	1,355	--	30	1,000
(Projected from Regression Analysis)					

Sources: Statistics of Hawaiian Agriculture 1982;  
Statewide Agricultural Park Action Plan, Phase II  
(Final Report, February 9, 1984).

would be required for the flower and nursery products. The additional value of production in 1990 is estimated to be \$19,243,000 for the truck and orchard crops (including \$2,665,000 for bananas, and \$8,500,000 for papayas), and \$10,200,000 for the flower and nursery products.

The 160 acres designated for truck and orchard crops at Kahuku Agricultural Park would meet only 4 percent of the demand for acreage for these commodities, and would account for approximately \$770,000 in additional production value per year. The 50 acres designated for nursery operations, on the other hand, would meet 25 percent of the demand for land for such commodities, and would generate approximately \$2,550,000 in new annual production value.

It should be noted that in the final analysis farmers will grow what they believe to be possible, what they believe is sufficiently profitable, and what they are personally capable of growing. There appears to be some room for flexibility in crop choice.

b. Employment

Employment opportunities will increase with the development of the Agricultural Park. While some of the farms are expected to be family operated, additional jobs may be created for field or processing operations. The number of employment opportunities that will be available in the park is dependent on the lessees and the crop type. Furthermore, there will be a proportionate increase in secondary service jobs.

c. Land Use Patterns

There will be a positive impact to land use and growth trends. The establishment of the Agricultural Park will insure that these lands, much of which are classified as prime agricultural lands (ALISH), will remain in agricultural use.

4. Infrastructure

a. Water Demand

The State Department of Land and Natural Resources and the Honolulu Board of Water Supply (BWS) have estimated the sustainable groundwater yield of the Kahuku subarea at 15 million gallons per day (mgd), and 35 mgd for the Koolauloa Basal Aquifer. The

existing water usage estimated by BWS for 1982 (7.91 mgd) and the water needed to develop the Kahuku Agricultural Park (1 mgd) will not exceed this limit. The consumption rates of all the agricultural park tenants drawing water will have to be monitored to protect against overdraft of the aquifer.

b. Traffic

Kamehameha Highway serves as the main transportation artery. The existing peak-hour traffic occurs between 1:00 pm and 2:00 pm and totals only 255 vehicles per hour (vph). The State Department of Transportation does not anticipate any adverse traffic impacts to Kamehameha Highway due to the proposed project.

If it is assumed that the proposed agricultural park will generate two (2) vehicles per farmplot and if all of project generated vehicles were to enter Kamehameha Highway during the peak traffic hour, the total volume would be 303 vph. Most of the additional traffic that will be generated by the project will be distributed throughout the daylight hours and will not significantly affect existing traffic peaks.



V. ALTERNATIVES TO THE PROPOSED PROJECT

## V. ALTERNATIVES TO THE PROPOSED ACTION

### A. No Action Alternative

The project site is presently vacant and unused. There are no existing plans for its use. If the State does not develop the Kahuku Agricultural Park it is uncertain whether these lands will ever be developed for agricultural use.

Prime agricultural land is a valuable resource for which productive use should be encouraged. Past experience has shown that once prime agricultural lands are converted to urban uses, reversing the situation to regain productive agricultural lands is unlikely.

Through the implementation of this project, the State will not only assist small farmers by providing infrastructure and long-term leases, but will also preserve and put to productive use prime agricultural land.

### B. Alternative Land Use Plans

The initial planning for this project considered a much larger area of land. The total area studied was approximately 3,370 acres, and included lands presently leased to various tenants. A number of land use schemes were developed for the study area that emphasized 1) livestock, 2) crops or 3) a combination of livestock and crops.

One alternative land use plan was developed for the Kahuku Agricultural Park site. The plan proposed a concentrated livestock area within the central portion of the project site. Livestock uses would include dairy, swine, or poultry farms on 5-10 acre lots. The lands in the upper elevations would be used for forage and pasture and the lands in the lower portions, adjacent to the Kahuku Farmers Association, would be used for truck and nursery crops.

This alternative was dropped from further consideration due to (1) the high cost of sewage treatment and disposal necessary to prevent adverse impacts to the aquifer; (2) probable overdraft of the groundwater if the entire 3,370 acres were developed in agricultural use; and (3) failure of two major tenants to consent to State master lease of the area.

### C. Alternative Site Improvements

#### 1. Water System Alternatives

Three alternative systems were considered for meeting irrigation needs.

Alternative 1 includes the development of new wells and provision for an enclosed reservoir. Total construction cost for this system is estimated to be \$1.73 million.

Alternative 2 is a full pressure system without a reservoir. Wells at the existing pump 1 source would be equipped with additional pumps to service the project site. Total estimated construction cost for Alternative 2 is \$0.64 million.

Alternative 3 represents a variation of Alternative 2 described above. This system is a fully pressurized system, and includes development of two new wells. The total construction cost for this system is \$1.07 million.

Among the systems evaluated, the pressure only systems (without reservoir) had the lowest initial capital costs. However, if DLNR is to operate and maintain the irrigation system, its staff prefers a reservoir system which would make water available to farmers without scheduling. Therefore, pressure only Alternatives 2 and 3 were eliminated from further consideration.

Comparison of costs of the remaining two alternatives, warranted the selection of the "reservoir" irrigation system utilizing the existing Pump 1 wells.

## 2. Roadway Alternatives

As an alternative to the use of crushed coral pavement, asphalt concrete (A.C.) pavement was considered. The initial capital cost for the A.C. pavement roads and the maintenance requirements were higher than for coral pavement. This cost estimate, however, is considered preliminary since assumptions relative to projected maintenance requirements cannot be confirmed. For the purposes of evaluation, it was assumed that resurfacing of the A.C. pavement would be required every ten years and minor repairs during interim five-year periods. The crushed coral pavement would require minor repairs on a yearly basis. It was also assumed that crushed coral material would be available from nearby sources. The estimates, although preliminary, do indicate the relative order of cost difference between the two pavement types. Crushed coral pavement was selected over A.C. pavement based on its lower capital and maintenance costs, and the fact that it will remain a private roadway which will not be dedicated to the City and County of Honolulu.

## D. Alternative Operations and Maintenance Program

One alternative plan was developed for the operations and maintenance program for the Kahuku Agricultural Park. The basic

difference between the proposed program and the alternative is whether the State or the farmers will have the responsibility of maintaining the roadway, water and drainage systems.

The alternative program would be run by the State which would be responsible for development, maintenance and operation of the infrastructure systems within the Kahuku Agricultural Park. The tenant farmers would be assessed a user fee for maintenance and operation costs. The user fee could be placed in a special fund set up specifically for the Kahuku Agricultural Park. The State could handle maintenance and operations through a private contractor.

An association of tenants could be organized to act as a unified body to present problems and proposals to the State. The Association could also promote a cooperative effort among its members to pool their resources to help solve common problems, especially in the areas of marketing and field technology.

The proposed operation and maintenance program as the responsibility of the Tenants Association was selected over the alternative of State responsibility for the following reasons: 1) DLNR does not have a staff to maintain roadways and drainage systems, and 2) no special fund presently exists to receive agricultural park user fees.

VI. SUMMARY OF UNRESOLVED ISSUES

VI. SUMMARY OF UNRESOLVED ISSUES

The potential contamination of the James Campbell National Wildlife Refuge from chemicals used in the Kahuku Agricultural Park and surrounding agricultural activities, remains an unresolved issue. However, use of chemicals within the Agricultural Park will be in compliance with accepted practices.

The drainage system for the Kahuku Agricultural Park is designed to mitigate any increased surface run-off generated from the Agricultural Park. However, it is not designed to mitigate existing downstream flooding problems. Therefore the current flooding and siltation problems in the low-lying areas are not expected to be eliminated or reduced.

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

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

Kahuku Agricultural Park includes lands that are designated by the State "Agricultural Lands of Importance" maps as Prime Agricultural Lands. The development of the agricultural park will serve the short-term uses of man's environment by providing farm lots and jobs to the tenant farmers.

Kahuku Agricultural Park will also enhance the long-term productivity of the land by using a valuable natural resource and helping to preserve the land in agriculture. Proper management of the resource will be provided by the State of Hawaii, insuring that this resource will be available in the future.



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

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

VIII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The development of Kahuku Agricultural Park will commit, for at least the term of the lease (30 years), about 555 acres of land. Approximately half of this area will be used for agriculture. The proposed project will also require the irretrievable commitment of electricity, construction materials, manpower, energy, and private and public funds.

IX. LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED

FEDERAL AGENCIES

Agricultural Stabilization and  
Conservation Service  
U.S. Department of Agriculture

Soil Conservation Service  
U.S. Department of Agriculture

Forest Service  
U.S. Department of Agriculture

Department of Housing and Urban  
Development

Environmental Protection Agency

Department of Commerce

Department of Energy

Department of the Air Force  
Base Commander

Department of the Army  
Commanding General  
Attn: Directorate of Engineering

U.S. Army - Corps of Engineers  
Honolulu District

Fish and Wildlife Service  
U.S. Department of the Interior

CONGRESSIONAL REPRESENTATIVES

Senate

The Honorable Daniel K. Inouye

The Honorable Spark M. Matsunaga

House of Representatives

The Honorable Daniel Akaka

STATE LEGISLATORS

Senate:

Honorable Ralph Ajifu

Honorable D.G. Anderson  
(Former member)

Honorable Mary George

House of Representatives:

Honorable Gerald T. Hagino  
(Former member)

Honorable Yoshiro Nakamura  
(Former member)

Honorable Yoshito Takamine

STATE AGENCIES

Mr. Hideo Murakami, Comptroller  
Department of Accounting & General  
Services

Ms. Georgiana K. Padeken, Director  
Department of Hawaiian Home Lands

Major General Valentine A. Seifermann  
Adjutant General (Former)  
Department of Defense

Ms. Donnis Thompson  
Superintendent (Former)  
Department of Education

Mr. Hideto Kono, Director (Former)  
Department of Planning & Economic  
Development  
Kamamalu Building

Ms. Jacqueline Parnell,  
Director (Former)  
Office of Environmental Quality  
Control

Mr. Roy Takemoto, Chairman (Former)  
Environmental Quality Commission

Mr. Susumu Ono, Director  
Department of Land & Natural  
Resources

Historic Sites Division  
Attention: Mr. Ralston Nagata  
Department of Land & Natural  
Resources

Mr. Franklin Sunn, Director  
Department of Social Services &  
Housing

Mr. Charles Clark, Director  
Department of Health

#### CITY COUNCIL

The Honorable Rudy Pacarro, Chairman (Former)  
City Council  
City and County of Honolulu

#### CITY & COUNTY OF HONOLULU

Honorable Eileen R. Anderson, Mayor

Mr. Roy A. Parker, Director (Former)  
Department of Transportation Services

Mr. Robert Masuda, Director (Former)  
Department of Parks and Recreation

Mr. Roy Tanji, Director  
Building Department

Mr. Michael McElroy, Director  
Department of Land Utilization

Mr. Andrew I.T. Chang,  
Managing Director  
City and County of Honolulu

Mr. Michael J. Chun, Director  
Department of Public Works

Mr. Kazu Hayashida  
Manager and Chief Engineer  
Board of Water Supply

Mr. Willard Chow, Director  
Department of General Planning

Mr. Edward Hasegawa, Executive  
Secretary (Former)  
Neighborhood Commission

Mr. Melvin M. Nonaka, Chief  
Honolulu Fire Department

PUBLIC UTILITIES

Hawaiian Telephone Company

Hawaiian Electric Company

Honolulu Gas Company

PRIVATE INDIVIDUALS AND COMMUNITY ORGANIZATIONS

Art Lowe, Inc.  
Attn: Mr. Bruce McElhoe

Kaaawa Community Assn.  
Dave Naud, President

Mr. Thomas N. Yamabe II, Pres.  
Kahuku Agriculture Co. (Hawaii) Inc.

Kahuku Community Assn.  
Mr. Thomas Pickard, Pres. (Former)

Kahuku Farmers Association  
c/o Toranosuke Nakamura

Kahuku Housing Corp.

Koolauloa Neighborhood  
Board No. 28

Mr. Bruce Smith

Kuilima Estates East  
Owners Association

Kuilima Estates Owners

Kuilima Hyatt Resorts  
Attention: Jan Leenders,  
General Manager

Laie Community Association  
Gladys Pualoa, President (Former)

North Shore Neighborhood Board  
No. 27

Sunset Beach Community Association  
Sharon Bruffey, President (Former)

Pat's at Punaluu

Sunset Hills Community Assn.  
Janet Husic, Secretary

Punaluu Community Assn.  
Creighton Matoon

Waialua Community Assn.  
Laura Bolles, President (Former)

Mr. Marcellino Pacheco

Hanohano Hale Owners Assn.

Life of the Land

Hauula Community Assn.  
Mr. Orin Jackson, President

Sierra Club, Hawaii Chapter

Outdoor Circle

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

X. COMMENTS AND RESPONSES TO THE PREPARATION NOTICE AND DRAFT EIS

X. COMMENTS AND RESPONSES TO THE PREPARATION NOTICE AND DRAFT EIS

Kahuku Agricultural Park  
Mailing List

The letters of response from the consulted parties are included on the pages indicated within the parenthesis after the zip code. Those without page numbers did not reply.

FEDERAL AGENCIES

U.S. Agricultural Stabilization  
and Conservation Service  
P. O. Box 50006  
Honolulu, HI 96850

Mr. Francis Lum  
State Conservationist  
U.S. Soil Conservation Service  
P. O. Box 50006  
Honolulu, Hawaii 96850 (X-5, X-40)

Mr. Kisuk Cheung, Chief  
Engineering Division  
U.S. Army-Corps of Engineers  
Honolulu District  
Building 230, Fort Shafter  
APO San Francisco, CA 96858 (X-39)

Facilities Engineer  
Naval Base Pearl Harbor  
Box 110  
Pearl Harbor; HI 96860 (X-41)

Director of Facilities Engineering  
U.S. Army Corps of Engineers  
Honolulu District  
Building 230  
Fort Shafter, HI 96858 (X-42)

STATE AGENCIES

Mr. Hideo Murakami, Comptroller  
Department of Accounting and  
General Services  
State of Hawaii  
1151 Punchbowl Street  
Honolulu, HI 96813 (X-7, X-43)

Directorate of Civil Engineering  
Department of the Air Force  
Headquarters 15th Air Base Wing  
(PACAF)  
Hickam Air Force Base, HI 96853(X-41)

Mr. Santos Valenciano  
Acting District Chief  
U.S. Geological Survey  
P. O. Box 50166  
Honolulu, HI 96850 (X-5, X-39)

U.S. Environmental Protection Agency  
P. O. Box 50003  
Honolulu, HI 96850

U.S. Fish & Wildlife Service  
P. O. Box 50167  
Honolulu, HI 96850 (X-14, X-49)

Commander, U.S. Coast Guard  
District Planning Officer  
300 Ala Moana Boulevard  
Honolulu, Hawaii 96850 (X-40)

Ms. Letitia N. Uyehara  
Interim Director  
Office of Environmental Quality  
Control  
550 Halekauwila Street, Room 301  
Honolulu, HI 96813 (X-8, X-56)



Ms. Georgiana Padeken, Chairman  
Department of Hawaiian Home Lands  
State of Hawaii  
335 Merchant Street, 3rd Floor  
Honolulu, HI 96813 (X-18, X-60)

Mr. Charles Clark, Director  
Department of Health  
State of Hawaii  
1250 Punchbowl Street  
Honolulu, HI 96813 (X-21, X-53)

Mr. Susumu Ono, Chairman  
Board of Land and Natural Resources  
State of Hawaii  
1151 Punchbowl Street  
Honolulu, HI 96813 (X-17, X-57)

Mr. Kent Keith, Director  
Department of Planning and  
Economic Development  
State of Hawaii  
Kamamalu Building  
250 South King Street  
Honolulu, HI 96813 (X-23)

Mr. Franklin Sunn, Director  
Department of Social Services  
and Housing  
State of Hawaii  
1390 Miller Street  
Honolulu, HI 96813

Mr. Paul A. Tom, Executive Director  
Hawaii Housing Authority  
State of Hawaii  
P. O. Box 17907  
Honolulu, HI 96817 (X-7, X-43)

#### CITY AGENCIES

Mr. William A. Bonnet, Director  
Department of Transportation  
Services  
City and County of Honolulu  
650 South King Street  
Honolulu, HI 96813 (X-10, X-66)

Mrs. Emiko Kudo, Director  
Department of Parks and Recreation  
City and County of Honolulu  
650 S. King Street  
Honolulu, HI 96813 (X-10, X-48)

Environmental Center  
University of Hawaii  
Crawford 317, 2550 Campus Road  
Honolulu, HI 96822 (X-63)

Water Resource and Research Center  
University of Hawaii  
2540 Dole Street  
Honolulu, HI 96822 (X-24, X-61)

Dr. N.P. Kefford, Dean  
College of Tropical Agriculture  
and Human Resources  
University of Hawaii  
3050 Maile Way  
Honolulu, HI 96822 (X-8, X-44)

Mr. Wayne Yamasaki, Director  
Department of Transportation  
State of Hawaii  
869 Punchbowl Street  
Honolulu, HI 96813 (X-20, X-55)

Dr. Donnis Thompson  
Superintendent of Education  
Department of Education  
State of Hawaii  
Queen Liliuokalani Building  
1390 Miller Street  
Honolulu, HI 96813 (X-9)

Major Jerry M. Matsuda  
Office of the Adjutant General  
Department of Defense  
State of Hawaii  
3949 Diamond Head Road  
Honolulu, HI 96816 (X-44)

Mr. Michael McElroy, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, HI 96813 (X-26, X-45)

Mr. Andrew I.T. Chang  
Managing Director  
City and County of Honolulu  
City Hall  
530 South King Street, 3rd Floor  
Honolulu, HI 96813 (X-11, X-45)

Dr. Michael J. Chun, Director  
Department of Public Works  
City and County of Honolulu  
650 S. King Street  
Honolulu, HI 96813 (X-29, X-48)

Mr. Kazu Hayashida  
Manager and Chief Engineer  
Board of Water Supply  
City and County of Honolulu  
630 South Beretania Street  
Honolulu, HI 96813 (X-31, X-67)

Mr. Willard Chow, Director  
Department of General Planning  
City and County of Honolulu  
650 South King Street  
Honolulu, HI 96813 (X-30, X-46)

Mr. Roy Tanji, Director  
Building Department  
City and County of Honolulu  
650 South King Street  
Honolulu, HI 96813 (X-11, X-47)

PRIVATE ORGANIZATIONS

Kahuku Housing Corporation  
P. O. Box 278  
Kahuku, HI 96731

Kuilima Hyatt Resort  
c/o Prudential Insurance Company  
Pacific Trade Center, Suite 1930  
190 South King Street  
Honolulu, HI 96813

Koolauloa Neighborhood Board, #28  
c/o Hauula S.C.H.  
54-010 Kukuna Road  
Hauula, HI 96717 (X-32)

Mr. Thomas N. Yamabe II, President  
Kahuku Agriculture Co. (Hawaii) Ltd.  
P. O. Box 4198  
Honolulu, HI 96813

Mr. Bruce Smith  
P. O. Box 168  
Kahuku, HI 96731

Mr. Melvin Nonaka, Chief  
Honolulu Fire Department  
City and County of Honolulu  
1455 South Beretania Street  
Honolulu, HI 96814 (X-12, X-46)

Mr. Douglas Gibb, Chief  
Honolulu Police Department  
City and County of Honolulu  
1455 South Beretania Street  
Honolulu, HI 96814 (X-13, X-47)

Mr. Joseph K. Conant, Director  
Department of Housing & Community  
Development  
650 South King Street  
Honolulu, HI 96813 (X-28)

Office of Council Services  
City Hall  
Honolulu, HI 96813

Life of the Land  
250 S. Hotel Street, Room 251  
Honolulu, HI 96813

Progressive Neighborhood Program  
335 Merchant Street, Room 101  
Honolulu, HI 96813

Outdoor Circle  
200 North Vineyard Blvd., Suite 502  
Honolulu, HI 96817

Mr. Edward S. McSweeney  
Manager of Operations  
Amorient Aquaculture  
International, Inc.  
P. O. Box 131  
Kahuku, HI 96731

East Oahu Farm Bureau  
c/o Mr. Joseph Matsukawa  
45-573 Duncan Drive  
Kaneohe, HI 96744

Amorient Aquaculture International  
Inc.  
P. O. Box 131  
Kahuku, HI 96731 (X-36)

Mr. Marcellino Pacheco  
c/o General Delivery  
Honolulu, HI 96731

Kahuku Community Association  
c/o Mr. Donald Hurlbut  
P. O. Box 278  
Kahuku, HI 96731

Mr. Russ K. Saito  
Network Engineering Director  
Hawaiian Telephone Company  
P. O. Box 2200  
Honolulu, HI 96805 (X-13)

Hawaii Historical Society  
560 Kawaiahao Street  
Honolulu, HI 96813

North Shore Neighborhood Board, #27  
P. O. Box 607  
Haleiwa, HI 96712

Kahuku Farmers Association  
c/o Mr. Toranosuke Nakamura  
P. O. Box 184  
Kahuku, HI 96731 (X-71)

Sierra Club, Hawaii Chapter  
P. O. Box 11070  
Honolulu, HI 96828

Oahu Banana Growers Association  
c/o Mr. Scott Chun  
47-762 Kamehameha Highway  
Kaneohe, HI 96744 (X-69)

Estate of James Campbell  
828 Fort Street Mall, Suite 500  
Honolulu, HI 96813

American Lung Association  
245 North Kukui Street  
Honolulu, HI 96817

50th State Dairy Farmers' Cooperative  
94-075 Leokane Street  
Waipahu, HI 96797

Hawaii Farm Bureau Federation  
215 Mokauea Street  
Honolulu, HI 96819

Mr. Richard L. O'Connell  
Manager, Environmental Department  
Hawaiian Electric Company  
P. O. Box 2750  
Honolulu, HI 96813 (X-13)



United States  
Department of  
Agriculture

Soil  
Conservation  
Service

P.O. Box 50004  
Honolulu, Hawaii  
96850

September 2, 1983

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto & Associates, Inc.  
1150 South King Street  
Honolulu, HI 96814

**RECEIVED**  
SEP 06 1983

WILSON OKAMOTO & ASSOCIATES

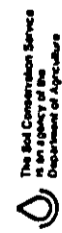
Dear Mr. Okamoto:  
Subject: EIS Preparation Notice, Kahuku Agricultural Park  
Kahuku, Oahu

We have no comments to offer at this time, but would appreciate the opportunity to review the Draft EIS on this project when it is completed. Thank you for the opportunity to review this document.

Sincerely,

*Francis C. Linn*  
FRANCIS C. LINN  
State Conservationist

cc:  
Paul J. Schwind, Chief Planner  
Planning and Development Office  
Department of Agriculture  
P.O. Box 22159  
Honolulu, HI 96822



The Soil Conservation Service  
is a part of the  
Department of Agriculture



United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division  
P.O. Box 50166  
Honolulu, Hawaii 96850

September 19, 1983

**RECEIVED**  
SEP 26 1983

WATER RESOURCES DIVISION

Mr. Gary Okamoto  
Project Manager  
Department of Agriculture  
Planning and Development Office  
P.O. Box 22159  
Honolulu, Hawaii 96822

Dear Mr. Okamoto:

Subject: EIS Preparation Notice for the  
Kahuku Agricultural Park

The Hawaii District Office of the U.S. Geological Survey, Water Resources Division, has reviewed the subject EIS preparation notice and has no comments at this time.

Thank you for giving us an opportunity to review the preparation notice.

Aloha.

*Santos Valenciano*  
Santos Valenciano  
Acting District Chief



DEPARTMENT OF THE ARMY  
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS  
FT SHAFTER, HAWAII 96839

August 26, 1983

RECEIVED  
SEP 01 1983

WILSON OKAMOTO & ASSOCIATES


Mr. Gary Okamoto, Project Manager  
Wilson Okamoto and Associates  
P.O. Box 3530  
Honolulu, Hawaii 96811

Dear Mr. Okamoto:

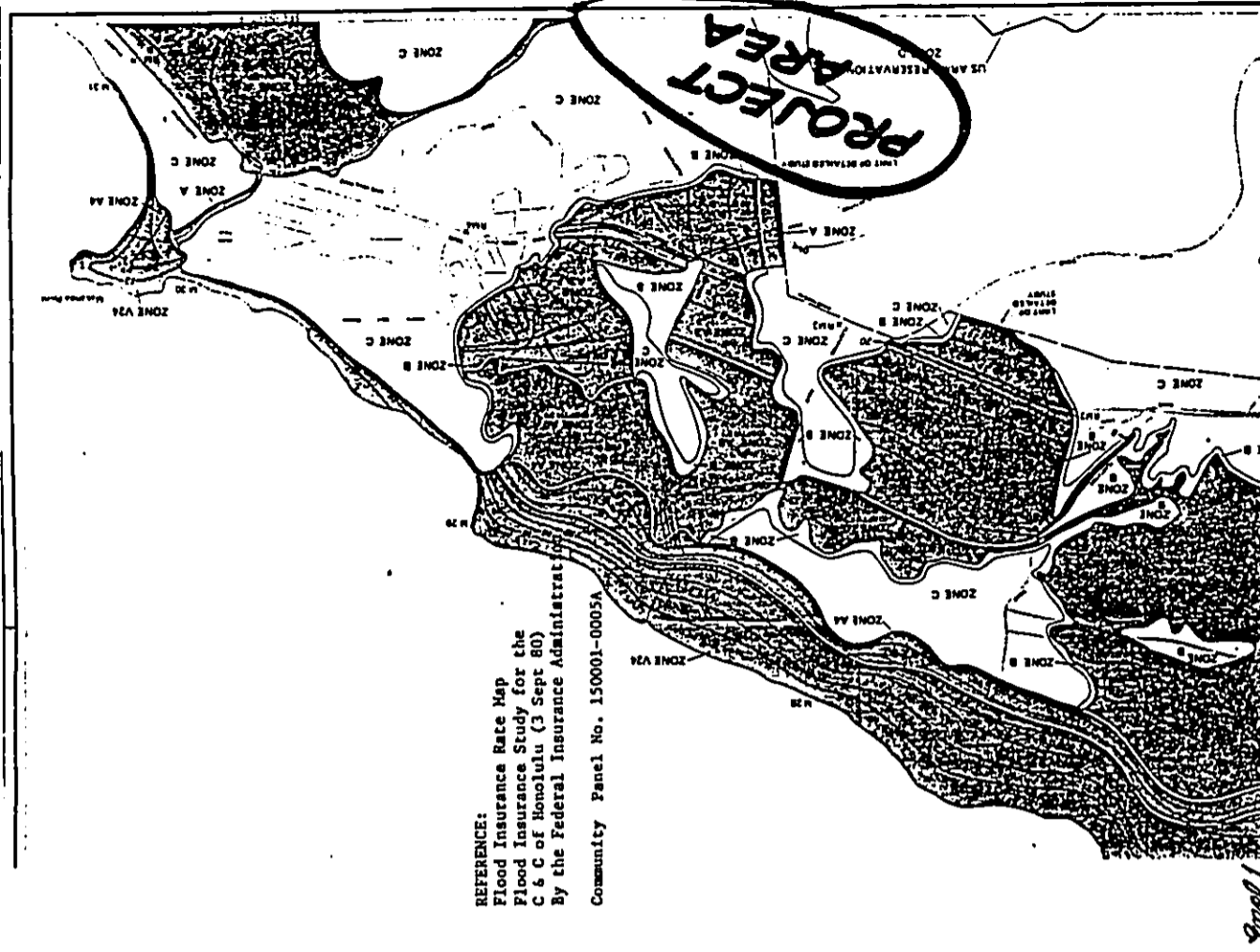
Thank you for the opportunity to comment on the EIS Preparation Notice for Kahuku Agricultural Park. The following comments are offered:

- a. The Department of the Army permit requirements are not applicable.
- b. Page III-4, III.A.4. (last paragraph). In the Kahuku area, taumamā inundation limits do not generally extend beyond one-third of a mile inland, whereas flood plain limits are shown about a mile inland on the Flood Insurance Rate Map (FIRM) for the area. The FIRM, attached as enclosure 1, shows the approximate location of the project site relative to the regulatory flood plain areas identified under the Flood Insurance Study for Oahu by the Federal Insurance Administration. Most of the site is designated Zone D, area of undetermined but possible flood hazards, or Zone C, area of minimal flooding. A small portion of the site is subject to riverine flooding and situated in the Keasālu Gulch flood plain of Zone A designation.

Sincerely,

  
Kisuk Cheung  
Chief, Engineering Division

Enclosure



GEORGE B. ANTONIO  
CONFIDENTIAL



STATE OF HAWAII  
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES  
P. O. BOX 114, HONOLULU, HAWAII 96810

HIDEO MURAKAMI  
COMPTROLLER  
STATE OF HAWAII  
HONOLULU, HAWAII 96810

LETTER NO. (P) 1686.3

AUG 23 1983

RECEIVED  
AUG 23 1983  
DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto & Associates  
P. O. BOX 3530  
Honolulu, Hawaii 96811

Dear Mr. Okamoto:

Subject: EIS Preparation Notice  
Kahuku Agricultural Park

We have reviewed the subject preparation notice and have no comments to offer.

Thank you for the opportunity to review the preparation notice.

Very truly yours,

*Hideo Murakami*  
HIDEO MURAKAMI  
State Comptroller



STATE OF HAWAII  
DEPARTMENT OF SOCIAL SERVICES AND HOUSING  
HAWAII HOUSING AUTHORITY  
P. O. BOX 1787  
HONOLULU, HAWAII 96817

August 17, 1983

RECEIVED  
AUG 17 1983  
DEPARTMENT OF SOCIAL SERVICES & HOUSING

Wilson Okamoto & Associates, Inc.  
P. O. Box 3530  
Honolulu, Hawaii 96811

Gentlemen:

SUBJECT: EIS Preparation Notice  
Kahuku Agricultural Park

The Hawaii Housing Authority has reviewed subject EIS preparation notice and has no specific comments to offer relative to the proposed action at this time.

Thank you for the opportunity to comment on this matter.

Sincerely,

*Paul A. Tom*  
PAUL A. TOM  
Executive Director

PAUL A. TOM  
EXECUTIVE DIRECTOR

BY MARY ALLEN

NO. 83:DEV/3904

GEORGE R. ANTOSH  
DIRECTOR



Leticia N. Uyehara  
Interim Director  
TELEPHONE NO.  
242-4013

STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
518 HALEKUPULA ST.  
ROOM 301  
HONOLULU, HAWAII 96813

September 6, 1983

RECEIVED  
WILSON OKAMOTO & ASSOCIATES

Mr. Jack Suwa, Chairman  
Board of Agriculture  
Department of Agriculture  
1428 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Suwa:

Subject: Preparation Notice for Kahuku Agricultural Park

We have reviewed the preparation notice and have no substantive comments to make. Thank you for providing us the opportunity to review your document.

Sincerely,

*Leticia N. Uyehara*  
Leticia N. Uyehara  
Interim Director

cc: Wilson Okamoto and Associates



University of Hawaii at Manoa

College of Tropical Agriculture and Human Resources  
Gilmore Hall 202 • 3050 Māhale Way  
Honolulu, Hawaii 96822

Office of the Dean and Director

September 9, 1983

RECEIVED  
WILSON OKAMOTO & ASSOCIATES

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto & Associates  
1150 S. King Street  
Honolulu, HI 96814

Dear Mr. Okamoto:

The EIS for the Kahuku Agricultural Park project was received by us on August 10, 1983. The study, we believe, adequately addresses the major environmental concerns of the project.

Thank you for the opportunity to comment on your report.

Yours sincerely,

*H. P. Kefferd*  
H. P. Kefferd  
Dean and Director of HITAH

JY  
cc: Yuki Kitagawa (w/attach.)

AN EQUAL OPPORTUNITY EMPLOYER

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

GEORGE S. JAYSON  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF EDUCATION  
P. O. BOX 2209  
HONOLULU, HAWAII 96810  
August 15, 1983

DR. DONALD H. THOMPSON  
SUPERINTENDENT

RECEIVED  
AUG 15 1983

PLANNING & ASSIGNMENT

OFFICE OF THE SUPERINTENDENT

Mr. Gary Okamoto  
Wilson, Okamoto & Associates  
1150 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Okamoto:

SUBJECT: EIS Preparation Notice  
Kahuku Agriculture Park

X-9

The Department of Education does not have any comments to offer on the proposed Kahuku Agriculture Park.

Thank you for the opportunity to review the project.

Sincerely,

*Donnis H. Thompson*  
for  
Donnis H. Thompson  
Superintendent

DHT:HL:J1

cc: Winward District  
Mr. James Edington

AN EQUAL OPPORTUNITY EMPLOYER





BUILDING DEPARTMENT  
CITY AND COUNTY OF HONOLULU  
HONOLULU MUNICIPAL BUILDING  
830 SOUTH KING STREET  
HONOLULU, HAWAII 96813



SILEEN M. ANDERSON  
MAYOR

ROY H. TANJJI  
DIRECTOR OF PLANNING AND BUILDING SUPERINTENDENT  
WILLIAM F. REMULAR  
DEPUTY DIRECTOR

PB 83-638

August 16, 1983

RECEIVED  
AUG 16 1983  
PLANNING & ASSOCIATES

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto & Associates  
1150 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Okamoto:

Subject: E. I. S. Preparation Notice  
Kahuku Agricultural Park  
Kahuku, Oahu, Hawaii

We have reviewed the Environmental Impact Statement  
Preparation Notice and have no comments.

Thank you for the opportunity to review the Agricultural  
Park located on the northern portion of the island of Oahu,  
between Kawela and Malaekahana Bays, in the Koolauloa district.

Very truly yours,

ROY H. TANJJI  
Director and Building Superintendent

cc: Dept. of Agriculture (Planning and Development Office)

X-11

DEPARTMENT OF LAND UTILIZATION  
CITY AND COUNTY OF HONOLULU  
850 SOUTH KING STREET  
HONOLULU, HAWAII 96813-4122



SILEEN M. ANDERSON  
MAYOR

MICHAEL M. HIELANDY  
DIRECTOR

ROBERT W. JONES  
DEPUTY DIRECTOR

August 15, 1983

LUB/83-4621(SM)

RECEIVED  
AUG 15 1983  
PLANNING & ASSOCIATES

Mr. Gary Okamoto  
Wilson Okamoto and Associates, Inc.  
1150 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Okamoto:

Environmental Impact Statement Preparation Notice (EISP/N)  
Kahuku Agricultural Park  
State of Hawaii - Department of Agriculture

Thank you for the opportunity to comment on the above. I have no  
specific comments to offer at this time; however, the issuance of an  
EISP/N is appropriate for a project of this nature and scope.

Specific comments to this EISP/N will be forthcoming from those City  
and County agencies solicited during this process. Any questions may  
be posed directly to those agencies.

Very truly yours,

ANDREW I. T. CHANG  
Managing Director

AITC:sj



HAWAIIAN TELEPHONE  
GTE

Russ K. Saito  
Network Engineering Director

September 8, 1983

RECEIVED  
SEP 13 1983

WILSON OKAMOTO & ASSOCIATES

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto & Associates  
P. O. Box 3530  
Honolulu, Hawaii 96811

Dear Mr. Okamoto:

EIS Preparation Notice, Kahuku Agriculture Park

Thank you for the opportunity to review and comment on this EIS Preparation Notice. We have no substantial comments to offer. If you have any questions, please call Richard Mau at 546-3650.

Sincerely,



cc: Department of Agriculture  
Planning & Development Office  
C. Kaneko

HAWAIIAN ELECTRIC COMPANY, INC.  
Box 2750 - Honolulu, Hawaii / 96840

August 29, 1983

RICHARD L. O'CONNELL, P.E.  
MANAGER, ENVIRONMENTAL DEPARTMENT  
(808) 546-3658

RECEIVED  
AUG 31 1983

Mr. Gary Okamoto  
Wilson, Okamoto & Associates  
P. O. Box 3530  
Honolulu, Hawaii 96811

Dear Mr. Okamoto:

Subject: Environmental Impact Statement Preparation Notice, Kahuku Agricultural Park

We have reviewed the subject Environmental Impact Statement Preparation Notice and find the project will have no effect on existing or planned company facilities.

Thank you for the opportunity to comment on this document.

Sincerely,



Richard L. O'Connell  
Manager, Environmental Department

JMP, Jr.:ca1

cc: Dept of Agriculture  
Planning & Dev. Ofc.

ENV 2-1  
NV/G



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
100 ALA MOANA BOULEVARD  
P. O. BOX 50187  
HONOLULU, HAWAII 96811

ES  
Room 6307  
SEP 1 1983

**RECEIVED**

SEP 1 1983

Mr. Gary Okamoto  
Wilson, Okamoto & Associates  
P.O. Box 3530  
Honolulu, Hawaii 96811

Mr. Okamoto & Associates

Re: EIS Preparation Notice  
Kahuku Agricultural Park

Dear Mr. Okamoto:

Thank you for forwarding a copy of the subject notice to us for review. My staff has prepared the following Service comments for your consideration during development of the final EIS for the Kahuku Agricultural Park. The preparation notice is comprehensive and generally presents an accurate description of fish and wildlife resources within the project area. Our specific comments are primarily directed toward an expanded discussion of storm water drainage and sedimentation effects within the James Campbell National Wildlife Refuge (NWR) which lies adjacent to the project area.

Page II-2, 2. Drainage Improvements. Our experience at the James Campbell NWR suggests that the present drainage system into and out of the refuge is inadequately sized for peak storm flows. Since the proposed action will put more water into the NWR, we suggest that the EIS address the need to improve the drainage capacity of the system.

Page II-3, 2. Drainage Improvements. The proposed siltation basins are expected to improve water quality during periods of normal rainfall; however, we doubt their ability to contain sediments during peak floods. We also suspect that the basins will not significantly reduce the volume of water reaching the NWR during flood discharge.

Page II-3, 3. Water System. What portion of the .98 mgd is expected to enter the drainage system as runoff rather than enter the ground as infiltration? In other words, what percentage of the increased flow in Kil ditch can the Service expect to receive into the NWR? How will this additional flow affect the capacity of the NWR to move water, and what would be the Service's increased pumping costs?

Page III-4, 4. Geology/Hydrology. The reference to the NWR should be corrected to read, "The U.S. Fish and Wildlife Service has established two units of the James Campbell NWR makai of the highway."



Save Energy and Yay Serve America!

III-6, a. Water System. The location and capacity of the existing drainage system (including the NWR's system) should be described in the EIS. Detailed reference should be made in the EIS to the recently completed flood hazard study contracted by Campbell Estate (1982).

III-8, Table 3. This table should include water use within the James Campbell NWR (acres in impoundment and estimated water use). Please note that the Service requires a mauka water source at the present time for the NWR; no groundwaters are being pumped within the refuge.

III-11, b. Fauna. The EIS should establish the use of areas adjacent to the NWR by waterbirds including endangered species, as these areas are well within the total area affected by the proposed development.

IV-1, 2. Erosion and Water Quality. This discussion requires substantial expansion to include the implications of water quality degradation and sedimentation upon wetland habitats within the NWR and upon endangered species.

IV-2, a. Flood Hazard. Long-term effects of flood hazards need to be more fully addressed in the EIS. Available information indicates that existing drainage ways are inadequately sized and configured to carry peak flows. The EIS must address how the proposed action will influence this existing condition.

IV-2, c. Water Quality. This discussion should be expanded to indicate what chemicals may be expected to enter the drainage system within the proposed subdivision, and in what quantities. Service data demonstrate that high concentrations of toxic substances exist in tissues of fishes and wildlife collected from the lower reaches of urbanized drainages on Oahu. In view of this knowledge, we wish to insure that all precautions are taken to avoid the long-term accumulation of such materials in animals inhabiting the NWR.

IV-2, d. Biological. The EIS must expand this discussion to include an evaluation of project-related impacts to the James Campbell NWR. This analysis should include the potential for increase in the number of stray, predatory dogs and cats on the refuge.

IV-4, 3. Economics. Once again, the ramifications associated with the Service's increased costs due to pumping project-related waters out of the refuge must be addressed. It is our opinion that those contributing to the increased flows should share the increased pumping expenses. We anticipate that the proposed development may lead to other expenses, such as: a) dollars lost if the project adversely impacts the production of endangered waterbirds; and b) increased ditch maintenance costs due to accelerated sedimentation. Cost sharing agreements must be developed and fully discussed in the EIS.



Please contact us directly to continue our dialogue concerning drainage problems, sedimentation effects, and refuge management cost sharing. I can assure you that you will receive coordinated assistance from both our Environmental Services, and Refuge and Wetland Resources staffs.

Sincerely,



for William R. Kramer  
Acting Project Leader  
Environmental Services

cc: RD, FWS, Portland, OR (AHR)  
Hawaii DOA  
Hawaii OEQC

(2396-01)  
October 21, 1983

Mr. William R. Kramer  
Acting Project Leader  
Environmental Services  
U.S. Fish & Wildlife  
Division of Ecology Services  
P.O. Box 50147  
Honolulu, HI 96850

Subject: Kahuku Agricultural Park

Dear Mr. Kramer:

Thank you for your letter of September 1, 1983, (ES Bure 6307) and your comments regarding the EIS Preparation Notice of the subject project. Subsequent to receipt of your letter, a meeting was held with the Department of Agriculture (D-A), Messrs. Chalton, Hester, Hester and Foster of your department, and the Consultants. A copy of the meeting notes has been sent to Mr. Chalton. The following responses to your comments are based on the discussion in that meeting.

11-2, 3. Drainage Improvements. The proposed land uses and drainage improvements will not significantly increase the peak discharge generated from the proposed Agricultural Park. Drainage improvements outside of the project boundaries are beyond the scope of this project.

11-3, 4. Drainage Improvements. Siltation basin sizing was based upon the City & County of Honolulu, Department of Public Works (November 1975) Soil Erosion Standards, Section 11.0. These standards develop measures for controlling soil erosion and sedimentation arising from land disturbance operations (i.e., during construction). Consequently, because runoff silt loads are usually much lower during normal operation operations than during construction, the siltation basins were conservatively sized to control sedimentation downstream (particularly at the James Campbell National Wildlife Refuge). Some of the water collected in the basins will be allowed to percolate. While, the siltation basins are not designed to significantly reduce the drainage volume, peaks will be attenuated.

C7496-01  
Letter to Mr. William R. Krazer  
October 21, 1983  
Page 2

II-2, 7. Water System. Due to the high cost of irrigation water and the development of the system, the tenant farmers can be expected to practice good conservation methods. Therefore, runoff from the 0.03 IAD is not expected to be significant and no increase of surface flow is anticipated.

III-1, 4. Geology/Hydrology. Reference to the HRR will be corrected as noted.

III-1, 5. Water System. The drainage study contracted by Cypriell Estate will be considered in the preparation of the draft EIS.

III-2, Table 3. The estimated water usage indicated in Table 3 refers to water currently being pumped from wells and not surface flows.

III-1, 6. Fauna. Reference will be made to the use of areas adjacent to the HRR by endangered species.

IV-1, 2. Erosion and Water Quality. The siltation basins will be designed in accordance with the City and County Grading, Soil Erosion, and Sediment Control ordinance to minimize adverse impacts.

IV-2, 3. Flood Hazard. The Xeluku Agricultural Park project will not increase flood hazard conditions for downstream areas. Improvements to the drainage system outside the Agricultural Park are beyond the jurisdiction of the project and the State.

IV-2, 4. Water Quality. Coordination has been initiated between the State DQA and ISFMS to address the potential impacts of agricultural chemicals on the HRR. The draft EIS will expand on this section.

IV-2, 4. Botanical. The lease conditions for the Agricultural Park prohibit any drilling units on the farm lots. Therefore, the Agricultural Park should not add to the present number of stray dogs and cats in the area.

C7496-01  
Letter to Mr. William R. Krazer  
October 21, 1983  
Page 3

IV-4, 1. Economics. As mentioned previously, the proposed drainage improvements will not increase surface runoff and therefore the project should not increase the present pumping requirements. The State is only one of a number of tenants in the area and if any effective and equitable cost sharing agreements are developed they will have to be executed between the landowners and all affected tenants.

We appreciate your comments and please feel free to contact me if you have any further questions or comments. We look forward to working with your Department on this project.

Sincerely,

*RC*

RC  
Project Manager

CC/ET/ugh

cc: Department of Agriculture



GEORGE B. ARYTOGH  
Director of Planning



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
P. O. BOX 921  
HONOLULU, HAWAII 96809

SEP 12 1983  
RECEIVED  
11:13 AM

WATER RESOURCES & AQUIFERS

Mr. Gary Okamoto, Project Manager  
Wilson Okamoto & Associates  
1150 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Okamoto:

We appreciate the opportunity to comment on the notice that an environmental impact statement (EIS) is being prepared for the Kahuku Agricultural Park.

We note that on page II-6 No. 5 of the notice, there is a statement that this department is to operate and maintain the irrigation system. To our knowledge, no definite commitment has been made for this agency to operate and maintain the irrigation system.

Sincerely,

*Susumu Ono*  
SUSUMU ONO  
Chairperson

Board of Land and Natural Resources

cc: Department of Agriculture  
Attn: Planning & Development Office

SUSUMU ONO, CHAIRMAN  
Board of Land and Natural Resources  
EDGAR A. MULLU  
SECRETARY TO THE COMMISSION  
DIVISIONS:  
AGRICULTURE DEVELOPMENT  
PROGRAM  
LAND AND NATURAL RESOURCES  
CONSERVATION AND  
RECREATION  
CONTRACTS  
LAND MANAGEMENT  
STATE PLANS  
WATER AND LAND DEVELOPMENT

C2496-01  
December 28, 1983

Mr. Susumu Ono  
Department of Land & Natural Resources  
State of Hawaii  
1151 Punchbowl Street  
Honolulu, Hawaii 96813

Subject: Kahuku Agricultural Park

Dear Mr. Ono:

Thank you for your letter of September 12, 1983 and your comments regarding the EIS Preparation Notice for the subject project.

The Department of Agriculture and their consultants have coordinated with the Department of Land and Natural Resources throughout the planning phase of this project. The irrigation system was of particular concern and modifications were made to the originally proposed system to comply with PLR recommendations. The system will be designed such that upon completion of the project, the irrigation system will be acceptable to DLNR. Design modifications, to comply with DLNR specifications, and past correspondence have led DLNR to the assumption that DLNR will operate and maintain the irrigation system.

We appreciate your comments and please feel free to contact me if you have any further questions.

Sincerely,

*Gary Okamoto*  
Gary Okamoto, Director  
Planning Department

EO/ry

cc: Department of Agriculture



GEORGE B. ANTOSH  
DIRECTOR OF LANDS

PROJECT OFFICES  
HONOLULU OFFICE  
P. O. BOX 125  
KALANIANA'OHOLE, HAWAII 96812

KAUNAOHOU OFFICE  
P. O. BOX 612  
KAUNAOHOU, HAWAII 96741



HAWAIIAN STATE ARCHIVES

3 SEP 20 A 7:49

STATE OF HAWAII  
DEPARTMENT OF HAWAIIAN HOME LANDS

P. O. BOX 1079  
HONOLULU, HAWAII 96813

September 28, 1983

PROJECT OFFICES  
MAUI OFFICE  
P. O. BOX 22  
KAMAHELE, MAUI 96752

HONOLULU OFFICE  
P. O. BOX 116  
HONOLULU, HAWAII 96813

KAUAI OFFICE  
P. O. BOX 329  
LAILOA, KAUAI 96741

The Honorable Jack Suka, Chairman  
September 28, 1983  
Page Two

However, the need for coordination between production and marketing is critical. The consultants might go further than they did in this report and discuss an appropriate mechanism to facilitate coordination, and the organizations that might be represented--Hawaii Farm Bureau, Department of Agriculture, Wholesalers Association and farmers in Kahuku.

We hope that you will find these comments of assistance. Should you have any questions, please contact Mr. Bryan Begley of our Land Management Division at telephone 548-2685.

GKP:RF:BB:jm

RECEIVED  
SEP 28 1983

MEMORANDUM

TO: The Honorable Jack Suka, Chairman  
Department of Agriculture

FROM: Georgiana K. Padeken, Chairman  
Hawaiian Homes Commission

SUBJECT: Environmental Impact Statement (EIS) for Kahuku Agricultural Park

We have reviewed Wilson Okamoto and Associates' EIS for the proposed agricultural park at Kahuku. Our review and comments are listed below.

Background:

The proposal to make over 200 acres of land on Oahu available for diversified farming has considerable merit. We fully support this. Therefore, in making the following comments, our concern is primarily to strengthen the proposal.

1. On page 11-1, reference is made to the fact that the park will consist of 555 acres. In fact, a little over 200 acres will be used for crops. Use of the additional acreage as a buffer zone and its relatively low cost should be more clearly explained.
2. On page 11-4, table 2 summarizes the cost of capital improvements and annual operations and maintenance. At \$16,000 per acre for infrastructural costs, these appear quite modest investments, but comparative figures should be used to illustrate this.
3. The consultant might also be requested to set out the framework within which the park fits.

By creating an agricultural park in Kahuku, the State is providing farmers with good land at reasonable prices. In addition, the Department of Agriculture supports farmers with low interest loans. Farmers then have the responsibility for raising crops, using sound production techniques and marketing them.

C2496-01  
December 20, 1983

Ms. Georgiana K. Padeken  
Chairman, Hawaiian Homes Commission  
Department of Hawaiian Home Lands  
State of Hawaii  
P. O. Box 1279  
Honolulu, HI 96805

Subject: Kahuku Agricultural Park

Dear Ms. Padeken:


This is in response to the memorandum of September 28, 1983 sent by you to Mr. Jack Suwa of the Department of Agriculture.

1. **Acresage:** The text of the draft EIS has been expanded to explain the buffer area more clearly.
2. **Cost:** Chapter V of the draft EIS discusses alternatives, cooperative costs, and the rationale for selection of the proposed improvements.
3. **Overview:** A discussion is included in the draft EIS on how the Kahuku Agricultural Park will address the State's goals, objectives and policies as outlined in the State Plan and the State Agricultural Park Program.

The proposed Tenants Association can serve as a means to initiate a cooperative and coordinated, production and marketing effort by the farmers. It can also serve as a unified body to facilitate communication between the farmers and industry organizations and experts.

We appreciate your comments and please feel free to contact us if you have any further questions.

Sincerely,

  
Gary L. Amato, Director  
Planning Department

GD/ry

cc: Department of Agriculture

GEORGE A. JAYGOSH  
Governor



ATKINSON HIGASHIMOMA, Ph.D.  
DIRECTOR

DEPUTY DIRECTORS  
WAYNE J. WAKABU  
JAMES H. HOKUMI  
JONATHAN K. SHIMADA, Ph.D.  
CHERYL D. SOON

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
400 KAUAI AVENUE, FIFTH FLOOR  
HONOLULU, HAWAII 96813

August 23, 1983

BEFORE REFER TO:  
STP 8.9308

RECEIVED

AUG 23 1983

WILLIAM T. KAPALAMA

Mr. Gary Okamoto  
Project Manager  
Wilson, Okamoto & Associates  
1150 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Okamoto:

EIS Preparation Notice  
Kahuku Agricultural Park

Thank you for referring the subject notice to us for consultation.

While we concur with your conclusion that the anticipated traffic to be generated by the agricultural park is not expected to have any significant adverse impact on the highway, we suggest for purpose of evaluation that you include in the EIS a discussion about the kinds and the magnitude of traffic that might be expected to be on the highway and about the traffic experience (turning movements) that might be expected at the intersection of the access road with Kamehameha Highway.

Very truly yours,

*Ryokichi Higashimoma*

Ryokichi Higashimoma  
Director of Transportation

(2496-0)  
October 21, 1983

Dr. Ryokichi Higashimoma  
Department of Transportation  
State of Hawaii  
300 Punchbowl Street  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park

Dear Dr. Higashimoma:

Thank you for your letter (STP B.9308) of August 23, 1983 and for your comment on the EIS Preparation Notice for the subject project.

A discussion of the kinds and magnitude of traffic that might be generated by the proposed agricultural park, will be included in the draft EIS document.

We appreciate your comments and please feel free to call me if you have any further questions or comments.

Sincerely,

*Gary Okamoto*  
Gary Okamoto, Project Manager

G/OE/TA

cc: Department of Agriculture



GEORGE B. ANTONIO  
Deputy Director of Health



STATE OF HAWAII  
DEPARTMENT OF HEALTH  
P. O. BOX 3328  
HONOLULU, HAWAII 96811

CHARLES S. CLARE  
Director of Health

September 9, 1983

RECEIVED  
SEP 14 1983

In Reply, Please Refer to  
EPDS-88

Mr. Gary Okamoto, Project Manager  
Wilson Okamoto & Associates  
P. O. Box 3530  
Honolulu, Hawaii 96811

STATE OF HAWAII  
DEPARTMENT OF HEALTH

Dear Mr. Okamoto:

Subject: Request for Comments on the Preparation Notice for an Environmental Impact Statement (EIS) for Kahuku Agricultural Park

X-21

Thank you for allowing us to review and comment on the subject proposed EIS. The following comments should be considered when preparing the draft EIS:

Noise Prevention

1. The Environmental Impact Statement should include projections of the noise impact of the Agricultural Park on adjacent residential areas. Farm equipment such as pumps, generators, tractors, and loaders may adversely impact areas such as the Koolauloa Support Housing project.
2. The proposed project may be designed to comply with the provisions of Title 11, Administrative Rules Chapter 43, Community Noise Control for Oahu.
3. Construction activities must comply with the provisions of Title 11, Administrative Rules Chapter 43, Community Noise Control for Oahu.
4. Increased heavy vehicle traffic along Kamehameha Highway may adversely affect Kahuku High and Elementary School.

General Sanitation

1. The intermixing of livestock farming operations with truck farms and nurseries is not conducive to good farming practices. This is reflected in different ways:
  - a. The use of insecticide and fungicide sprays in nursery and truck farm operations will have adverse effects on the animals and poultry unless separated by large buffer zones.

Mr. Gary Okamoto

-2-

September 9, 1983

- b. The offensive odors generated by the livestock farms may be unbearable to the nurserymen and truck farmers living downwind or within the close proximity.
2. An acceptable method for disposing of liquid and solid wastes from the livestock farms should be designed and implemented. The current practice of selling poultry farm manure to truck farmers as fertilizer has not been too successful. The use of oxidation ponds to dispose of liquid wastes from hog and dairy farms has had only limited success due to poor maintenance. Recycling has been undertaken, but has encountered problems of economic unfeasibility.
  3. Without a feasible means of manure disposal, the trend is to stockpile the manure within the farms' premises. Under normal conditions, odors are minimal, but during the rainy season, the odors become pungent, and at times, unbearable. Also, stockpiled manure may be washed down into the lower sections and pond in the waste areas. The resulting nuisances will have a detrimental effect on the resort development of Kuliama.

Safe Drinking Water

1. The Department of Health is vested with the responsibility to assure that public water systems in the State are providing water which is in compliance with the State's drinking water regulations known as Chapter 20, Title 11, Administrative Rules. A public water system is defined as a system serving 25 or more individuals at least 60 days per year or having a minimum of 15 service connections. If a new well and distribution system or a substantially modified distribution system is intended to serve these minimum numbers of persons or service connections, please be advised that the well and distribution system will be subject to the terms of Section 11-20-29 and Section 11-20-30 of Chapter 20 respectively.
2. In the event that the proposed well is solely intended to serve irrigation or other non-domestic purposes, or if the proposed well will not serve the minimum number to qualify as a public water system, then the new well and distribution system are not subject to Chapter 20 requirements. However, if at some point in the future, the decision is made to use the water for potable purposes, or if the system expands to meet the minimum service population or number of service connections, the source and distribution system will be subject to Chapter 20 requirements.
3. We also emphasize the necessity for protection of water sources from potential pesticide and/or herbicide contamination. These chemicals shall not be allowed to contaminate ground water or surface water sources in any way. Distribution systems should also be protected from contamination through the use of proper backflow prevention devices.

Sincerely, yours,

*Melvin K. Kozlowski*  
MELVIN K. KOZLOWSKI  
Deputy Director for  
Environmental Health

cc: Dept. of Agriculture

C2495-01  
October 21, 1983

Mr. Helehu K. Koiuzumi  
Deputy Director for Environmental Health  
Department of Health  
State of Hawaii  
P. O. Box 372  
Honolulu, HI 96913

Subject: Kahuku Agricultural Park  
Re: Mr. Koiuzumi:

Thank you for your letter of September 9, 1983 (EPHSD-SS) and your comments regarding the EIS Preparation Notice for the subject project. The following is a point by point response to your comments.

Noise Prevention

The proposed agricultural park will be designed and constructed in compliance with the provisions of Title II, Administrative Rules Chapter 43, Community Noise Control for Oahu. In addition, projections of noise impacts on adjacent residential areas will be included in the draft EIS.

General Sanitation

Livestock operations are not among the land uses proposed for the agricultural park. It was considered as an alternative, however, due to environmental impacts and the high cost of waste disposal. It was not considered further.

Safe Drinking Water

The proposed water system will be used for irrigation only. There will not be any residences allowed within the agricultural park. Therefore, the proposed system will not be subject to the terms of Chapter 20. The proposed water system will be designed with appropriate backflow prevention devices to protect against contamination.

We appreciate your comments and please feel free to call me if you have any further questions or comments.

Sincerely,

*GC*  
Mr. Gary Ozemoto, Project Manager

GC/ET/s

cc: Department of Agriculture



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

GEORGE R. ARONSON  
KENT M. KEITH  
FRANK S. WATSON

STATE OF HAWAII, DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT, P.O. BOX 2009, HONOLULU, HAWAII 96814

September 6, 1983

Ref. No. 8039

RECEIVED

SEP 16 1983

PLANNING & ASSOCIATES

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto & Associates  
1150 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Okamoto:

Subject: EIS Preparation Notice, Kahuku Agricultural Park, Oahu

We have reviewed the subject preparation notice and find it to be a satisfactory representation of project impacts and possible mitigating measures.

However, the section on public land use policies and controls (Page III-9) should include reference to The Hawaii State Plan. The EIS should cite the appropriate objectives and policies of The Hawaii State Plan and the State Agriculture Plan and indicate the manner in which the project addresses these objectives and policies.

Thank you for this opportunity to comment on the subject preparation notice.

Very truly yours,

*M. Keith*  
for Kent M. Keith

cc: Planning & Development Office, Dept. of Agriculture  
Office of Environmental Quality Control

C2495-01  
October 21, 1983

Mr. Kent M. Keith, Director  
Department of Planning & Economic Development  
State of Hawaii  
250 S. King Street  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park

Dear Mr. Keith:

Thank you for your letter of September 5, 1983 (Ref. No. 8039) and for your comments regarding the EIS Preparation Notice for the subject project.

In preparation of the draft EIS document, reference will be made to the appropriate objectives and policies of the Hawaii State Plan and the State Agricultural Plan.

We appreciate your comments and please feel free to call us if you have any further questions or comments.

Sincerely,

*G. Kamito*  
Gary Kamito, Project Manager

GK/ET/2

cc: Department of Agriculture



**University of Hawaii at Manoa**

Water Resources Research Center  
 Holmes Hall 283 • 2540 Dole Street  
 Honolulu, Hawaii 96822

20 September 1983

RECEIVED  
 S.E.P. 1983

Mr. Gary Okamoto  
 Wilson Okamoto & Associates  
 P. O. Box 3530  
 Honolulu, Hawaii 96814

1983-09-20 10:00 AM  
 MRS. OKAMOTO & ASSOCIATES

Dear Mr. Okamoto:

**Subject:** EIS Preparation Notice, Kahuku Agricultural Park

We have reviewed the subject EISPN and offer the following comments:

- (1) P. II-3, 3. Water System. Average consumption rates of 6,000 gallons/acre/day for nursery and 4,000 gallons/acre/day for truck crops is proposed as the design demand. Is this based on an annual average? If it is, the rate may be too low because it is during the dry summer months that the irrigation consumption is the highest and the winter months is the lowest. Therefore, an average for the whole year will not reflect peak consumption periods, for which the system will need to be designed.
- (2) P. II-4, Sewage Improvements. How will the use of the sewage collection system be enforced to insure sanitary conditions?
- (3) What is the possibility of constructing ponds to catch runoff, the water from which could subsequently be used for irrigation? Since the sustainable groundwater yield for the Kahuku area is only 15 mgd (p. III-7), surface sources which would otherwise be wasted, could provide lower grade water for irrigation.

Thank you for the opportunity to comment. This material was reviewed by MRRC and affiliate personnel.

Sincerely,  
  
 Edwin T. Murabayashi  
 EIS Coordinator

ETM:jm

cc: Dept. of Agriculture

AN EQUAL OPPORTUNITY EMPLOYER

C2496-01  
 December 28, 1983

Mr. Edwin T. Murabayashi  
 Water Resources Research Center  
 University of Hawaii  
 Holmes Hall 283  
 2540 Dole Street  
 Honolulu, Hawaii 96822

**Subject:** Kahuku Agricultural Park  
**Dear Mr. Murabayashi:**

Thank you for your letter of September 20, 1983 and your comments regarding the EIS Preparation Notice for the subject project.

- 1. Water System. It has been determined, through coordination with the Department of Land and Natural Resources, that the average consumption rates of 6,000 gallons/acre/day for nursery and 4,000 gallons/acre/day for truck crops and orchards can be used as the demand factor in the design of the irrigation system. There are other factors that are applied in the design of the system to account for fluctuations in the daily or seasonal demands. In addition, the 6,000 and 4,000 gallon figures were applied to the gross acreage, including roads, windbreaks, drainage ditches, and retention basins, which means there will be a greater amount of water available for the net cultivated area.
- 2. Sewage Improvements. Lease conditions prohibit the construction of any facilities in the agricultural park except for security purposes. Therefore, it is unlikely that there will be any sewage facilities on-site. If, however, there are individual on-site holding tanks, the proper use of those units will be the responsibility of the individual user. Department of Health regulations control the use of such private wastewater treatment systems.
- 3. Low grade irrigation. The proposed irrigation system will be designed to permit all methods of irrigation including overhead spray and drip irrigation. Drip irrigation requires water that is relatively free of suspended particles, to prevent clogging. Use of lower grade surface water may require filters which could increase irrigation costs.

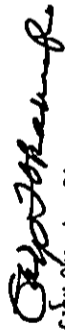
UNIVERSITY OF HAWAII AT MANOA

C2496-01  
Letter to Mr. Edwin T. Murabayashi  
Page 2  
December 20, 1983

The proposed irrigation system will be metered and the farmers will pay for the amount of water they use. If a farmer wishes to use the lower grade water from the retention basins and thereby reduce the amount of metered water used, he may do so at his own expense.

We appreciate your comments and please feel free to contact me if you have any further questions.

Sincerely,



Saki Yamoto, Director  
Planning Department

EO/ry

cc: Department of Agriculture



DEPARTMENT OF LAND UTILIZATION  
**CITY AND COUNTY OF HONOLULU**  
 630 SOUTH KING STREET  
 HONOLULU, HAWAII 96813-1000



SILEEN R. ANDERSON  
 CLERK

MICHAEL H. McELROY  
 DIRECTOR

ROBERT S. JONES  
 ASSISTANT DIRECTOR

LUB/93-4621(LH)

September 9, 1983

**RECEIVED**  
 SEP 16 1983

McELROY & ASSOCIATES

Mr. Gary Okamoto, Project Manager  
 Wilson Okamoto & Associates  
 P.O. Box 3530  
 Honolulu, Hawaii 96811

Dear Mr. Okamoto:

Environmental Impact Statement Preparation Notice (EISP/N)  
 Kahuku Agriculture Park  
 Tax Map Key 5-6-05: Portion G, Portion 9 and  
 5-6-03: Portion 2

X-26

We have reviewed the above EISP/N and have the following comments for your consideration.

1. Reference: Figure 3. Soil Types  
Comment: The document should include information on the site's susceptibility to erosion, and other pertinent soil characteristics.
2. Reference: Page 11-3, Water System  
Comment: A Board of Water Supply facility is located within the boundary of the Kahuku Agricultural Park. Information regarding this facility and whether it could be affected by this proposal, i.e., from chemicals, pesticides, and fertilizer, should be included in the Draft EIS.
3. Reference: Page 1V-2, Water Quality  
Comment: Runoff generated by the Kahuku Agriculture Park is estimated to be 2% over the natural runoff. How much will actually be retained by the proposed drainage plan? An inadequate drainage plan could cause the water quality in Kii Pond, a wildlife refuge, to deteriorate. The EIS document should provide information on proposed off-and on-site mitigation measures to protect the pond from sediment and agriculture contaminants.

Mr. Gary Okamoto, Project Manager  
 Page 2

4. Reference: Page IV-4, Economics

Comment: The lease negotiated with Campbell Estate prohibits residential dwellings on the lots. How will this restriction affect demand and the marketability of the agriculture lots to prospective tenants?

5. Comment: Will restrictions be imposed on the use of chemicals, fertilizers, and pesticides to protect ground and surface water resources, and wildlife habitats from contamination?

If you should have any questions or comments, please contact Lorene Haki of our staff at 527-5038.

Very truly yours,

MICHAEL H. McELROY  
 Director of Land Utilization

MHN:st

cc: State Department of Agriculture  
 Planning & Development Office



C2406-01  
October 21, 1983

Mr. Michael M. McElroy  
Department of Land Utilization  
City and County of Honolulu  
c/o S. King Street  
Honolulu, HI 96813

Subject: Kaimuku Agricultural Park

Dear Mr. McElroy:

Thank you for your letter of September 9, 1983 (LUS/93-4621 (L)) and your comments regarding the EIS Preparation Notice for the subject project.

Froton and water quality are major concerns that will be addressed in the draft EIS. We are working closely with the Department of Agriculture and the U.S. Fish and Wildlife Service, to mitigate any significant adverse impacts to the wildlife refuge. The two agencies are also evaluating the list of EPA approved chemicals that might be used in the Agricultural Park. The draft EIS will include a more detailed discussion of the proposed drainage system.

The Board of Water Supply (BWS) has been consulted with regard to the proposed well location and the proposed uses within the Agricultural Park. To date, the only restrictions the BWS has imposed on the project is that no wells be located within a radius of 1,000 feet of their domestic system well and that no concentrated livestock operations or sewage disposal be allowed within the proposed Agricultural Park. Coordination with the BWS will continue throughout the remainder of the project.

The residential dwelling restriction imposed by the lease will not have a significant effect on the demand or marketability of the lots in the Agricultural Park. The Department of Agriculture has a list of prospective tenants and due to the high demand for farm lots, it does not appear that the Department will have difficulty in leasing the lots out.

We appreciate your comments and please feel free to call me if you have any further questions or comments.

Sincerely,

*et*  
Mary Okamoto, Project Manager

MO/CT/la

cc: Department of Agriculture

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT  
**CITY AND COUNTY OF HONOLULU**

430 SOUTH KING STREET  
HONOLULU, HAWAII 96813  
PHONE 532-1151



SILEEN A. ANDERSON  
CLERK

JOSEPH K. CONANT  
DIRECTOR  
CHARLES H. TORIODE  
DEPUTY DIRECTOR

(2425-43)  
October 21, 1983

Mr. Joseph K. Conant, Director  
Department of Housing & Community Development  
City & County of Honolulu  
600 S. King Street, 5th Floor  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park  
Dear Mr. Conant:

Thank you for your letter of August 25, 1983 and for your comments regarding the EIS Preparation Notice for the subject project.

The State Agricultural Park Program was established to preserve arable land for agriculture and help farmers make use of these lands. In other State agricultural parks a single dwelling unit is permitted on each lot. However, in accordance with the State's lease with Campbell Estate no dwelling units will be allowed in the Kahuku Agricultural Park. The tenant farmers and employees must therefore commute to the agricultural park.

It is felt that the availability of good farm lots is a very critical issue with farmers already on waiting lists to obtain arable farm lots. Housing for farmers and employees does not seem to be of primary importance to those farmers on the waiting list, and due to lease restrictions, cannot be addressed by this project.

In your comment regarding the issue of local employment, we assure you are referring to the Koolauloa district and not the Koolauloa district as was stated in your letter. The rural and agricultural character of the Koolauloa district would seem to indicate that there would be no problems for farmers to satisfy employment needs with local residents. People in the area could easily commute to the farm lots, and are likely to have the appropriate experience to fill the positions.

We appreciate your comments and please feel free to call me if you have any further questions or comments.

Sincerely,

*[Signature]*  
JOSEPH K. CONANT

cc: Gary Okamoto, Project Manager  
GJ/EI/43

cc: Department of Agriculture

August 25, 1983

RECEIVED  
AUG 26 1983  
PLANNING & ANALYSIS

Mr. Gary Okamoto, Project Manager  
Wilson Okamoto & Associates  
P.O. Box 3530  
Honolulu, Hawaii 96811

Dear Mr. Okamoto:

Subject: EIS Preparation Notice: KAHUKU AGRICULTURAL PARK

The proposed development of a 555 acre Agricultural Park in Kahuku, Oahu, has been reviewed by this Department.

We understand that conditions of the lease agreement with Campbell Estate prohibit the development of any farm dwellings or residential units on the project site. Thus, we request that the environmental impact statement address the issue of farmer and employee housing.

We also request that the environmental impact statement address the issue of local employment and indicate whether Koolauloa Judicial District residents would be able to fill the jobs which would be created by the proposed Ag park. If not, how would employment needs be filled?

We shall retain the Draft EIS report in our files.

Sincerely,

DEPARTMENT OF PUBLIC WORKS  
**CITY AND COUNTY OF HONOLULU**  
650 SOUTH KING STREET  
HONOLULU, HAWAII 96813



EILEEN R. ANDERSON  
MAYOR

MICHAEL J. CHUN, PH.D.  
DIRECTOR AND CHIEF ENGINEER  
Hauroice H. Kaya  
Deputy Director  
ENW 83-216

August 22, 1983

**RECEIVED**  
AUG 23 1983  
PLANNING & DEVELOPMENT

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto and Associates  
1150 South King Street  
Honolulu, Hawaii 96814

Dear Mr. Okamoto:

Re: EIS Preparation Notice for the Kahuku Agriculture Park

We are responding to your letter dated August 1, 1983 regarding the subject project. Our comments are as follows:

1. If only individual on-site waste holding tanks will be permitted in the proposed agricultural park, private companies will have to be employed when these tanks require pumping.
2. We recommend against the use of crush coral pavement for the roadway improvements. Coral pavements are easily eroded by surface runoff and require extensive first aid treatment annually, whereas paved asphaltic roadways can be satisfactorily maintained without resurfacing for periods up to 12-15 years with minimal first aid treatment. Equivalent annual maintenance cost is roughly twice as much for an unpaved roadway than a paved one. Dust nuisance, in addition, is a constant source of irritation and complaints for unpaved roadways and should not be ignored. The City will not maintain any roadway that does not conform to the City's standards for agricultural subdivisions.
3. In designing peak runoff flows, we recommend the methodology employed in the City's storm drain standards. We assume that the drainage system including ditches, culverts, swales, and siltation basins will be maintained by the tenant association.

He ke aloha punehana,

MICHAEL J. CHUN  
Director and Chief Engineer

cc: State Dept. of Agriculture  
Attention: Planning and Development Office

02456-01  
October 21, 1983

Dr. Michael J. Chun, Director  
Department of Public Works  
City & County of Honolulu  
670 South King Street  
Honolulu, Hawaii 96813

Subject: Kahuku Agricultural Park

Dear Dr. Chun:

Thank you for your letter of August 22, 1983 (ENW 93-216) and your comments regarding the EIS Preparation Notice for the subject project.

The conditions of the master lease between the State of Hawaii and Campbell Estate prohibit any drilling units on the property. It is therefore unlikely that an on-site wastewater system will be constructed. However, if such facilities are necessary, established governmental regulations and controls will be consulted with, and maintenance will be the responsibility of the individual lessee.

A basic assumption in the recommended coral pavement roadway system, is that coral material will be available on-site. Maintenance of the roadway will be the responsibility of the tenant farmers and the tenants association. Due to lease conditions the roadway cannot be dedicated to the City and County, and have been designed with a service life equal to the term of the lease.

The calculation of the peak runoff was based on the methodology developed by the Soil Conservation Service. The City's storm drain standards will be evaluated for applicability to this project. The drainage facilities will be maintained by the tenant's association.

We appreciate your comments and please feel free to contact me if you have any further comments or questions regarding the subject project.

Sincerely,

Gary Okamoto, Project Manager

GO/EJ/AN

cc: Department of Agriculture

DEPARTMENT OF GENERAL PLANNING  
CITY AND COUNTY OF HONOLULU  
630 SOUTH KING STREET  
HONOLULU, HAWAII 96813



EILEEN R. ANDERSON  
MAKER

WILLARD T. CHOW  
CHIEF PLANNING OFFICER  
RALPH KAWAMOTO  
DEPUTY CHIEF PLANNING OFFICER

September 8, 1983  
RECEIVED  
MDAN22  
DCP8/83-8021

Wilson Okamoto & Associates  
P. O. Box 3530  
Honolulu, Hawaii 96811

WILSON OKAMOTO & ASSOCIATES

Attention: Mr. Gary Okamoto, Project Manager

Gentlemen:

EIS Preparation Notice, Kahuku Agricultural Park

Our comments on the above EIS preparation notice are as follows:

A concern is the preservation of Kahuku's Kii Pond as a wildlife refuge.

In the drainage scheme under consideration, Kii Pond is the proposed destination of drainage runoffs generated by the Kahuku Agricultural Park development prior to discharge into the ocean.

The U.S. Fish and Wildlife Service has established Kii Pond as a wildlife refuge and as a habitat area for a variety of water-birds including several native species. Considering the pond's sensitivity, safeguards to prevent agricultural fertilization and pesticide applications from discharging into the pond may need to be proposed.

It is also important that agricultural drainage and storm runoffs be monitored, and with evidence of pond contamination, mitigation steps be taken.

Sincerely,

*Ralph Kawamoto*  
RALPH KAWAMOTO  
Planner

APPROVED:

*W.T. Chow*  
WILLARD T. CHOW

cc: OEQC, DOA

C2146-01  
October 21, 1983

Mr. Willard T. Chow  
Department of General Planning  
City and County of Honolulu  
630 S. King Street, 6th Floor  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park

Dear Mr. Chow:

Thank you for your letter of September 8, 1983 (MDAN22/DCP8/83-8021) and for your comments regarding the EIS Preparation Notice for the subject project.

Your concern for the wildlife refuge is shared by the Department of Agriculture (DOA). The DOA is working with the U.S. Fish and Wildlife Service to ensure that the Kahuku Agricultural Park will not have any significant adverse impacts on the wildlife refuge. These efforts and any mitigative measures will be documented in the draft EIS.

We appreciate your comments and please feel free to call me if you have any further questions or comments.

Sincerely,

*Gary Okamoto*  
Mr. Gary Okamoto, Project Manager  
GO/RT/da

cc: Department of Agriculture

BOARD OF WATER SUPPLY  
CITY AND COUNTY OF HONOLULU  
625 SOUTH BERTANIA  
HONOLULU, HAWAII 96813



EILEEN R. ANDERSON, Mayor  
YOSHIE H. FUJINAKA, Chairman  
DONNA M. HOWARD, Vice-Chairman  
MILTON J. AGAOKA  
MICHAEL J. CHUN  
WALTER A. DOOS, JR.  
RICHARD H. KAWAHARA  
ERNEST A. WADSWORTH

September 8, 1983

KAZU HAYASHIDA  
Manager and Chief Engineer

RECEIVED  
SEP 11 1983  
CITY AND COUNTY OF HONOLULU

Mr. Gary Okamoto  
Project Manager  
Wilson Okamoto & Associates  
P. O. Box 3530  
Honolulu, Hawaii 96811

Dear Mr. Okamoto:

Subject: Your Letter of August 1, 1983,  
on the EIS Preparation Notice  
for Kahuku Agricultural Park

X-31

Thank you for your letter of August 1, 1983 on the EIS  
Preparation Notice for Kahuku Agricultural Park.

We have the following comments on the environmental document  
for the proposed project:

1. Our estimated consumption in 1982 is 7.91 mgd.  
(Ref: page IV-6)
2. The proposed park is planned to accommodate only  
nurseries and truck crops/orchards. However, should  
livestock and poultry operations be considered as  
viable uses in the park, discussions on water usage and  
sewage disposal are recommended to be included in the  
environmental document. (Ref: page II-1 and Fig. 3)

Thank you for allowing us the opportunity to review and  
comment on the proposed project.

If you have any questions, please call Lawrence Whang at  
527-6138.

Very truly yours,

*Kazu Hayashida*  
KAZU HAYASHIDA  
Manager and Chief Engineer

cc: Department of Agriculture  
Office of Environmental Quality Control

Water Bureau...man's...at...of...

CSADA-01  
October 21, 1983

Mr. Kazu Hayashida  
Manager & Chief Engineer  
Board of Water Supply  
City & County of Honolulu  
625 S. Bertania Street  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park

Dear Mr. Hayashida:

Thank you for your letter of September 8, 1983, and for your  
comments regarding the EIS Preparation Notice for the subject  
project.

Your estimate consumption for 1982 of 7.91 mgd. will be  
incorporated in the draft EIS.

Livestock and poultry operations will not be included in the  
Kahuku Agricultural Park. It was determined during the  
planning phase of the project that due to high costs and  
environmental impacts, livestock operations would not be  
feasible in this location. It was therefore removed from  
further consideration for the Kahuku Agricultural Park.

We appreciate your comments and please feel free to call me if  
you have any further questions or comments.

Sincerely,

*cc*  
Gary Okamoto, Project Manager

GO/EI/12

cc: Department of Agriculture

2446-01  
ST

KOOLAULOA NEIGHBORHOOD BOARD  
NO. 28  
Kahuku, Lilo, Hawaii, Punahele, Kapaemahu  
C/O MAUIA SATELLITE CITY HALL  
54 010 KUKUNA, RD.  
MAUIA, HAWAII 96117



RECEIVED  
SEP 20 1983

Sept. 20, 1983

Letitia N. Uyehara, Interim Dir.  
Office of Environmental Quality Control  
550 Hailkawa'ila Street  
Honolulu, Hawaii 96813

Ref: EIS Prep Notice-KAP

Dear Ms Uyehara:

Of concern to the Koolauloa Neighborhood Board #28 is that there be recognition that the promotion and development of Agriculture is a prime objective and goal of the Oahu General Plan and the Koolauloa Development Plan. It therefore is disturbing to note that although there is an abundant supply of water available in the Koolauloa area to support all forms of agriculture, references are being made to limiting this resource for this purpose.

We object to the premise that there will be a conflict over water needs that may limit agriculture/aquaculture development and expansion in Koolauloa. We feel strongly that water needs for areas outside of Koolauloa should be met by limiting development in those areas, not by depleting this resource which historically supported a very large agriculture industry in this area.

Reference to water in the Kahuku Agriculture Park EIS Prep Notice should note that this resource is not a limiting factor.

Enclosed please find comments received from Mr. Jeffrey Wallace of Amorient Aquafarm, Inc. We would like to have his comments regarding water needs as well as possible flooding problems included in this review.

Sincerely,

KOOLAULOA NEIGHBORHOOD BOARD #28

*Cathleen J. Mattoon*

Cathleen J. Mattoon, Chairman  
Planning and Zoning Committee

CH  
cc: Wilson Okamoto & Assoc.  
Part of Koolauloa

KOOLAULOA NEIGHBORHOOD BOARD  
NO. 28  
Kahuku, Lilo, Hawaii, Punahele, Kapaemahu  
C/O MAUIA SATELLITE CITY HALL  
54 010 KUKUNA, RD.



September 1, 1983

Jeffrey Wallace, Mgr.  
Amorient Aquafarm, Inc.  
P. O. Box 131  
Kahuku, Hi. 96731

Dear Mr. Wallace,

Neighborhood Board #28 is interested in receiving comments on the possible environmental effects of the proposed Kahuku Agricultural Park. Please review this preparation notice Environmental Impact Statement and return your comments as soon as possible.

Your assistance is greatly appreciated.

Sincerely,

KOOLAULOA NEIGHBORHOOD BOARD #28

*Cathleen J. Mattoon*

Cathleen J. Mattoon, Chairman  
Planning and Zoning Committee

CH

8/16/83

THE FOLLOWING COMMENTS ARE FOR YOUR CONSIDERATION CONCERNING THE KAWAKU AGRICULTURE PARK

① THE MOST IMPORTANT QUESTION I'M CONCERNED WITH, SPEAKING STRAIGHT FROM AMERICAN'S POSITION, IS THAT OF IDENTIFICATION AND ALLOCATION OF THE AVAILABLE WATER RESOURCES. IF IS MGD (P.I.I. 7) OR THE PREPARATION NOTICE IS ACCEPTED AS THE LIMIT OF USABLE WATER FOR THE FUTURE AREA THEN THE OVERLAP OF THE AGRICULTURE PARK WOULD VIRTUALLY ELIMINATE ANY POSSIBILITY OF FUTURE AGRICULTURE EXPANSION ON OUR EXISTING LANDS. WE BELIEVE THAT A RESTRICTION SUCH AS THIS IS NOT NECESSARY BECAUSE THE AVAILABLE RESOURCE IS BEING SUBSTANTIALLY UNDERESTIMATED BASED ON HISTORICAL USAGE WHICH HAS A TOTAL DRAFT OF 22 MGD. IT IS OUR POSITION THAT BOTH THE AG PARK AND ANY FUTURE EXPANSION ON OUR PART COULD BE DONE HANDS IN HAND AND NOT HAVE ANY ADVERSE EFFECT ON THE RESOURCE. I THINK IT SHOULD ALSO BE MENTIONED THAT OUR STATED USE OF WATER (P.I.I. 7, TABLE 3) DOES NOT ACCURATELY REFLECT ACTUAL CONSUMPTION BY OUR OPERATION. 1983 CONSUMPTION RATES ARE APPROXIMATELY 2 MGD AND THIS AMOUNT IS MINIMUMS REQUIRING CONSTANT MANAGEMENT WITH AN ASSUMPTION OF A HIGH DEGREE OF RISK FOR OUR POND.

②

THE AREA IN QUESTION IS, AFTER EXTENSIVE ACCEPTING FOR DEVELOPMENT IN MY MIND EVEN THOUGH THE DISTURBED AREA IS MINOR OF WHAT HAS ALREADY BEEN FOOTHOLES OF THE KOOLOA. HOWEVER BEING THAT THE MAJORITY OF THIS AREA IS NOT FERTILE IS A POTENTIAL PROBLEM WITH THE POSSIBILITY OF SUBSTANTIAL EROSION DURING HEAVY RAINS. THIS LEADS TO ANOTHER IMPORTANT POINT IN WHICH I'M CONCERNED WITH FROM AMERICAN'S POSITION STANDPOINT. THE PROPOSED DRAINAGE SYSTEM FROM THE PARK FLOWS ESSENTIALLY ALONG THE OUTER BOUNDARY OF A SECTION OF OUR FARM AND THEN INTO KAI STREAM FOR DISCHARGE INTO THE OCEAN. IT HAS BEEN OUR EXPERIENCE IN THE PAST THAT DURING TIMES OF HARD RAINS AND "SMALL FLOOD" CONDITIONS, HEAVY SILTATION OCCURS AND UNEXPECTEDLY ENDS UP IN THE LOW LANDS OR NEAR OF OUR EXISTING DRAINAGE SYSTEMS. THIS WE ARE FACED WITH ADDITIONAL COSTS IN REMOVING THE SILT IN ORDER TO MAKE OUR SYSTEM OPERATIONAL AGAIN. I CAN ONLY HOPE THAT THE PROPOSED SILT RETENTION BASINS (P.I.I. 7, TABLE 3) OF THE PREPARATION NOTICE WILL BE CAPABLE OF HANDLING THE ADDITIONAL SILT RUN OFF DURING THE AREA IS CREATED FOR FARMING.



③

OTHER THAN THESE TWO AREAS OF CONCERN I CAN SEE NO OTHER PROBLEMS WITH THE PARK ITSELF. HOWEVER WATER IS AND WILL ALWAYS BE THE LIMITING FACTOR FOR AGRICULTURAL DEVELOPMENT IN THE KATHIWA DESERT. IF LOW YIELDS (15 MGD) ARE BEING ACHIEVED NOW WITH THE VIEW TO PRESERVE EXISTING RESOURCES AS A FUTURE SOURCE OF POTABLE WATER FOR DOMESTIC USE, THEN NOW IS THE TIME TO CHALLENGE THIS. THE STATE AGRICULTURE PLAN CURRENTLY ASSUMES PRIORITY FOR DEVELOPMENT OF UNUSED WATER RESOURCES TO AGRICULTURE USE.

— JEFF

C2496-01  
October 21, 1983

Ms. Cathleen J. Hattoon, Chairman  
Planning and Zoning Committee  
Koolauloa Neighborhood Board #28  
c/o Hale Wai'a Satellite City Hall  
64-310 Kihuna Road  
Hauula, HI 96717

Subject: Kahuku Agricultural Park

Dear Ms. Hattoon:

This is in response to the comments you submitted to the Office of Environmental Quality Control dated September 20, 1983.

Protection and development of agriculture is a prime objective of not only the Oahu General Plan and Koolauloa Development Plan, but of the Department of Agriculture as well. However, development of agriculture must go hand-in-hand with proper consideration of all significant social, economical and environmental impacts. Development must be implemented in an orderly manner and not at the undue expense of other interests or the environment.

The Department of Land and Natural Resources (DLNR) and the Honolulu Board of Water Supply (BWS), the two primary agencies responsible for Oahu's water resources, have established the sustainable groundwater yield of 15 million gallons per day (MGD) for the Kahuku area. This means that the hydrological characteristics of the area allow an average recharge of the groundwater aquifer of 15 MGD. Withdrawal of more than 15 MGD over an extended period of time, could result in degradation of the aquifer, such as salt water intrusion.

The aquifer in the Kahuku area is actually part of a much larger groundwater source that underlies much of the Koolauloa District. Due to subsurface structure and condition, over-pumping of the aquifer in the Kahuku area could have even greater impacts in other areas, with no apparent ill-effects in the Kahuku area. Unlimited development in the Kahuku area could have serious impacts to existing agricultural and domestic water sources throughout the Koolauloa District.

Enclosed please find the response letter to comments received from Mr. Edward McSwamy of Moorland Aquaculture International, Inc. The comments are similar to those submitted by Mr. Jeffrey Wallace.

C2496-01  
Letter to Ms. Cathleen J. Hattoon, Chairman  
Page 2  
October 21, 1983

We appreciate your comments and please feel free to call me if you have any further questions or comments.

Sincerely,

*John Y. Okamoto*  
John Y. Okamoto, Project Manager

69/ET/2a

cc: Department of Agriculture

**AMORIENT  
AQUACULTURE  
INTERNATIONAL**

RECEIVED

8009 293 8531  
TELEX PCA 723 8416

P.O. BOX 131, KAHUKU, HAWAII 96731

August 26, 1983

Wilson Okamoto & Associates  
P. O. Box 3530  
Honolulu, HI 96811

Attention: Mr. Gary Okamoto

Dear Mr. Okamoto:

SUBJ: EIS, Kahuku Agricultural Park

The following comments are for your consideration in the preparation of the Environmental Impact Statement for the Kahuku Agricultural Park.

Amorient Aquaculture Intl., Inc., formerly Lowe Farms, Inc. conducts agricultural and aquacultural operations in the vicinity of the proposed park. We have no objections to the proposed Ag Park, per se, but the ESI preparation notice raises some questions which should be addressed in the process.

1. We are particularly concerned with the identification and allocation of available water resources. We believe that the available resource is substantially underestimated at 15 mgd (p. III-7 of the Preparation Notice) as evidenced by historic use. It is important to accurately identify the sustainable yield of this resource so that development of agricultural lands is not unnecessarily restricted. We feel that a low sustainable yield may have been identified with a view to preserving existing aquifers as a future source of potable water. The Kahuku area has a high percentage of prime or important agricultural lands and therefore should be protected from extensive urbanization, reducing the need for allocation of present capacity to future potable supplies. In addition, the State Agriculture Plan clearly assigns priority for development of unused water resources to agricultural use.

Wilson Okamoto & Associates 2

August 26, 1983

2. Inherent in the conflict between agricultural and potable uses is the assumption that degradation of groundwater occurs as a result of Agricultural use. We believe that the geological and hydrological characteristics of the area are such that permanent degradation of groundwater quality will not occur under normal agricultural practices. In other words, any degradation from potable water standards which might result from agriculture would be both minor and reversible.

3. Water use by Amorient's agricultural operations varies significantly depending on environmental conditions, principally rainfall. Conversion of part or all of this land to aquaculture, an option which is important to future profitability of these lands, would require a significantly increased water allotment. If the 15 mgd figure is accepted as a limit, then development of the Kahuku Agricultural Park would in effect be at the expense of future development of our agricultural lands. We do not believe that such a restriction is necessary, but that both developments could proceed without adversely impacting the resource.

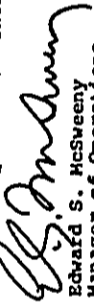
4. Present use of water as stated in the Preparation Notice (p. III-7, and Table 3) does not accurately reflect actual consumption by Amorient Aquafarm (formerly Lowe Aquafarm). We reported average use of 1.5, 1.4 and 1.5 mgd in 1980, 1981, and 1982, respectively to the Board of Water Supply. Recent expansion of the Aquafarm has added 0.4 mgd to consumption, as noted in Table 3 of the Preparation Notice, so that 1983 consumption is averaging nearly 2 mgd. This usage is minimal, reflecting the most careful management and assumption of a high degree of operating risk.

Wilson Okamoto & Associates 3 August 26, 1983

Thank you for the opportunity to bring these points to your attention. I hope they will be given careful consideration during preparation of the EIS.

Sincerely,

AMORIENT AQUACULTURE INTL., INC.

  
Edward S. McSweeney  
Manager of Operations

ESM/lmc

cc: Planning & Development Office  
Department of Agriculture  
P. O. Box 22159  
Honolulu, HI 96822

The Estate of James Campbell  
828 Fort St. Mall Suite 500  
Honolulu, HI 96813  
Mr. Jim Dybdal

Mr. Phil Meyer

C2406-01  
October 21, 1983

Mr. Edward S. McSweeney  
Manager of Operations  
Agriculture Intl., Inc.  
P.O. Box 131  
Kahuku, HI 96731

Subject: Kahuku Agricultural Park

Dear Mr. McSweeney:

Thank you for your letter of August 26, 1983 and for your comments regarding the EIS Preparation Notice for the subject project.

1. The evaluation of water resources recognizes the future role of agriculture in the Kahuku area to be of high priority and significance. Water resources data and information collected and analyzed during the preparation of the EIS were coordinated among users and State and City agencies to ensure that agricultural needs of the Kahuku area were addressed to the fullest extent possible. The Department of Land and Natural Resources in coordination with the Honolulu Board of Water Supply, established the 15 mgd sustainable yield based on best available historical and hydrologic data. While the accuracies of hydrologic estimates such as these are difficult to measure, we believe that the State's estimates are applicable for long-range planning purposes.

2. As reported by the U.S. Geological Survey in their "Preliminary Report on The Water Resources of the Kahuku Area," basal water recharge in the Kahuku area includes (1) leakage and underflow from high-level water, (2) rainfall on dike-free lava flows, (3) infiltration from stream, and (4) infiltration from irrigated fields. To mitigate the impacts of agricultural land uses upon the groundwater supply, efficient and effective agricultural practices will need to be promoted. Efforts towards this end by major agricultural operators such as Aqarient Aquaculture will be pivotal in maintaining the integrity of Kahuku's ground-water supply.

3. The establishment of the 15 mgd sustainable yield served to provide needed guidance for planning and developing the State's Kahuku Agricultural Park. Consideration of future water availability by State and City agencies will probably involve an assessment of changes in water uses and needs over time for the Kahuku area.

C2406-01  
Letter to Mr. Edward S. McSweeney  
Page 2  
October 21, 1983

A. Estimates of 1.26 mgd included in Table 3 for the Lowe Aquifarms were based on discussions between HDA and Mr. Bruce McElroy of Lowe Farms. Estimates for Lowe, Inc. of 5.94 mgd and 3.96 mgd for 1980 and 1981 respectively were based on pump power consumption data. Given the lack of data on existing pumpage, best available information was used to establish water usage for planning purposes. The information developed for Table 3 was coordinated with Camp-All Estate, DLIR, and BWS to ensure that water use planning criteria was appropriate and acceptable. The updated water consumption figures will be incorporated in the draft EIS.

We appreciate your comments and please feel free to call me if you have any further questions or comments.

Sincerely,

*ET*  
Mary Dremoto, Project Manager

7/10/ET/da

cc: Department of Agriculture  
Ms. Catherine J. Mattson



United States Department of the Interior

GEOLOGICAL SURVEY  
Water Resources Division  
P. O. Box 50166  
Honolulu, Hawaii 96850

February 29, 1984

RECEIVED  
FEB 29 1984

W. S. CHEUNG & ASSOCIATES

Ms. Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street  
Room 301  
Honolulu, Hawaii 96813

Dear Ms-Uyehara: *Tish!*

RE: Kahuku Agricultural Park, Kahuku, Oahu (EIS)

The above environmental impact statement has been reviewed by the Hawaii District, U.S. Geological Survey, Water Resources Division staff, and we have no comments to make at this time.

Thank you for the opportunity to review the statement; we are returning it for your further use.

Sincerely, *Stan*

*Stan*

Stanley F. Kaputika  
District Chief

Enclosure

cc: Planning and Development Office, State Department of Agriculture, III  
Mr. Gary Okamoto, Wilson Okamoto & Associates, Inc., III



DEPARTMENT OF THE ARMY  
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS  
FT. SHAFTER, HAWAII 96838

January 27, 1984

REPLY TO  
ATTENTION OF

RECEIVED  
JAN 27 1984

W. S. CHEUNG & ASSOCIATES

Dr. Paul Schwind  
Planning and Development Office  
P. O. Box 22159  
Honolulu, Hawaii 96822

Dear Dr. Schwind:

Thank you for the opportunity to review and comment on the Environmental Impact Statement for Kahuku Agricultural Park, Kahuku, Hawaii. The Corps' comments dated August 26, 1983 have been acknowledged. We have no further comments.

Sincerely,

*W. S. Cheung*  
W. S. Cheung  
Chief, Engineering Division

Copy Furnished:

Mr. Gary Okamoto  
Wilson Okamoto & Associates, Inc.  
1150 South King Street, Suite 800  
Honolulu, Hawaii 96814

Ms. Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

United States  
Department of  
Agriculture

Soil  
Conservation  
Service

P.O. Box 50004  
Honolulu, Hawaii  
96850

January 20, 1984

Ms. Letitia N. Uyehara  
Interim Director  
Office of Environmental Quality Control  
550 Halekauwila St., Room 301  
Honolulu, Hawaii 96813

**RECEIVED**  
JAN 22 1984  
MASON CRYSTAL & ASSOCIATES

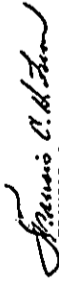
Dear Ms. Uyehara:

Subject: EIS for Kahuku Agricultural Park, Kahuku, Oahu

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

Thank you for the opportunity to review this document.

Sincerely,

  
FRANCIS C.H. LIU  
State Conservationist

cc:  
Planning and Development Office  
State Department of Agriculture  
P.O. Box 22159  
Honolulu, Hawaii 96822

Mr. Gary Okamoto, Project Manager  
Wilson Okamoto & Associates, Inc.  
1150 S. King St., Suite 800  
Honolulu, Hawaii 96814

The Soil Conservation Service  
is an agency of the  
Department of Agriculture

X-40

U.S. Department  
of Transportation  
United States  
Coast Guard



Commander (dp1)  
Fourteenth Coast Guard District

Prince Kalahelele  
Federal Building  
300 Ala Moana Blvd.  
Honolulu, Hawaii 96860  
Phone: 546-2861

**RECEIVED**  
JAN 18 1984  
MASON CRYSTAL & ASSOCIATES

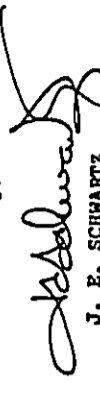
11000  
Serial 4/002  
11 JAN 1984

Ms. Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

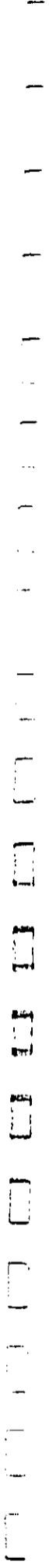
Dear Ms. Uyehara:

The Fourteenth Coast Guard District has reviewed the  
Environmental Impact Statement (EIS) for the Kahuku  
Agricultural Park and has no objection or constructive  
comments to offer at the present time.

Sincerely,

  
J. E. SCHWARTZ  
Commander, U. S. Coast Guard  
District Planning Officer

By direction of  
Commander, Fourteenth Coast Guard District





DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 15TH AIR BASE WING (FACAF)  
HICKAM AIR FORCE BASE, HAWAII 96813

**RECEIVED**  
JAN 13 1984

MEMO TO  
ATTN: DEEV (Mr Yamada, 449-1831)

12 JAN 1984

WILSON OKAMOTO & ASSOCIATES

SUBJECT: Environmental Impact Statement for the Kahuku Agricultural Park

TO: Ms Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekaunila Street, Room 301  
Honolulu, HI 96813

1. This office has reviewed the subject EIS and has no comment 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 document. The EIS is returned for your file.

*Robert M. Okazaki*  
ROBERT M. OKAZAKI  
Chief, Engrg & Envtl Ping Div  
Directorate of Civil Engineering

1 Atch  
EIS

cc: Planning and Development Office w/ Atch  
State Dept of Agriculture  
P. O. Box 22159  
Honolulu HI 96822

Mr. Gary Okamoto, Project Manager w/ Atch  
Wilson Okamoto & Associates, Inc  
1150 South King Street, Suite 800  
Honolulu HI 96814



HEADQUARTERS  
NAVAL BASE PEARL HARBOR  
BOX 110  
PEARL HARBOR, HAWAII 96880

IN REPLY REFER TO:  
0028:MKL:Jam  
Ser 2578

10 JAN 1984

**RECEIVED**  
JAN 12 1984

Ms. Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekaunila Street, Room 301  
Honolulu, Hawaii 96813

WILSON OKAMOTO & ASSOCIATES

Dear Ms. Uyehara:

Environmental Impact Statement  
Kahuku Agricultural Park

The EIS for the Kahuku Agricultural Park has been reviewed and the Navy has no comments to offer. As this command has no further use for the EIS, the EIS is being returned to the Environmental Council, by copy of this letter.

Thank you for the opportunity to review the EIS.

Sincerely,

M. M. DALLAM  
CAPTAIN, U. S. NAVY  
FACILITIES ENGINEER  
BY DIRECTION OF THE COMMANDER

Enclosure

Copy to:  
Planning and Development Office  
State Department of Agriculture  
P. O. Box 22159  
Honolulu, Hawaii 96822

Mr. Gary Okamoto, Project Manager  
Wilson Okamoto & Associates, Inc.  
1150 South King Street, Suite 800  
Honolulu, Hawaii 96814

Environmental Council



February 2, 1984

Directorate of Facilities Engineering

RECEIVED

FEB 07 1984

PLANNING & DEVELOPMENT

Ms. Letitia N. Uyehara  
Interim Director  
Office of Environmental Quality  
Control  
550 Kalia Avenue, Suite 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

The Draft Environmental Impact Statement (EIS) for Kahuku Agricultural Park, Kahuku, Oahu, Hawaii has been reviewed and we have no substantive comments to offer. Although the proposed site is in close proximity to the Kahuku Training Area, it is anticipated that the construction and operation of the agricultural park will not conflict with military training activities in the area.

Thank you for the opportunity to comment on the Draft EIS.

Sincerely,

*[Signature]*  
Colonel, Corps of Engineers  
Director of Facilities Engineering

Copies Furnished:

Planning and Development Office  
State Department of Agriculture  
P.O. Box 72159  
Honolulu, Hawaii 96822

Mr. Gary Orsato, Project Manager  
Wilson Orsato & Associates, Inc.  
1170 South King Street, Suite 800  
Honolulu, Hawaii 96814

GEORGE R. JAYSON  
Governor



STATE OF HAWAII  
DEPARTMENT OF DEFENSE  
OFFICE OF THE ADJUTANT GENERAL  
204 DILLON ROAD, HONOLULU, HAWAII 96819

ALEXIS T. LUM  
Major General  
Adjutant General

DANIEL S. C. AU  
Colonel  
Adjutant General

# University of Hawaii at Manoa

College of Tropical Agriculture and Human Resources  
Gilmore Hall 202 • 3050 Mālie Way  
Honolulu, Hawaii 96822

Office of the Dean and Director

February 6, 1984

HIENG

JAN 11 1984

RECEIVED  
FEB 10 1984

Ms. Letitia M. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Ms. Letitia M. Uyehara  
Interim Director  
Office of Environmental Quality Control  
State of Hawaii  
550 Halekauwila Street, Room 301  
Honolulu, HI 96813

RECEIVED  
JAN 11 1984

U.S. FOREST SERVICE & ASSOCIATES

Dear Ms. Uyehara:  
  
Kahuku Agricultural Park

Dear Ms. Uyehara:  
  
The EIS for the Kahuku Agricultural Park project was received by us on January 13, 1984. The study, we believe, adequately addresses the major environmental concerns of the project.

Thank you for providing us the opportunity to review the proposed project, "Kahuku Agricultural Park" Environmental Impact Statement Draft.

Thank you for the opportunity to comment on the report.

We have completed our review and have no comments to offer at this time.

Yours sincerely,

Yours truly,

Signed

JERRY M. MATSUDA  
Major, HANG  
Contr & Engr Officer

*M. P. Kefford*

M. P. Kefford  
Dean and Director of HITABR

cc: Planning & Development Office of  
Dept of Agriculture  
Wilson Okamoto & Associates, Inc  
ATTN: Mr. Gary Okamoto  
Environmental Council w/EIS Draft

JY  
cc: Planning and Development Office, DOA  
Mr. Gary Okamoto  
Mr. Yukio Kitagawa

AN EQUAL OPPORTUNITY EMPLOYER

GEORGE R. ARTHUR  
Secretary



**RECEIVED**  
JAN 22 1984  
STATE OF HAWAII  
DEPARTMENT OF SOCIAL SERVICES AND HOUSING  
HAWAII HOUSING AUTHORITY  
P. O. BOX 10887  
HONOLULU, HAWAII 96817

MAIL ROOM & RECORDS January 17, 1984

PAUL A. TOM  
EXECUTIVE DIRECTOR

BY REPLY MAIL

YES

FEB 07 1984

(P)1061.4

MEMORANDUM:

**TO:** Ms. Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control

**FROM:** Paul A. Tom, Executive Director

**SUBJECT:** Environmental Impact Statement (EIS) - Kahuku  
Agricultural Park

The Hawaii Housing Authority has reviewed the subject EIS and has no comments to offer relative to the proposed action at this time.

Thank you for allowing us to comment on this matter.

PAUL A. TOM  
Executive Director

cc: Planning and Development  
Office  
Mr. Gary Okamoto

Ms. Letitia N. Uyehara  
Interim Director  
Office of Environmental  
Quality Control  
550 Halekaunila Street  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

**Subject:** Kahuku Agricultural Park  
Environmental Impact Statement

We have reviewed the subject environmental impact statement and have no comments to offer.

Thank you for the opportunity to review the environmental impact statement.

Very truly yours,

RIKIO NISHIOKA  
State Public Works Engineer

MS:lm  
cc: Department of Agriculture  
Wilson Okamoto & Assoc., Inc.



DEPARTMENT OF LAND UTILIZATION  
**CITY AND COUNTY OF HONOLULU**  
450 SOUTH KING STREET  
HONOLULU, HAWAII 96813 • AREA CODE 808 • 522-4222



EILEEN R. ANDERSON  
MAYOR

MICHAEL H. McELROY  
DIRECTOR  
ROBERT B. JONES  
DEPUTY DIRECTOR

February 3, 1984

LU1/04-81(JDH)

**RECEIVED**  
FEB 07 1984

Ms. Letitia N. Uyebara, Interim Director  
Office of Environmental Quality Control  
State of Hawaii  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

X-45

Dear Ms. Uyebara:

Draft Environmental Impact Statement (EIS) for  
Kahuku Agricultural Park, Kahuku, Oahu  
Tax Map Keys 5-5-5: 9, 5-5-6: 19, 5-5-6-8: 2

We have reviewed the subject Draft EIS and find that our concerns  
have been adequately addressed.

If there are any questions, please contact John Makagawa of our  
staff at 523-4548.

Very truly yours,  
*Loretta Chee*  
MICHAEL H. McELROY  
Director of Land Utilization

MMH:sj

cc: State Dept. of AG  
Gary Okamoto

OFFICE OF THE MANAGING DIRECTOR  
**CITY AND COUNTY OF HONOLULU**  
HONOLULU, HAWAII 96813 • AREA CODE 808 • 522-4222



EILEEN R. ANDERSON  
MAYOR

ANDREW I. T. CHANG  
MANAGING DIRECTOR

**RECEIVED**

FEB 07 1984

PLANNING DEPARTMENT & ASSOCIATES

February 1, 1984

Ms. Letitia N. Uyebara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Draft EIS on Kahuku Agricultural Park

Thank you for forwarding the subject Draft EIS.

I am aware that affected City agencies have previously  
indicated their interest in the Kahuku Agricultural Park  
project at the EIS preparation stage. EIS procedures call for  
your providing them copies of the draft report containing new  
and significant information. The agencies would then submit  
their respective comments to you separately.

Thank you for including us in the review and evaluation  
process.

Very truly yours,

*Andrew I. T. Chang*  
ANDREW I. T. CHANG

cc: Planning and Development Office  
State Department of Agriculture  
P. O. Box 22159  
Honolulu, Hawaii 96822

Mr. Gary Okamoto, Project Manager  
Wilson Okamoto & Associates, Inc.  
1150 South King Street, Suite 800  
Honolulu, Hawaii 96814



RECEIVED  
JAN 18 1984

DI-ES

January 18, 1984

Ms. Letitia H. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Environmental Impact Statement (EIS)  
Kahuku Agricultural Park - Kahuku, Oahu

We have reviewed the Environmental Impact Statement on the proposed  
Kahuku Agricultural Park and have no specific comments other than  
those we submitted on our review dated August 17, 1983.

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

Sincerely,

DOUGLAS G. GIBB  
Chief of Police

By *[Signature]*  
EDWIN ROSS  
Assistant Chief  
Administrative Bureau

cc: Planning and Development Office  
State Department of Agriculture  
P.O. Box 22159  
Honolulu, Hawaii 96822

Mr. Gary Okamoto, Project Manager  
Wilson Okamoto & Associates, Inc.  
1150 South King Street, Suite 800  
Honolulu, Hawaii 96814

PB 84-39

January 17, 1984

RECEIVED

Ms. Letitia M. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Kahuku Agricultural Park  
Environmental Impact Statement

We have reviewed the subject environmental impact statement  
and have no comments.

Thank you for the opportunity to review the EIS.

Very truly yours,

ROY H. TANJII  
Director and Building Superintendent

TH:jo  
cc: J. Harada  
State Dept. of Agriculture  
Wilson Okamoto & Assoc., Inc.

DEPARTMENT OF PARKS AND RECREATION  
**CITY AND COUNTY OF HONOLULU**  
650 SOUTH KING STREET  
HONOLULU, HAWAII 96813

EILEEN R. ANDERSON  
MAIER



EMIKO I. KUDO  
DIRECTOR  
SAM L. CARL  
DEPUTY DIRECTOR  
OSCAR R. ARAMINA  
EXECUTIVE ASSISTANT

January 16, 1984

EILEEN R. ANDERSON  
MAIER

DEPARTMENT OF PUBLIC WORKS  
**CITY AND COUNTY OF HONOLULU**  
650 SOUTH KING STREET  
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, Ph.D.  
DIRECTOR AND CHIEF ENGINEER  
MAURICE M. KAYA  
DEPUTY DIRECTOR

ENV 84-16

January 17, 1984

X-48

Ms. Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Environmental Impact Statement  
Kahuku Agricultural Park  
TRK: 5-6-05, 5-6-06 and 5-6-08

We have no comments to offer on the EIS for the proposed Kahuku Agricultural Park.

Thank you for the opportunity to review the report.

Sincerely yours,

(Mrs.) EMIKO I. KUDO, Director

EIK:vc

cc: Dept. of Agriculture  
Wilson Okamoto & Assoc., Inc.

RECEIVED  
JAN 16 1984  
PLANNING & DEVELOPMENT

PLANNING & DEVELOPMENT

Ms. Letitia N. Uyehara  
Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Re: EIS for Kahuku Agricultural Park  
Kahuku, Oahu, Hawaii

We do not have any additional comments.

He ke Aloha pumehana,

MICHAEL J. CHUN  
Director and Chief Engineer

cc: State Dept. of Agriculture,  
Planning and Development Office  
Mr. Gary Okamoto, Wilson Okamoto &  
Associates, Inc.

RECEIVED  
JAN 17 1984  
PLANNING & DEVELOPMENT

PLANNING & DEVELOPMENT



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
300 ALA MOANA BOULEVARD  
P. O. BOX 50127  
HONOLULU, HAWAII 96810

INTERNAL SERVICE TAG  
ES  
Room 6307

Ms. Letitia Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekawaia Street, Room 301  
Honolulu, Hawaii 96813

RECEIVED

JAN 26 1984

JAN 21 1984

Dear Ms. Uyehara:

The Service has reviewed the Draft Environmental Impact Statement (EIS) for the Kahuku Agricultural Park which was forwarded to us with your letter of January 5, 1984. Our concerns (expressed in our letter to Wilson Okamoto and Associates, Inc. on September 1, 1983 and during a meeting with them and the Department of Agriculture on September 28, 1983) focus primarily on the storm water drainage system which is designed to empty into Kii Pond of the James Campbell National Wildlife Refuge. The impacts of siltation and pesticide contamination on important biological resources within the Refuge need to be addressed in the EIS.

As we have previously stated, the Refuge's drainage system is inadequately sized for peak storm flows. The proposed development may exacerbate the sedimentation problem which may require more frequent maintenance dredging. The proposed silt basins within the Agricultural Park may be adequate during normal agrarian operation and construction; however, we are concerned that they will not significantly attenuate peaks or hold silt during storm periods. Compounding this problem, silt which has accumulated within the basins during non-storm periods may in fact be purged from the basin during large storms. Strict enforcement of City and County soil ordinances must be maintained to prevent substantial sediment loads from entering adjacent waterways.

We further recommend that the list of resource contaminants provided to Wilson Okamoto and Associates, Inc. (copy to Paul Schwind) with our letter of December 1, 1983 be included in the EIS. Specific restrictions against the use of these substances within the proposed Agricultural Park should be identified in the EIS.

Specific Comments

- 1. Page III-15, 3. The scientific name for the Hawaiian Stilt, Koioa and Hawaiian Gallinule are (respectively) Himantopus mexicanus knudseni, Anas wyvilliana, and Gallinula chloropus. All four native waterbirds mentioned in the EIS are Federally listed as endangered (50 CFR 17.11 and 17.12).

CONSERVE  
AMERICA'S  
ENERGY



Save Energy and You Save America!

2. Page IV-3, 2. Although paraquat may be an effective herbicide, we will insist that it not be used in the Agricultural Park because of its adverse effects on wildlife.

3. Page VIII-1, 1. The Fish and Wildlife Service should be included as a consulting party.

4. Page X-1, 1. We continue to urge that the flood hazard study for the Campbell Estate be consulted and discussed in the EIS.

We appreciate this opportunity to comment.

Sincerely,

*Ernest Kosaka*  
Ernest Kosaka  
Project Leader  
Office of Environmental Services

cc: Wilson Okamoto and Associates, Inc. ✓  
State Department of Agriculture  
HDAR  
HDF6W  
EPA, San Francisco





United States Department of the Interior

FISH AND WILDLIFE SERVICE

300 ALA MOANA BOULEVARD  
P.O. BOX 50187  
HONOLULU, HAWAII 96810

NO DISPLAY AFTER 1983

ES Room 6307  
DEC 1 1983

RECEIVED  
DEC 1 1983

Mr. Ernest M. Takahashi  
Wilson Okamoto & Associates  
P.O. Box 3530  
Honolulu, Hawaii 96811

Dear Ernie:

WILSON OKAMOTO & ASSOCIATES

As you recall, at our last meeting on September 28 the Service agreed to provide a list of chemicals which should not be used within the proposed Kahuku Agricultural Park. The chemicals listed below are known to be detrimental to fish and wildlife resources. If these substances were to be applied to soils or crops in quantity, contaminated stormwater runoff from the agricultural park might lead to serious impacts upon the integrity of the James Campbell National Wildlife Refuge. The Service therefore recommends that the use of these chemicals and compounds containing these chemicals be restricted within the boundaries of the proposed project by whatever means are appropriate and binding.

This must not be interpreted as a comprehensive list of all substances known to affect fish and wildlife resources. We will be providing additional information to you on this subject in the near future and may ask that additional substances not listed herein also be restricted from use at Kahuku.

Chemical	Comment
Azodrin	Organophosphate insecticide
Baytex	Insecticide
Dieldrin	Chlorinated hydrocarbon insecticide
Dursbon	Highly toxic to crustaceans
Furadan	Organophosphate insecticide
Heptachlor	Chlorinated hydrocarbon insecticide
Kelthane	DDT derivative acaricide
Paraquat	Chlorinated hydrocarbon herbicide
Parathion	Insecticide
Vydate	
2,4,5-T	

Please note that most of these chemicals may be known by other names, i.e. Dicofof = Kelthane. The attached information is excerpted from the Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates (FWS Resource Publication 137).



Save Energy and You Serve America!

We would like assurance that the listed substances and their synonyms be fully restricted from use within the proposed agricultural park.

I appreciate the cooperative spirit which you and Paul Schwind of State Department of Agriculture have displayed in your meetings with us regarding this sensitive and important resource issue. Please forward your comments about this matter to Mr. John Ford of my Environmental Services staff as soon as practicable. I look forward to continuing our coordination on the planning process for Kahuku Agricultural Park.

Sincerely,

*Robert J. Shallenberger*

Robert J. Shallenberger, Ph.D.  
Acting Pacific Islands Administrator

cc: ED, FWS, Portland, OR (AMR, AMR)  
Paul Schwind, State DOW

**WILSON  
OKAMOTO  
& ASSOCIATES**

C2496-01  
Letter to Mr. Ernest Kosaka  
Page 2  
April 5, 1984

C2496-01  
April 5, 1984

**WILSON  
OKAMOTO  
& ASSOCIATES**



ENGINEERS  
ARCHITECTS  
PLANNERS  
115 SOUTH BIRD STREET  
HONOLULU, HAWAII 96850  
PHONE: (808) 531-1111  
FAX: (808) 531-1112

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

Subject: Kahuku Agricultural Park EIS

Dear Mr. Kosaka:

Thank you for your letters of December 1, 1983 and January 26, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

Drainage System - The proposed drainage system will be designed in compliance with the City and County of Honolulu, Department of Public Works, Soil Erosion Standards and Guidelines (November 1975).

Siltation and Pesticides - Application of the Universal Soil Loss Equation has indicated that there will be no appreciable increase in the loss of soil due to surface runoff, within the proposed agricultural park. Detention basins will be designed to handle the 50-year storm, which is in compliance with the City's standards.

The Environmental Protection Agency (EPA) has issued a list of chemicals that have been approved for use in agriculture. The State Department of Agriculture (DOA) regulates the use of pesticides through the Hawaii Pesticides Law (HRS Section 149A) which states that no person shall use, store, transport, or discard any pesticide or the containers of such pesticide in any manner which would have unreasonable adverse effect on the environment. If the use of a certain pesticide is deemed to have unreasonable adverse environmental impacts the DOA has the power to ban the use of and cancel all licenses for the use of that pesticide. These controls are not only applicable to the proposed Kahuku Agricultural Park but to all agricultural operations. Furthermore if the improper use of a pesticide can be attributed to a particular farmer within the Kahuku Agricultural Park, he will be in violation of his lease with the State and will be subject to civil action or termination of lease.

Current data on the long-term effects of chemicals on the environment and wildlife are limited. Tolerance levels in wildlife have not been established. Chronic exposure of wildlife within the refuge to pesticides use within the Kahuku Agricultural Park is not expected to occur since there are no perennial streams within or near the Agricultural Park. Although chemicals could be applied to fields on a daily basis, opportunity for pesticides to reach the refuge will only occur during heavy rainfall. Additionally, many chemicals lose their toxicity with time and therefore the period between application and heavy rainfall will be a factor in the toxin levels in the storm run-off.

Acute exposure of refuge wildlife to pesticides is remote. As mentioned earlier, the only way for pesticides from the agricultural park to reach the wildlife refuge is via storm run-off. The amount of rainfall required to generate enough run-off to reach the refuge would also result in a large volume of water that would drastically reduce the concentration of toxins.

Specific Comments

1. The scientific names of the four native species will be corrected in the Revised EIS and it will be noted that they are Federally listed as endangered.
2. The use of paraquat in Kahuku Agricultural Park will not be extensive in all likelihood; instead, the bulk of the use should be confined to boarder type weed control around the individual farm units. Further, while paraquat concentrate has high acute toxicity, less toxic are the diluted spray tank mixes. Paraquat also binds tightly to soil and on high clay content soil has very little, if any, biological activity. Therefore, treated soil should pose very little risk to wildlife. The use of paraquat is regulated by the Hawaii Pesticides Law and if its use is determined to have an unreasonable adverse impact on the environment the DOA has the power to ban its use.
3. USFWS will be added to the list of consulted parties.

C2496-01  
Letter to Mr. Ernest Kosaka  
Page 3  
April 5, 1984

4. Our engineers have examined the Campbell Estate Flood study and found that the run-off coefficients were derived from Curve A, Plate 6 of the Storm Drainage Standards of the City and County of Honolulu. The input data used in this method are very general, which result in very general estimates of run-off which tend to be conservative.

The calculation of the peak runoff from the Agricultural Park was based on a methodology developed by the Soil Conservation Service (SCS). The SCS methodology takes into account types of ground cover, rainfall, soil types and land uses. The use of the SCS method with site specific input data results in more precise, site specific run-off estimates.

We hope that we have adequately addressed your concerns. Your letters will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest Takahashi*

Ernest Takahashi, Project Manager

ET/ry

cc: DOA



GEORGE R. ANTHONY  
DIRECTOR OF HEALTH



STATE OF HAWAII  
DEPARTMENT OF HEALTH  
P. O. BOX 329  
HONOLULU, HAWAII 96809

RECEIVED  
FEB 14 1984

COMMUNICATIONS & ASSAULTS

February 14, 1984

CHARLES C. CLARE  
DIRECTOR OF PUBLIC HEALTH

In reply, please refer to  
EPHSD-55

Ms. Letitia Uyehara

-2-

February 14, 1984

Noise & Radiation

The Environmental Impact Statement must include projections of noise levels from agricultural equipment upon adjacent residential areas. Contingency plans to mitigate possible adverse long-term noise impact of this project must also be included.

Air Quality

Page M-2 notes odors and pollutants and does not indicate the source of these and any mitigative actions that can be taken.

*Melvin K. Koyama*  
MELVIN K. KOYAMA

KS:ao

cc: Mr. Gary Okamoto ✓

MEMORANDUM

To: Ms. Letitia Uyehara, Interim Director  
Office of Environmental Quality Control

From: Deputy Director for Environmental Health

Subject: Request for Comments on Kahuku Agricultural Park Environmental Impact Statement

X-53

Thank you for allowing us to review and comment on the Kahuku Agricultural Park Environmental Impact Statement. Our staff makes the following comments:

Drinking Water Program

The Program would like to take this opportunity to reiterate the necessity for protection of groundwater sources from potential pesticide and/or herbicide contamination.

Page IV-3 of the EIS lists several chemicals which might be used at Kahuku Agricultural Park. To mitigate the impacts of these chemicals upon groundwater supply, stringent compliance to prescribed application and use procedures must be accomplished. Location of existing and potential water resources must be considered with respect to the location of the proposed agricultural park site and pesticide and/or herbicide application. The recent incidents of drinking water contamination by EDB, DBCP and TCP illustrate the necessity for these precautions.

Sanitation

Most of the major concerns noted in our earlier comments have been satisfactorily resolved. However, one concern of lesser health significance still remains--the use of chicken or cow manure in fertilizing the fields intended for truck crops.

Currently, chicken manure is being used to fertilize the fields. Numerous complaints have resulted from its use by the patrons of the old Kullima Hotel and the other residents living downwind.

Perhaps the use of better farming practices or the use of "cured" fertilizer may be the solution.

**WILSON  
OKAMOTO  
& ASSOCIATES**

C2496-01  
April 5, 1984

Mr. Melvin K. Koizumi  
Department of Health  
State of Hawaii  
1250 Punchbowl Street  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park E.I.S.

Dear Mr. Koizumi:

Thank you for your letter of February 14, 1984 (EPHSD-SS) commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

Drinking Water Program

The City and County of Honolulu Board of Water Supply and the State Department of Land and Natural Resources have been consulted regarding the proposed Agricultural Park.

The State Department of Agriculture and United States Environmental Protection Agency have programs in force that regulate the use of agricultural chemicals. The Environmental Protection Agency (EPA) has issued a list of chemicals that have been approved for use in agriculture. The State Department of Agriculture (DOA) regulates the use of pesticides through the Hawaii Pesticides Law (HRS Section 149A) which states that no person shall use, store, transport, or discard any pesticide or the containers of such pesticide in any manner which would have unreasonable adverse effect on the environment. If the use of a certain pesticide is deemed to have unreasonable adverse environmental impacts the DOA has the power to ban the use of and cancel all licenses for the use of that pesticide. These controls are not only applicable to the proposed Kahuku Agricultural Park but to all agricultural operations. Furthermore if the improper use of a pesticide can be attributed to a particular farmer within the Kahuku Agricultural Park, he will be in violation of his lease with the State and will be subject to civil action or termination of lease.

Sanitation

The proposed agricultural park lies approximately 1,600 ft. inland (mauka) from Kamehameha Highway and over 2.8 miles southeast of the Turtle Bay Hilton Resort. If any offensive odors are generated within the agricultural park, the prevailing northeasterly trade winds will carry those odors away from populated areas.

C2496-01  
Letter to Mr. Melvin K. Koizumi  
Page 2  
April 5, 1984

Noise and Radiation

The Revised E.I.S. includes a discussion of noise levels of various agricultural equipment. Prevailing northeasterly trades should carry most noise away from adjacent residential areas. If additional mitigative measures are required, windbreaks could be planted along the perimeter abutting residential areas.

Air Quality

The odors and pollutants referred to on page 1V-2 are those associated with normal agricultural practices, including fertilizers, pesticides and herbicides sprays. Use of agricultural chemicals is regulated by EPA and the State Department of Agriculture.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest M. Takahashi*

Ernest Takahashi, Project Manager

ET/ry

cc: DOA

**WILSON  
OKAMOTO  
& ASSOCIATES**



ENGINEERS  
ARCHITECTS  
PLANNERS  
1154 SOUTH KING STREET  
HONOLULU, HAWAII 96813  
PHONE: (808) 531-5211

GEORGE R. ANTOSH  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HONOLULU, HAWAII

February 2, 1984

Ms. Letitia N. Uyebara, Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Kahuku Agricultural Park  
Kahuku, Oahu  
TMK: 5-6-05: 9  
5-6-06: 19  
5-6-08: 02

Thank you for the opportunity to review the Kahuku  
Agricultural Park Environmental Impact Statement.

The hourly capacity of Kamehameha Highway is less than  
the 1,500 vehicles per hour in each direction stated on page  
IV-9. However, we do not anticipate any problems in accommo-  
dating the traffic from the proposal.

It is unclear from the document whether Access Point  
"P" is a new or existing connection to Kamehameha Highway.  
Should it be a new one, then a permit allowing construction  
within the highway right of way must be obtained from our  
Highways Division.

Very truly yours,

Wayne J. Yamasaki  
Director of Transportation

cc: Mr. Gary Okamoto

WAYNE J. YAMASAKI  
DIRECTOR

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

IN REPLY REFER TO  
STEP 8.9671

RECEIVED

FEB 14 1984

WILSON OKAMOTO & ASSOCIATES

C2496-01  
April 5, 1984

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

Subject: Kahuku Agricultural Park EIS

Dear Mr. Yamasaki:

Thank you for your letter of February 2, 1984 commenting on the  
Kahuku Agricultural Park Draft Environmental Impact Statement.  
Following are responses to your comments:

According to data provided by the Highway Planning Section of  
DOT taken on May 23, 1983, along Kamehameha Highway at Kil  
Bridge, peak-hour traffic in one direction is 255 vehicles per  
hour and the traffic from the proposed Agricultural Park is not  
expected to pose any significant impacts.

Access Point "P" represents a relocation of the existing access  
road and is considered to be a new connection to Kamehameha  
Highway. A permit to construct within the highway right-of-way  
will be obtained from the Highways Division.

We hope that we have adequately addressed your concerns. Your  
letter will be included in the Revised Environmental Impact  
Statement.

Sincerely,

Ernest Takahashi, Project Manager

ET/ry

cc: DOA

WILSON  
OKAMOTO  
& ASSOCIATES



ENGINEERS  
ARCHITECTS  
PLANNERS  
110 SOUTH KULE STREET  
HONOLULU, HAWAII 96813  
PHONE: (808) 531-3100  
FAXING ADDRESS:  
P. O. B. 3570  
Honolulu, Hawaii 96811



STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
508 HALEKUAHILA STREET  
ROOM 301  
HONOLULU, HAWAII 96813

Letitia N. Uyebara  
Interim Director  
TELEPHONE NO. 548-8111

February 9, 1984

Mr. Jack Suwa, Chairman  
Board of Agriculture  
1428 South King Street  
Honolulu, Hawaii 96813

RECEIVED  
FEB 10 1984

WILSON OKAMOTO & ASSOCIATES

WILSON  
OKAMOTO  
& ASSOCIATES



ENGINEERS  
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PLANNERS  
100 SPAIN BIRD STREET  
HONOLULU, HAWAII 96813  
PHONE: (808) 531-1111  
MAILING ADDRESS:  
P. O. BOX 45, 111  
Honolulu, Hawaii 96813

Dear Mr. Suwa:

Subject: Kahuku Agricultural Park Draft EIS

We have reviewed the draft EIS and offer the following comments for your consideration:

1. The proposed Kahuku Agricultural Park is on the "no-pass" side of the underground injection control line being considered by the Department of Health. For this reason waste disposal is of some concern and we wish to know how high waste generating operations such as piggeries would dispose of their wastes.
2. The EIS should discuss the potential problem of pesticide spray drift into the nearby residential area.

Thank you for the opportunity to comment on this EIS.

Sincerely,

*Letitia N. Uyebara*  
Letitia N. Uyebara  
Interim Director

cc: Wilson Okamoto and Associates, Inc.

C2497-01  
April 5, 1984

Ms. Letitia N. Uyebara  
Interim Director  
Office of Environmental Quality Commission  
State of Hawaii  
550 Halekuaahila Street  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park EIS

Dear Ms. Uyebara:

Thank you for your letter of February 9, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

1. The proposed Kahuku Agricultural Park will not include any livestock operations or dwelling units. Therefore no sewage disposal facilities are being proposed.
2. The Kahuku Agricultural Park is situated such that the prevailing tradewinds will carry agricultural overspray away from nearby residential areas. However, over spraying can occur at any time if applicators fail to use best spray practices. Drift can be a more significant problem with high wind conditions and for Kahuku, when the wind is from the south. This is a chronic problem for all of agriculture not only Kahuku, and a problem for pesticide application in general, because of the absence of clear guidelines on acceptable risks and exposure without consent.

The use of EPA approved agricultural chemicals requires a permit from the State Department of Agriculture. The permittee is required to pass a written examination and to follow label instructions in the proper use of these chemicals.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest Takahashi*  
Ernest Takahashi, Project Manager

ET/ry

cc: DOA

OEQC  
DEIS - Kahuku Ag Park  
Page Two  
January 24, 1984

RECEIVED

JAN 24 1984

WILDLIFE RESOURCES & ASSOCIATES

January 24, 1984

Ms. Letitia N. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekuanila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

We have reviewed the draft environmental impact statement (EIS) for Kahuku Agricultural Park, and have the following comments to offer:

Wildlife

1. This draft EIS should mention the Red-vented Bulbul (*Pycnonotus cafer*) and address the potential problems to agricultural crops this species as well as others may cause.
2. It should address the impact on the pueo (*Asio flammeus sandwichensis*), an endemic species whose population is classed as endangered on Oahu by the State.
3. It should also address the potential for pesticides to be carried into Kif Pond, a wildlife refuge, through the agricultural park's drainage system.
4. It should state that the native waterbirds named on page III-15 are classed as endangered species.

Archaeological Resources

1. The archaeological reconnaissance report located three small archaeological sites shown in Figure 4 of the report. The site locations shown in the report are not the same as the locations shown in Figure 10 of the draft EIS.
2. The map included in the archaeological reconnaissance report is too generalized to be useful.

3. The archaeological reconnaissance survey only provides the results of a partial surface survey of the project area, and provides no information on the kinds of archaeological deposits likely to be disturbed during construction of the proposed improvements, such as the water system. Buried midden deposits and Hawaiian graves are known to occur in the Kahuku area.

4. The archaeological reconnaissance report needs to be more specific about the details of the scientific investigations that were conducted, including the exact locations of field work conducted, number of man-days spent in the field, constraints on the study (if any), significance of sites located, relevance of archival research to survey results, and an explicit discussion of the survey and testing strategies employed.

5. Substantial archaeological excavations have been conducted in Kahuku, so the area lacks the comparative data needed for regional studies.

6. The archaeological reconnaissance report does not discuss the project area's potential for historic archaeological sites.

7. The draft EIS contains sufficient information to recommend that additional archaeological investigations be conducted in the project area, including a comprehensive, intensive survey of the area, and subsurface testing.

Sincerely,

*Susumu Ono*

SUSUMU ONO  
Chairperson

and  
State Historic Preservation Officer

cc: State Dept. of Agriculture,  
(Planning & Development Office)  
Wilson Okamoto & Associates, Inc.



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FEB 11 1984

PLANNING & DEVELOPMENT

February 7, 1984

Ms. Letitia M. Uyebara, Interim Director  
Office of Environmental Quality Control  
550 Halekaumila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

This is to add to our January 24, 1984 comments on the environmental impact statement (EIS) for Kahuku Agricultural Park.

Recreation

A small portion of the proposed project appears to be in the Halekahana Stream watershed. This stream forms the boundary of the undeveloped portion of Halekahana State Park which adjoins the Kahuku urban area. Improvement in stream quality and reduction in peak flood flow is desired. The draft EIS addresses these concerns only in a general way and does not indicate potential impacts downstream in each watershed. Since the quantity and quality of water depend in part on proper watershed maintenance, maintenance standards, monitoring systems, and enforcement should also be addressed.

Sincerely,

*Susumu Ono*  
SUSUMU ONO  
Chairperson

and  
State Historic Preservation Officer

cc: State Dept. of Agriculture,  
(Planning & Development Office)  
/Wilson Okamoto & Associates, Inc.

C2496-01  
April 5, 1984

Mr. Susumu Ono  
Department of Land and Natural Resources  
State of Hawaii  
1151 Punchbowl Street  
Honolulu, Hawaii 96813

Subject: Kahuku Agricultural Park EIS

Dear Mr. Ono:

Thank you for your letter of January 24, 1984, and your additional comment dated February 7, 1984 regarding the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

Wildlife

1. The Red-vented Bulbul (*Pycnonotus cafer*) will be added to the list of common avifauna in Table 5.
2. The Pueo (*Asio flammeus sandwichensis*) will be added to the discussion in the Revised EIS.
3. Current data on the long-term effects of chemicals on the environment and wildlife are limited. Tolerance levels in wildlife have not been strongly established. Chronic exposure of wildlife within the refuge to pesticides use within the Kahuku Agricultural Park is not expected to occur since there are no perennial streams within or near the Agricultural Park. Although chemicals could be applied to fields on a daily basis, opportunity for pesticides to reach the refuge will only occur during heavy rainfall. Additionally, many chemicals lose their toxicity with time and therefore the period between application and heavy rainfall will be a factor in the toxin levels in the storm run-off.  
Acute exposure of refuge wildlife to pesticides is remote. As mentioned earlier, the only way for pesticides from the agricultural park to reach the wildlife refuge is via storm run-off. The amount of rainfall required to generate enough run-off to reach the refuge would also result in a large volume of water that would drastically reduce the concentration of toxins.
4. It will be stated in the Revised EIS that the native waterbirds named on Page III-15 are classified as endangered species.

WILSON  
OKAMOTO  
& ASSOCIATES



ENGINEERS  
ARCHITECTS  
PLANNERS  
1115 KUMU STREET  
HONOLULU, HAWAII 96813  
PHONE: (808) 521-3111  
P. O. BOX 2, J. P. 119  
Honolulu, Hawaii 96811

**WILSON**  
**OKAMOTO**  
**& ASSOCIATES**

C2496-01  
Letter to Mr. Susumu Ono  
Page 2  
April 5, 1984

**WILSON**  
**OKAMOTO**  
**& ASSOCIATES**

C2496-01  
Letter to Mr. Susumu Ono  
Page 3  
April 5, 1984

Archaeological Resources

1. The archaeological reconnaissance report shows three sites in Figure 4 of the report. There is also mention of a limestone outcrop which appears to be relatively undisturbed.  
Site number 1 of the report is well removed from the Kahuku Agricultural Park site and was not included in Figure 10 of the EIS. The limestone outcrop was included in Figure 10 along with sites 2 and 3 of the report. Each site in Figure 10 was labeled by feature rather than number.

2. A more detailed reconnaissance map used by the archaeologist during the field survey could not be reproduced for the report. As a follow-up to your letter, an archaeologist from your department, Mr. Earl Meller, visited our office to examine the detailed map. The information on the detailed map was copied onto another map and given to Mr. Meller. According to Mr. Meller, the map shown in the EIS is sufficient for that document.

3. We agree that buried midden deposits and graves are known to occur in the Kahuku area, but no evidence of any such remains was found during fieldwork. We have coordinated subsequent field trips with the State archaeologist.

4. According to the archaeological consultant, two man-days were spent walking through the entire 500-acre survey area. Some of this time was spent traversing the area along existing dirt roads and footpaths, but the primary concentration of effort was in all of those areas which had not been intensively cultivated in sugarcane. This consisted mainly of hilltops and ridges, each of which was thoroughly and completely surveyed. The density of vegetation represented the only minor constraint on the conduct of the survey. No sites were located during the survey. Archival research indicated no sites in the near the ocean evident in the published materials suggested that no sites would be found.

5/6. After a discussion with your staff, it was found that a word was omitted in comment number 5. It should have read: "Substantial archaeological excavations have never been conducted in Kahuku, so the area lacks the comparative data needed for regional studies." We agree that comparative archaeological data for the Kahuku area is limited. However, no evidence of historic archaeological sites were found in the undisturbed portions of the survey area, and the remainder of the survey area has been subjected to intensive agricultural disturbance during historic times, the likelihood that any such remains are present is remote.

7. Based on the responses to items 4, 5, and 6 above, we do not believe that additional archaeological investigations are necessary in the project area. In the event any archaeological sites or artifacts are uncovered during construction, work will be stopped and the State Historic Preservation Officer notified.

Recreation

A small portion of the project site lies within the Keana drainage basin which drains into the Halaekahana Stream. However, only a small area (about 10 acres) of the portion within the Keana drainage basin will actually be developed. The major portion will remain undeveloped as part of the project site "waste land", or area which will not be improved.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest M. Takahashi*

Ernest Takahashi, Project Manager

ET/ry

cc: DOA



STATE OF HAWAII  
DEPARTMENT OF HAWAIIAN HOME LANDS

GEORGE R. ANTONIO  
Director of Home

PROJECT OFFICES

WAIKOLA OFFICE  
P. O. BOX 175  
WAIKOLA, HAWAII 96793

STANWELL OFFICE  
P. O. BOX 132  
MLO, HAWAII 96748

PROJECT OFFICES

HAWAII OFFICE  
P. O. BOX 22  
LAWAIE, HAWAII 96756

MOLOKAI OFFICE  
P. O. BOX 100  
MOLOKAI, HAWAII 96768

KAUAI OFFICE  
P. O. BOX 222  
LAWAIE, HAWAII 96756

RECEIVED  
MAR 15 1984

MEMORANDUM

TO: Letitia H. Uyehara, Interim Director  
Office of Environmental Quality Control

FROM: Georgiana K. Padeken, Chairman  
Hawaiian Homes Commission

SUBJECT: Draft Environmental Impact Statement (EIS) for Kahuku  
Agricultural Park

We appreciate this opportunity to comment on the draft Environmental Impact Statement (EIS) for the Kahuku Agricultural Park, prepared by Wilson Okamoto and Associates, Inc. Although the proposed park has no direct connection with the Department of Hawaiian Home Lands (DHHL), the expressed objective of supporting agricultural industries in the State is shared by DHHL's concern for farm development on its lands.

We note the State Department of Land and Natural Resources (DLNR) is recommended as the approving agency for all actions proposed by the Tenant's Association (page 11-9). As the Tenant's Association is seen as a "cooperative effort... to solve problems... in the areas of marketing and field technology", it may be more operationally expedient to have the Department of Agriculture (DOA) involved, rather than the DLNR. We suggest the DOA be given a more active role in assisting the Tenant's Association in agriculture production and marketing areas.

Thank you for this opportunity to comment on the draft EIS. If you should have any questions, please feel free to contact Mr. Bryan Begley of our Land Management Division at 548-2685.

GKP:RF:MT:eah

cc: State Department of Agriculture, Planning and Development Office  
Gary Okamoto, Wilson Okamoto and Associates, Inc.

WILSON  
OKAMOTO  
& ASSOCIATES



ENGINEERS  
ARCHITECTS  
PLANNERS

1110 SOUTH KING STREET  
HONOLULU, HAWAII 96814  
PHONE: (808) 531-1311  
FAX: (808) 531-1311  
P. O. BOX 10000  
HONOLULU, HAWAII 96810

22496-01  
April 17, 1984

Mrs. Georgiana K. Padeken, Chairman  
Hawaiian Homes Commission  
State of Hawaii  
P. O. Box 1879  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park E.I.S.  
Dear Ms. Padeken:

Thank you for your letter of March 15, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments.

The State Department of Land and Natural Resources (DLNR) is the agency responsible for the management and administration of all State owned or controlled lands. DLNR will collect fees, rent, maintain the water system and monitor overall maintenance of the Park. DLNR will, therefore, be the agency with the most direct contact with the farmers. All actions regarding the operation and maintenance of the Kahuku Agricultural Park must be approved by DLNR.

The Tenant's Association will be established for the primary purpose of coordinating the maintenance of the Agricultural Park and to monitor compliance with lease conditions. If the Association close to act as a cooperative body in the marketing or technological aspects of farming, efforts could be coordinated through DLNR or DOA. These actions do not require DLNR approval as they do not pertain to operation or maintenance of the Park. The DOA has set up their Marketing and Consumer Services Branch to help all farmers throughout the State.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*ET*

Ernest Tsuchihashi, Project Manager

ET/ry

cc: Department of Agriculture



University of Hawaii at Manoa

Water Resources Research Center  
Holmes Hall 283 • 2540 Dole Street  
Honolulu, Hawaii 96822

31 January 1984

RECEIVED  
JAN 03 1984

WASA (WATER & SEWER)

Ms. Letitia N. Uyehara  
Interim Director  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

SUBJECT: Draft Environmental Impact Statement for Kahuku,  
Agricultural Park, Kahuku, Oahu, Hawaii, December 27, 1983

We have reviewed the subject DEIS and offer the following comment.

We continue to be concerned about possible fecal and other contamination of the groundwater, particularly since the agricultural park lies within the Board of Water Supply's "no pass zone". The EIS must address this further. Since there will be no residences, has it been determined that there are applicable Department of Health regulations requiring toilet facilities in non-public and non-residence situations?

The EIS does not seem to appreciate the seriousness of the potential problem and is unrealistic in assuming that there will be no sewage disposal within the agricultural park (p. IV-2, sec. C). Collection-type toilets should be required on each farm, possibly through the lease instrument. In the absence of a required collection system (with adequate inspection) there will undoubtedly be privies, or possibly even surface defecation. Being raw sewage, these practices can very easily create unsanitary site conditions as well as contaminate ground and surface waters.

Another reason for requiring a collection-type sewage system is for disposing of leftover pesticides and washings, which may otherwise be dumped on the ground. There should also be an impermeable pad where pesticide equipment can be washed, with drainage plumbed to the collection tank. Similarly, burying of pesticide containers on the premises should not be allowed.

The EIS should also address how the sewage will be collected from individual systems and how it will be disposed.

Ms. Letitia N. Uyehara  
31 January 1984  
Page 2

The farmers should also be informed of the sites location within the "no pass zone", which makes it imperative that all regulations be complied with.

Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

*Edwin T. Murabayashi*

Edwin T. Murabayashi  
EIS Coordinator

ETM:jm

cc: Planning & Development Office,  
State Dept. of Agriculture  
Cary Okamoto  
Env. Center, UH

**WILSON  
OKAMOTO  
& ASSOCIATES**

C2496-01  
April 5, 1984

Mr. Edwin T. Murabayashi  
EIS Coordinator  
Water Resources Research Center  
University of Hawaii  
HoTimes Hall 283  
2540 Dole Street  
Honolulu, Hawaii 96822

Subject: Kahuku Agricultural Park E.I.S.

Dear Mr. Murabayashi:

Thank you for your letter of January 31, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are our responses to your comments:

The Board of Water Supply (BWS) has been kept apprised of the project throughout the planning phase and during the current design phase. During the early planning phase of the project the BWS voiced strong concern regarding livestock operations and sewage disposal within the "no pass zone". Livestock operations were dropped from further considerations due to BWS restrictions, and cost of developing a sewage treatment and disposal system.

The State Department of Health (DOH) does not require toilet facilities unless there is a dwelling or building. If the individual farmer elects to install toilet facilities, then he is subject to DOH Public Health Regulations, Chapter 57, and will be responsible for the proper installation, operation and maintenance of the facility. Only self-contained holding or treatment systems will be allowed within the agricultural park.

The Environmental Protection Agency (EPA) has issued a list of chemicals that have been approved for use in agriculture. The State Department of Agriculture (DOA) regulates the use of agricultural chemicals through a permit program, which mandates the proper use of approved chemicals. The proper use of EPA approved chemicals should not result in any adverse environmental impacts to surrounding lands. These controls are not only applicable to the proposed Kahuku Agricultural Park but to all agricultural operations.

Current data on the long-term effects of chemicals on the environment and wildlife are limited. Tolerance levels in wildlife have not been strongly established. Chronic exposure of wildlife within the refuge to pesticides use within the

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Letter to Mr. Edwin T. Murabayashi  
Page 2  
April 5, 1984

Kahuku Agricultural Park is not expected to occur since there are no perennial streams within or near the Agricultural Park. Although chemicals could be applied to fields on a daily basis, opportunity for pesticides to reach the refuge will only occur during heavy rainfall. Additionally, many chemicals lose their toxicity with time and therefore the period between application and heavy rainfall will be a factor in the toxin levels in the storm run-off.

Acute exposure of refuge wildlife to pesticides is remote. As mentioned earlier, the only way for pesticides from the agricultural park to reach the wildlife refuge is via storm run-off. The amount of rainfall required to generate enough run-off to reach the refuge would also result in a large volume of water that would drastically reduce the concentration of toxins.

The collection and disposal of sewage from individual systems will be the responsibility of each individual farmer who elects to install toilet facilities. The installation and maintenance of these individual systems are controlled by DOH regulations.

The lease agreement between the farmers and the State will include all restrictions and requirements applicable to the Agricultural Park. This will include the restrictions imposed by the "no-pass zone".

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest M. Takahashi*

Ernest Takahashi, Project Manager

ET/ry

cc: DOA

**WILSON  
OKAMOTO  
& ASSOCIATES**



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# University of Hawaii at Manoa

Environmental Center  
Crawford 317 • 2550 Campus Road  
Honolulu, Hawaii 96822  
Telephone (808) 928-7301

RECEIVED  
115 10 1984

February 7, 1984

RE-0398

Ms. Letitia N. Uyehara  
Office of Environmental Quality Control  
550 Halekauwila Street  
Honolulu, Hawaii 96813

WILSON OKAMOTO & ASSOCIATES

Dear Ms. Uyehara:

Draft Environmental Impact Statement  
Kahuku Agricultural Park  
Kahuku, Oahu

The proposed Kahuku Agricultural Park will encompass approximately 555 acres of former sugar cane land. The land will be leased by the State from Campbell Estate and subsequently subleased to qualified farmers to promote the development of diversified agriculture. We have been assisted in this review by Charles Lamoureux, Botany; Bjorn Griffin, Anthropology; Harold Baker, Agriculture Economics; Jacquelin Miller and Pamela Bahren, Environmental Center.

The Environmental Center's comments at the preparation stage of this document were inadvertently sent to your office instead of the Department of Agriculture or the consultants, Wilson Okamoto and Associates, and were apparently never transmitted to the drafters of the EIS, since they are not included in the DEIS. Because some of these concerns have not been fully addressed in the DEIS we are incorporating our earlier comments into this review.

### Water Demands

Since water demand for Kahuku Agricultural Park (KAP) is estimated at 0.98 mgd (p. II-3) the total demand on the groundwater resources for the Kahuku area will be close to the estimated sustainable groundwater yield for the Kahuku area. The present draft in the Kahuku area is 12 mgd (p. III-7), and the Board of Water Supply has reserved 1.0 mgd for domestic purposes (p. III-7). If the BWS reservation is additional to the 12 mgd, the total anticipated draft from the Kahuku area, including the agricultural park draft will be 12.0 (present use) + 1.0 (BWS) + 1.0 (Ag. Park) = 14.0 mgd, only 1 mgd less than the 15.0 mgd estimated sustainable yield of the Kahuku aquifer (p. III-7).

As indicated in the preliminary DEIS for the Kalamoi wells, it is possible that the natural groundwater discharge from the Kalamoi area is by way of the Kahuku area. If so, the draft from the Kalamoi wells will constitute an additional deduction from the sustainable yield of the Kahuku aquifer. The EIS for the proposed Agricultural park should take this possibility into account.

AN EQUAL OPPORTUNITY EMPLOYER

Ms. Letitia N. Uyehara

-2-

February 7, 1984

If there is a significant margin between the total draft from the aquifer and its sustainable yield, the general effects of the draft for the Agricultural Park, from Pump 1 may be slight. However, the EIS should comment on the salinity of the water drawn from Pump 1 when it was operated by Kahuku Sugar Co., the anticipated salinity with the 1 mgd draft, and the salinity tolerance of the crops proposed for the Agricultural Park.

### Drainage

No mention is made of the possible impacts the drainage improvements will have on the Kil Pond Wildlife Refuge or the aquaculture farms in the vicinity. Will siltation cause any problems to these interests located so close to KAP?

### Botany

The mitigation measures (p. IV-3, 4), specifically the exclusion of the botanically sensitive areas from cultivation and development, in response to the recommendation of the Botanical survey team (Appendix 1, p. 13, 14), should satisfactorily avoid significant impacts to sensitive or endangered botanical species. We suggest that awareness of these sensitive areas be called to the attention of the Agricultural Park lessees in their lease agreements to help promote maximum awareness and cooperation in the protection of a limited natural resource.

### Archeological/Historical

Removal of the archeological sites identified during the survey (Appendix 2) from the development plan sites (p. IV-5) should preclude significant impacts on Archeological remains. Because of the likelihood that this area was formerly rich in archeological remains, prior to its development for sugar cane, it might be well to apprise the lessees of its former archeological significance and ask for their watchfulness for archeological remains during farming/grading operations.

### Groundwater

The concerns expressed in the Water Resources Research Center review with regard to possible contamination of groundwater by inadequate sewage containment or incorrect pesticide use, are of particular concern. It would seem that the number and use of holding tanks/toilets should be specified in the sublease agreements to assure awareness for the problem and compliance with satisfactory sanitary and pesticial waste disposal techniques.

### Economics

We note (p. II-7) that the annual lease rent will be \$50/acre for arable land and \$1/acre for waste land. Since more than half of the park land, specifically 345 acres, are considered of marginal development potential (p. II-1) and not designated for development at this time, will these lands be classified under the "waste land" category? Otherwise, it would not seem reasonable to include the entire 345 acres in the Agricultural Park but only sufficient acreage to provide the noted desirable buffer zone.

Mr. Letitia N. Uyehara

-3-

February 7, 1984

We appreciate your consideration of our comments in the preparation of the revised EIS.

Yours truly,

*Doak C. Cox*

Doak C. Cox  
Director

cc: Department of Agriculture,  
Planning and Development Office  
Gary Okamoto, Wilson Okamoto & Assoc. ✓  
Harold Baker  
Charles Lamoureux  
Bion Griffin  
Jacquelin Miller  
Pamela Bahnen

**WILSON  
OKAMOTO  
& ASSOCIATES**



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MEMBERS, SOCIETY OF  
REGISTERED PROFESSIONAL ENGINEERS  
HAWAII, INC.

C2496-01  
April 5, 1984

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

Subject: Kahuku Agricultural Park E.I.S.  
Dear Dr. Cox:

Thank you for your letter of February 7, 1984 (RE: 0398) commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

Water Demands

Table 4 on page III-8 of the Draft E.I.S. shows the estimated groundwater usage for the study area. Kahuku Housing Corporation formerly operated a domestic water source at Pump No. 1 to supply the town of Kahuku. Recently, the Board of Water Supply (BWS) has taken over that responsibility with their new well. The BWS 1.0 MGD is therefore included in the 12 MGD estimated existing consumption.

The hydraulic connection between the Kahuku aquifer and other areas along the Windward coast was taken into consideration during calculation of the sustainable yield. Historically, withdrawal has been greater than 15 MGD. Kahuku Sugar Co. pumping records show pumpages averaged 22 MGD. The State Department of Land and Natural Resources (DLNR) and the BWS worked together to arrive at the 15 MGD sustainable yield estimate (April 27, 1982).

A number of wells that were used by the Kahuku Sugar Co. showed higher saline levels. The Pump No. 1 source, however did not experience salinity problems. In fact, water from Pump No. 1 was used to dilute saline water from other wells. Withdrawal from the Pump No. 1 source averaged 3.8 MGD while the Sugar company was operating. Up until just recently, the town of Kahuku was supplied its drinking water from the well of Pump No. 1. The water from Pump No. 1 is not expected to present any salinity problems for irrigation since it was acceptable for domestic uses.

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**OKAMOTO**  
**& ASSOCIATES**

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Letter to Dr. Doak C. Cox  
Page 2  
April 5, 1984

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**OKAMOTO**  
**& ASSOCIATES**

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Letter to Dr. Doak C. Cox  
Page 3  
April 5, 1984

Drainage

Analysis of the Soil Conservation Services' method for estimating peak discharge indicates that the proposed agricultural park will not significantly impact the existing drainage flows. Moreover, analysis of the SCS's Universal Soil Loss Equation indicates minimal siltation impacts from erosion. Therefore it is anticipated that present siltation problems will not be aggravated.

Botany

The botanically sensitive areas are located on steeper slopes or hill tops that are considered unutilizable. These areas will not be included in any of the leased farmlots.

Archaeological/Historical

To ensure consideration of archaeological/historical concerns design and construction of the project is currently being coordinated with the State Historic Sites Division.

Groundwater

The Environmental Protection Agency (EPA) has issued a list of chemicals that have been approved for use in agriculture. The State Department of Agriculture (DOA) regulates the use of agricultural chemicals through a permit program, which mandates the proper use of approved chemicals. The proper use of EPA approved chemicals will minimize any adverse environmental impacts to surrounding lands. These controls are not only applicable to the proposed Kahuku Agricultural Park but to all agricultural operations.

Current data on the long-term effects of chemicals on the environment and wildlife are limited. Tolerance levels in wildlife have not been strongly established. Chronic exposure of the wildlife within the refuge to pesticides use within the Kahuku Agricultural Park is not expected to occur since there are no perennial streams within or near the Agricultural Park. Although chemicals could be applied to fields on a daily basis, opportunity for pesticides to reach the refuge will only occur during heavy rainfall. Additionally, many chemicals lose their toxicity with time and therefore the period between application and heavy rainfall will be a factor in the toxin levels in the storm run-off.

X-65

Acute exposure of refuge wildlife to pesticides is remote. As mentioned earlier, the only way for pesticides from the agricultural park to reach the wildlife refuge is via storm run-off. The amount of rainfall required to generate enough run-off to reach the refuge, would also result in a large volume of water that would drastically reduce the concentration of toxins.

The State Department of Health (DOH) does not require toilet facilities unless there is a dwelling or building. If the individual farmer elects to install toilet facilities, then he is subject to DOH Public Health Regulations, Chapter 57 and will be responsible for the proper installation, operation and maintenance of the facility. Only self-contained holding or treatment systems will be allowed within the agricultural park.

Economics

The remaining approximately 345 acres of land that were formerly in sugarcane will be leased at the "waste land" rate of \$1/acre. With adequate irrigation, this area could provide for future expansion; however, there are no present plans for its development.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest M. Takahashi*

Ernest Takahashi, Project Manager

ET/ry

cc: DOA



DEPARTMENT OF TRANSPORTATION SERVICES  
**CITY AND COUNTY OF HONOLULU**  
 HONOLULU MUNICIPAL BUILDING  
 850 SOUTH KING STREET  
 HONOLULU, HAWAII 96813



SILEEN B. ANDERSON  
 MANAGER

ANDREW I. T. CHANG  
 MANAGER

WILLIAM A. BONNETT  
 DIRECTOR

DALE KNEE  
 ASSISTANT DIRECTOR

February 23, 1984

TE1/84-116

X-166  
 Ms. Letitia N. Uyehara  
 Interim Director  
 Office of Environmental  
 Quality Control  
 550 Halekauwila Street, Room 301  
 Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Draft Environmental Impact Statement  
for Kahuku Agricultural Park

On page 11-2, the section on Roadway Improvements indicates that the minor access roads will consist of a 15' crushed coral surface. In our judgment 15' is too narrow because the edges of the coral surface will deteriorate rapidly leaving a narrow traveling surface. We suggest 20' of crushed coral surfacing for the minor roads.

Sincerely,

WILLIAM A. BONNETT  
 Director

cc: State Dept. of Agriculture  
 Wilson Okamoto & Associates, Inc.  
 Gary Okamoto

WILSON  
 OKAMOTO  
 & ASSOCIATES



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U.S. DEPARTMENT OF AGRICULTURE

C2496-01  
 April 5, 1984

Mr. William A. Bonnett, Director  
 Department of Transportation Services  
 Honolulu Municipal Building  
 650 South King Street  
 Honolulu, Hawaii 96813

Subject: Kahuku Agricultural Park EIS

Dear Mr. Bonnett:

Thank you for your letter of February 23, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

The proposed roadway width has been revised from 15-ft. wide to 26-ft. wide crushed coral surface. This will allow two-way traffic even if another vehicle is parked along the road or if the roadway edges are deteriorated.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

Ernest Takahashi, Project Manager  
 ET/ry

cc: DOA

HONOLULU MUNICIPAL BUILDING  
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BOARD OF WATER SUPPLY  
CITY AND COUNTY OF HONOLULU



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BOARD OF WATER SUPPLY  
CITY AND COUNTY OF HONOLULU



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Ms. Letitia Uyehara  
Page 2

February 2, 1984

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February 2, 1984

FEB 08 1984

WILSON OKAMOTO & ASSOCIATES

Ms. Letitia Uyehara  
Interim Director  
Office of Environmental  
Quality Control  
State of Hawaii  
Room 301  
550 Haickauwila Street  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Draft Environmental Impact Statement for Kahuku  
Agricultural Park

Thank you for the opportunity to review the draft  
environmental document for the proposed agricultural park.  
We have the following comments:

1. The water quality data for Pump No. 1 should be included in Section II-B3.
2. The sustainable groundwater yield of 35 mgd referred to on pages III-7 and IV-8 for the Kahuku Basal Aquifer should be referred to as the Koolauloa Basal Aquifer.
3. The document should also discuss any mitigative action that may be pursued in the event the quantity or quality of water is inadequate to meet the needs of the park.

If you have any questions, please contact Lawrence Whang at 527-6138.

Very truly yours,

*Kazu Kayashida*  
KAZU KAYASHIDA  
Manager and Chief Engineer

cc: Department of Agriculture  
(Planning & Development)  
Wilson Okamoto & Associates

C2496-01  
April 5, 1984

Mr. Kazu Hayashida  
Manager & Chief Engineer  
Board of Water Supply  
City & County of Honolulu  
630 S. Beretania Street  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park E.I.S.

Dear Mr. Hayashida:

Thank you for your letter of February 2, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

1. Water quality for Pump No. 1 will be addressed in Section II-53 and the bacteriological reports will be appended to the Revised EIS.
2. Reference to the Kahuku Basal Aquifer will be changed to Koolauloa Basal Aquifer in the Revised EIS.
3. Water quality from Pump No. 1 is not expected to pose any problems. The Kahuku community used 1.0 MGD from that well for domestic consumption up until the time that BWS installed the new well to serve the Koolauloa Support Housing and Kahuku Town. After the BWS well went into operation, the domestic source at Pump No. 1 was shut down. The Kahuku Agricultural Park will utilize the water that was being pumped for domestic service.

Mitigative measures for inadequate quality or quantity of irrigation water will be discussed in the Revised EIS.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,



Ernest Takahashi, Project Manager

ET/ry

cc: DDA

**WILSON  
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X-68

Oahu Banana Growers Association



45-760 Waialua Road  
Kaneohe, Hawaii 96744  
(808) 247-0421

February 01, 1984

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WATER CONSERVATION & ASSOCIATES

Ms. Letitia N. Uyehara  
Interim Director  
Office of Environmental Quality Control  
550 Halekauwila St., Rm. 301  
Honolulu, HI 96813

Subject: Kahuku Agricultural Park E. I. S.

Dear Ms. Uyehara:

The Oahu Banana Growers Association (OBGA) has several concerns regarding the planned Kahuku Agricultural Parks.

We feel that the proposed water delivery system for the park is inadequate. We feel that a larger water delivery system and a larger reservoir would decrease the amount of man hours necessary to complete irrigation work and allow better time utilization by the individual farmer.

We feel that for lands less than or equal to 4 acres, a 2 inch main should be the minimum. For lands greater than or equal to 4 acres, a 3 inch main minimum, for lands greater than or equal to 8 acres, a 4 inch main minimum, and for lands greater than or equal to 15 acres, a 5 inch main minimum, with a minimum of 50 pounds water pressure after the main under usage.

Another concern is the security of the equipment and commodities produced on the farm. Experience has shown the unguarded farms are more susceptible to theft and vandalism. We believe that a farm dwelling should be allowed on a lot.

In a related concern, electricity and city water needs to be provided for the use of electrical systems and final cleansing of farm produce.


The OBGA also feels that the main road should be paved. Crushed coral needs constant maintenance during adverse weather conditions and could cause financial and personality conflicts between the tenants.

Ms. Letitia N. Uyehara  
February 01, 1984  
Page Two

Finally, the portion of the study regarding the formation of the agricultural cooperative is highly commendable.

Thank you for the opportunity to review and respond to the E. I. S.

Sincerely,

  
Scott Chun, President  
OBGA

cc: State Department of Agriculture  
Gary Okamoto, Project Manager  
Hilary Okamoto & Associates, Inc.

**WILSON**  
**OKAMOTO**  
**& ASSOCIATES**

C2496-01  
April 5, 1984

Mr. Scott Chum, President  
Oahu Banana Growers Association  
45-260 Maikala Road  
Kaneohe, HI 96744

Subject: Kahuku Agricultural Park E.I.S.

Dear Mr. Chum:

Thank you for your letter of February 1, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

The proposed water system will provide 2-inch water meters at each farm lot. The meters are sized such that a full 10 acres of crops can be irrigated in 5 to 8 hours at a rate of 4,000 to 6,000 gallons per acre per day. The proposed 10-acre lots are not expected to be fully planted at all times. Typically, about 60 percent of a farm lot is actually under cultivation at any one time. The remaining area consists of fallow fields, windbreaks, roadways, drainageways or unplanted areas. Therefore, a 10-acre farm lot could be irrigated in less than 5 to 8 hours, depending on how much of the area actually requires irrigation.

The land upon which the Kahuku Agricultural Park will be developed is owned by Campbell Estate. The State DIRM has a master lease with Campbell Estate for the project site. As a condition of that lease, dwellings are not allowed on the property. Security buildings other than permanent dwellings are allowable.

All improvements made within the Agricultural Park must be either removed or turned over to Campbell Estate at the termination of the master lease. Improvements that will be provided are the roadway system, irrigation water, and electricity. Potable water required for final cleaning of farm produce, must be obtained off-site.

Crushed coral pavement was selected over A.C. pavement due to lower capital costs and the fact that the roads must be surrendered to Campbell Estate at the end of the lease term.

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**& ASSOCIATES**



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X-70

C2496-01  
Letter to Mr. Scott Chum  
Page 2  
April 5, 1984

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest Takahashi*  
Ernest Takahashi, Project Manager

ET/ry

cc: DOA

C2496-01  
April 5, 1984

Mr. Toranosuke Nakamura, President  
Kahuku Farmers Association  
P. O. Box 184  
Kahuku, Hawaii 96731

Subject: Kahuku Agricultural Park E.I.S.

Dear Mr. Nakamura:

Thank you for your letter of February 6, 1984 commenting on the Kahuku Agricultural Park Draft Environmental Impact Statement. Following are responses to your comments:

1. The Kahuku Farmers Association will be consulted during design and renovation of Pump House No. 1.
2. Security for the Kahuku Farmers Association area will be maintained during and after construction of the proposed agricultural park. The Association will be consulted as to security requirements for vehicular access and the pump house.

We hope that we have adequately addressed your concerns. Your letter will be included in the Revised Environmental Impact Statement.

Sincerely,

*Ernest M. Takahashi*

Ernest Takahashi, Project Manager

ET/ry

cc: DOA

**WILSON  
OKAMOTO  
& ASSOCIATES**



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WILSON OKAMOTO & ASSOCIATES

February 6, 1984

Ms. Letitia H. Uyehara, Interim Director  
Office of Environmental Quality Control  
550 Halekaunila Street, Room 301  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Re: Kahuku Agricultural Park

We have reviewed the draft EIS for the above captioned project and would like to offer the following comments:

1. Since our Association will be affected by the renovation and/or reconstruction of pump house #1, we would like to be consulted during the design stage as well as during the construction stage to ensure that there will be no interruption of our field irrigation schedule.
2. The Kahuku farmers area is presently secured against public vehicular intrusion by means of security barriers, when the new access road is constructed some form of security will be required.

Thank you for the opportunity to comment.

Sincerely,

*Toranosuke Nakamura*

TORANOSUKE NAKAMURA, PRESIDENT  
Kahuku Farmers Association

cc: Department of Agriculture  
Wilson Okamoto & Associates

XI. REFERENCES

## REFERENCES

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The following publications were prepared by industry representatives, members of the College of Tropical Agriculture and Human Resources at the University of Hawaii, and various government officials.

Leafy Vegetables Industry Analysis No. 2, February, 1983.

Solanaceous and Cucurbit Crops Industry Analysis, December 1981.

Papaya Industry Analysis No. 3, May, 1983.

Banana Industry Analysis No. 2, June, 1983.

Dendrobium Industry Analysis, February, 1981.

Ornamental Potted Plant Industry Analysis No. 3, May, 1982.

XII. APPENDICES

APPENDIX A - BOTANICAL SURVEY

BOTANICAL SURVEY OF THE  
PROPOSED KAHUKU AGRICULTURAL PARK,  
KAHUKU, O'AHU

Prepared by:  
Kenneth M. Nagata  
Winona P. Char

July 1981

For:  
Wilson Okamoto and Associates, Inc.

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BOTANICAL SURVEY OF THE PROPOSED KAHUKU AGRICULTURAL PARK,  
KAHUKU, O'AHU

INTRODUCTION

The proposed Kahuku Agricultural Park lies on the northern end of the Kō'olau Mt. Range, O'ahu. It is bordered on the north by Kamehameha Highway, to the south by the Kahuku Military Training Area, to the east by Malaekahana Stream, and to the west by Waiale'e Gulch. The proposed agricultural park covers well over 3,000 acres; one-half of which is under cultivation at present while the other one-half consists of abandoned sugar cane fields and scrub. The cultivated areas are located mainly along the relatively level Kamehameha Highway border and such crops as corn (both feed corn and seed corn), watermelon, papaya, eggplant, etc. are grown here. On the Malaekahana Stream border a large fruit orchard (guava, banana, liliko'i and papaya) and a prawn farm can be found. The uncultivated areas lie along the south boundary where the terrain is more hilly and vegetation consists of abandoned cane fields interspersed with Haole Koa Thicket and Haole Koa-Christmas Berry Scrub. Vegetation on a number of hills that are frequently found in these areas consists of 'Ūlei Scrub.

A botanical survey of the proposed agricultural park was conducted in June 1981 to map and describe the vegetation types, to inventory the flora, and to search for plants on the proposed list of rare and endangered plants (Federal Register 1976, 1980).

## METHODOLOGY

Prior to field investigations both aerial photographs and topographic maps were studied for existing roads and trails to provide access into the project site. An intensive walk-through survey was made of the unencumbered 550 acre parcel while only a generalized survey was made of the remaining acreages. Areas which were less disturbed were also surveyed more intensely since rare species are more likely to occur in such localities.

Tentative vegetation zones delineated from recent aerial photographs were verified by ground check and correlated with the photographs. Boundaries of the different vegetation types were also confirmed. Notes on representative vegetation types were also made and species observed in each vegetation type were recorded. Collections were made of plants which could not be positively identified in the field for later determination in the laboratory and herbarium.

## VEGETATION TYPES

A botanical survey of the project site was conducted between 6 June and 13 June 1981. Major emphasis was given to the 550 acre parcel, which was surveyed in its entirety. Based on aerial photographs and verified by site visitation, a general vegetation map of the entire project site was prepared (Figure 1). The nine vegetation types recognized are discussed in the following paragraphs.

### Cultivated Lands (C)

All cultivated areas including vegetable farms, orchards, prawn farms and fallowed fields within these areas are designated Cultivated Lands. In the northwest portion of the project site along Kamehameha Highway west of Tanaka Store corn (Zea mays) is the exclusively grown crop. Papaya (Carica papaya), watermelon (Citrullus lanatus) and corn are the major crops between Kahuku Village and Tanaka Store. Small fields of green onion (Allium fistulosum) and eggplant (Solanum melongena) are also present. East of Kahuku Village the major crops are guava (Psidium guajava), yellow fruited passion fruit or liliko'i (Passiflora edulis f. flavicarpa) and banana (Musa x paradisiaca). A single papaya field and an abandoned watermelon field were also observed in this section. An extensive aquaculture farm is situated in the northeast portion of the project site.

Thickets of haole koa (Leucaena leucocephala), paragrass (Brachiaria mutica) and Guinea grass (Panicum maximum) are often present along roadsides and in abandoned or vacant areas. Common adventives within the crops are buffelgrass (Cenchrus ciliaris), spiny amaranth (Amaranthus



spinosus), goosegrass (Eleusine indica), nut grass (Cyperus rotundus), lions-ear (Leonotus nepetaefolia), pigweed (Portulaca oleracea), sourgrass (Tricachne insularis) and Bidens pilosa var. minor. In the drainageways, Haola Koa - Paragrass Drainage Association can be found. In the vicinity of the aquaculture farm, sensitive plant (Mimosa pudica), honohono (Commelina diffusa), goosegrass and paragrass are common.

Several species such as ironwood (Casuarina equisetifolia), sugar cane (Saccharum officinarum) and banana are used as windbreaks between fields. Haole koa and the "Hawaiian Giant" variety of haole koa are used as supports for the passion fruit vines.

Fallow or abandoned fields, possible crop rotation and expansion of existing fields contribute to the changing general dynamics of agriculture. Thus, boundaries delimiting specific crops are not designated on the vegetation map and only general localities where specific crops are presently found have been indicated.

Also included in this vegetation type are the three antenna enclosures near the wind farm facility in the northern portion of the project site. The vegetation within the enclosures is being maintained as a lawn consisting of a mixture of various grasses and forbs.

#### Abandoned Sugar Cane (ASC)

Much of the uplands above Kahuku Village were once planted in sugar cane. These fields were established in nearly every possible site except on steep hillsides and on the crests of ridges and knolls. Today these fields are in various stages of abandonment. Some areas which have been abandoned for many years have been largely replaced by

haole koa. Some fields on the other hand, are still dense and have not been invaded by other species. These appear to be only recently abandoned.

Included within this vegetation type are sections of haole koa and small, isolated knolls and ridges, and waste areas which are vegetated with such species as 'Ūlei (Osteomeles anthyllidifolia), Java plum (Eugenia cumini), Christmas berry (Schinus terebinthifolius), ironwood and various grasses. Often, extensive stands of haole koa have replaced portions of former cane fields. These stands have been classified as Haole Koa Thicket rather than Abandoned Sugar Cane.

Interspersed within the sugar cane are such species as Macaranga tanarius, Christmas berry, guava, haole koa and paragrass. Usually these species occur more frequently along former irrigation ditches and flumes. Few species are found along the trails and former cane haul roads through this vegetation type. Bidens pilosa var. minor is the dominant roadside species. Balsam apple (Momordica charantia var. pavel), pohāpohā (Passiflora foetida), huehue-haole (P. suberosa) and Guinea grass occur only occasionally.

Abandoned Sugar Cane is the dominant vegetation type in the uplands within the project site.

#### Haole Koa Thicket (HKt)

This vegetation type is characterized by dense stands of haole koa which form a closed canopy 10 feet or more in height. Often, Haole Koa Thicket occurs in flat or gentle to moderate slopes and constitutes the second most prevalent vegetation type in non-cultivated areas. Few species can be found within the Haole Koa Thicket. The understory

consists almost exclusively of seedling haole koa. Paragrass and hono-hono are occasionally found, especially in moist areas. Among the species that grow along the trails and roads through this vegetation type are Bidens pilosa var. minor, 'uhaloa (Waltheria americana), pluchea (Pluchea odorata), huehue-haole, pohāpohā and Christmas berry.

Remnants of old flumes and irrigation ditches are common in many of the flat areas. In these areas the Haole Koa Thickets have replaced cane fields.

#### 'Ūlei Scrub (Us)

Remnants of native vegetation exist on the larger ridges and knolls above Kahuku Village that have not been put into sugar cane. The vegetation consists largely of the native 'ūlei, 'ākia (Wikstroemia sp.), huehue (Cocculus ferrandianus), and pili grass (Heteropogon contortus). 'Ūlei is dominant and often forms dense, extensive mats. Exotic species such as Christmas berry, haole koa, sourgrass and broomsedge (Andropogon virginicus) have invaded the native ecosystem and have become associated with this vegetation type. Ironwood trees have been planted on many of these sites and have become established. At higher elevations guava is associated with the 'Ūlei Scrub.

Three native species which are rare in the project site are found in this vegetation type. Five individuals of alahe'e (Canthium odoratum) and two 'ili-ahi (Santalum freycinetianum) trees were found at about 300 foot elevation above Kahuku Village and approximately two dozen individuals of 'ili-ahi-a-lo'e (Santalum ellipticum var. littorale) were observed on a hill at approximately 180 foot elevation near the Board of Water Supply Kahuku Wells.

The 'Ūlei Scrub represents remnants of the native ecosystem which originally dominated the hillsides in the project site. The original vegetation probably consisted of extensive mats of 'Ūlei with scattered shrubs of 'ākia and 'ili-ahi-a-lo'e and trees of alahe'e and 'ili-ahi. Other species present within this ecosystem include huehue, and pili grass. Although 'ilima (Sida fallax) and wiliwili (Erythrina sandwicensis) were not observed in the 'Ūlei Scrub, they probably occurred here prior to cultivation since they were found in other vegetation types during the survey.

#### Haole Koa-Christmas Berry Scrub (HKCs)

This vegetation type consists predominantly of open stands of haole koa and Christmas berry less than 10 feet in height. It is differentiated from the Haole Koa Thicket by its open canopy, shorter stature, generally more diverse composition, and is usually found on steeper rocky slopes. Typically, this association is found on steep hillsides between the 'Ūlei Scrub at the crest and the Haole Koa Thickets at the base. Occasionally, the Haole Koa-Christmas Berry Scrub may consist of dense stands of shrubs four to seven feet in height. Associated with this vegetation type are guava, grasses such as sourgrass, molasses grass (Melinis minutiflora) and broomsedge, trees such as ironwood, Java plum and Formosan koa (Acacia confusa) and remnant native vegetation consisting of 'Ūlei, 'ākia and huehue.

A small patch of Haole Koa-Christmas Berry Scrub exists on the limestone outcrops and talus across Tanaka Store along Kamehameha Highway. Scrubby Chinese banyan (Ficus microcarpa) and lantana (Lantana camara) are also common in this area. This is the only locality in the

project site where several native species such as alena (Boerhavia diffusa), 'ilima, 'ilie'e (Plumbago zeylanica) and maiapilo (Capparis sandwichiana var. sandwichiana) can be found.

#### Mixed Forest (mf)

The Mixed Forest association consists of stands of several tree species taller than 20 feet. Tall Christmas berry, Java plum, Formosan koa, ironwood, guava, Chinese banyan and Port Jackson fig (Ficus rubiginosa) constitute this vegetation type. Haole koa is sometimes found but only as an understory species. The understory is usually sparse and may consist of paragrass, huehue-haole, basketgrass (Oplismenus hirtellus), 'ākia and seedlings of the canopy species. This vegetation type is found on hillsides and gulch sides and in waste areas within canefields.

#### Haole Koa-Paragrass Drainage Association (HKPRd)

In the uplands as well as in the cultivated lowlands, dense stands of haole koa and paragrass can be found along the ditches, in gulch floors or in other moist depressions. This type of vegetation also may occur at the periphery of the Cultivated Lands where napiergrass (Pennisetum purpureum) and Guinea grass are also common. In the upland gulches, Christmas berry, hau (Hibiscus tiliaceus) and honohono are commonly associated with the Haole Koa-Paragrass Drainage Association.

This vegetation type may be diverse in composition. In some drainage ways the dense stands of haole koa are replaced by tall Christmas berry, Java plum and kukui (Aleurites moluccana). In such situations, paragrass, the dominant understory species, is usually found at the periphery of the canopy.

### Broomsedge Grassland (Bg)

The hills immediately above the project site are characterized by grasslands of broomsedge (Andropogon virginicus) with scattered shrubs of Christmas berry and lantana. In the project site this association only occurs in the uppermost areas above 400 feet elevation. Andropogon is the dominant species on the hillsides and on the ridge crests which are often marked by erosional scars.

### Pangola Grassland (PNg)

This vegetation type only occurs in one location in the central portion of the project site where pangolagrass (Digitaria decumbens) had been used to revegetate a denuded area. The revegetation efforts have not been entirely successful as the grass has not formed a complete cover. A few weedy species have also become established. Haole koa has been the most successful and small shrubs can be found scattered throughout the site. Partridge pea (Cassia leschenaultiana), rattlebox (Crotalaria mucronata), pigweed and sensitive plant are among the few forbs found in this area.

## DISCUSSION

The vegetation in the lowlands consists of cultivated crops. In the western portion of the project site, corn is exclusively grown and in the central portion, corn, papaya and watermelon are the major crops. Banana, guava and passion fruit are cultivated in the eastern end. The common wayside species in the cultivated areas are Bidens pilosa var. minor, sensitive plant, paragrass, buffelgrass, spiny amaranth, nut

grass and goosegrass. Sugar cane, ironwood and banana are used as windbreaks. This vegetation has been classified as Cultivated Land.

The upland vegetation is largely secondary and is dominated by two species - sugar cane and haole koa. The extensive sugar cane fields which once dominated the landscape have been abandoned and are being replaced by thickets of haole koa. Few other species are found in these thickets. Other species commonly found in the uplands are Christmas berry, guava and ironwood. Common forbs include the ubiquitous Bidens pilosa var. minor, huehue-haole, sourgrass, paragrass, and vervain (Stachytarpheta jamaicensis). Macaranga tanarius, Java plum, Chinese banyan, Formosan koa and rattlebox are found occasionally throughout the uplands.

In addition to Cultivated Land, eight vegetation types are distinguished. Abandoned Sugar Cane, the most prevalent type, is found on flat lands, depressions, wide gulches, and gentle to moderate slopes. Haole Koa Thicket, the second most common vegetation type, has replaced the cane fields in several areas and is also commonly found on flat areas, in gulches, on gentle to moderate slopes and at the periphery of cultivated areas. On steeper, rocky slopes, Haole Koa-Christmas Berry Scrub is dominant and on ridge crests and knolls that have remained undisturbed, the vegetation consists of 'Ūlei Scrub. Mixed Forest occurs wherever banyans have been planted, on isolated mounts of boulders and debris within the cane fields, on knolls that have been reforested and along the major drainages that are not dominated by haole koa. Along most drainages in both the uplands and lowlands, the vegetation consists of Haole Koa-Paragrass Drainage Association. Two vegetation types occur

only once in the project site. Broomsedge Grassland only occurs in one area above 400 feet behind Kahuku Village and Pangola Grassland only in a small section at 200 feet elevation in the central portion of the project site.

Thirteen native species were encountered in the project site. 'Ūlei, 'ākia, pili grass and huehue are important constituents of the 'Ūlei Scrub which are commonly found on relatively undisturbed ridges. 'Ūlei, 'ākia and pili are also found occasionally in the Haole Koa-Christmas Berry Scrub and rarely in the Broomsedge Grassland. Huehue is present in the Haole Koa-Christmas Berry Scrub and in small numbers in the Haole Koa Thicket and in the Abandoned Sugar Cane. The indigenous moa (Psilotum nudum) was recorded only once in the 'Ūlei Scrub within the project site. Three other native species were associated with the 'Ūlei Scrub. At about 300 feet elevation behind Kahuku Village two individuals of 'ili-ahi and five alahe'e were encountered. On another hill above Kahuku Village, approximately 24 shrubs of 'ili-ahi-a-lo'e were observed. The 'Ūlei Scrub with its associated native species is thought to represent the remnants of an ecosystem which once probably predominated in the lower elevations of the Kahuku region.

In the Haole Koa-Christmas Berry Scrub on the limestone outcrops along Kamehameha Highway, five native species were recorded. A single alahe'e tree and a single shrub of maiapilo and several 'ilima, alena and 'ilie'e grow either on the limestone or on the talus below. This is the only known locality in the project site for all but the alahe'e. Finally, a single small wiliwili was seen in the haole koa along the road near the puree processing plant in the east section of the project site.



## ENDANGERED SPECIES

Two proposed endangered species are present in the project site. Approximately 24 individuals of Santalum ellipticum var. littorale ('ili-ahi-a-Io'e) were encountered at the summit of a hill behind Kahuku Village. Many of the plants were robust and seemingly healthy but several were growing precariously at the edge of erosional features. Most of these erosion scars can probably be attributed to a jeep road that has been severely gullied. Recent tire tracks in the vicinity indicate that off-road vehicles - most likely dirt bikes - are still using this road and are accelerating the natural erosional process. In view of the fact that no signs of predation or over-collecting were observed, habitat deterioration caused by erosion and compounded by ORV impact can be assumed to be among the serious threats to this population.

One windswept individual of Capparis sandwichiana var. sandwichiana was present atop a large limestone block along Kamehameha Highway. It is persisting in an ecosystem that has been all but destroyed by exotic species. The environment is windswept and the surrounding lantana and Christmas berry form an impenetrable thicket. Cocculus ferrandianus is the only native species to be found in the immediate vicinity. Several flowers, buds and young fruit were present on the Capparis but no seedlings were found and the continued existence of this taxon in this locality is extremely doubtful.

Both taxa were originally proposed for protection by the U.S. Fish and Wildlife Service in 1976 (Federal Register Vol 41 No. 117: 24524-24572). Neither were officially listed and were subsequently re-proposed

for endangered status in 1980. Both are listed under Category 1 in the recent submission (Federal Register Vol 45 No. 242: 82480-82569). Taxa in this critical category include those for which the U.S. Fish and Wildlife Service has sufficient information on hand to support the appropriateness of their being listed as Endangered or Threatened species.

#### RECOMMENDATIONS

The following recommendations are offered regarding the 550 acre parcel:

1. It may be neither economically nor ecologically advisable to cultivate or in any way disturb the presently intact vegetation on the hills and knolls. These features are too steep to cultivate and any disturbance to the vegetation will result in irreparable erosion. The Kahuku Sugar Company probably recognized this and did not attempt to establish sugar cane on these features.
2. Because of the danger of erosion, grazing should be discouraged on hillsides.
3. There is evidence of erosion in the project site caused by off-road vehicles - probably dirt bikes. Security should remain at a maximum to prevent further trespass and degradation of the vegetative cover.
4. Measures should be taken to protect the Santalum ellipticum var. littorale habitat from further degradation. Presently, off-road vehicles are contributing to the erosion on the

mauka side of the hill. Further trespass should be prevented. Ideally, development should be excluded from the entire hill and if grazing is permitted in the project site, the entire hill should be enclosed by a fence to keep grazing animals out.

## CHECKLIST OF VASCULAR PLANTS

Families are listed alphabetically within each of four groups: Pteridophyta (Ferns and Fern Allies), Gymnospermae, Monocotyledonae, and Dicotyledonae. Genera and species are arranged alphabetically. Taxonomy and nomenclature of Pteridophytes follow Wagner's unpublished Checklist of Hawaiian Pteridophytes except where more commonly accepted names are used. Taxonomy and nomenclature of flowering plants follow St. John (1973) except where more commonly used names are listed. Hawaiian names used in the checklist are in accordance with St. John (1973) or Porter (1972).

For each species the following information is provided:

1. Scientific name.
2. Common name or Hawaiian name, when known.
3. Status of the species. The following symbols are employed:

E = endemic to the Hawaiian Islands, i.e.,  
occurring naturally nowhere else in the world.

I = indigenous, i.e., native to the Hawaiian  
Islands but also occurring naturally elsewhere.

X = exotic, i.e., plants of accidental or deliberate introduction after the Western discovery of the islands.

P = Polynesian introduction; it includes those plants brought by the Polynesian immigrants previous to Captain Cook's discovery of the islands.

4. The presence of a particular species within each of nine recognized vegetation types within the study area is indicated by a plus (+) sign. The nine vegetation types recognized are:

C = Cultivated lands

ASC = Abandoned Sugar Cane

HKt = Haole Koa thicket

Us = 'Ulei scrub

HKCs = Haole Koa-Christmas berry scrub

mf = mixed forest

HKPRd = Haole Koa-Paragrass drainage association

Bg = Broomsedge grassland

PNg = Pangola grassland

BOTANICAL SURVEY - KAHUKU AGRICULTURAL PARK

SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	HKT	UB	HKCS	mf	HKPRd	Bg	PNd
PTERIDOPHYTA											
ADIANTACEAE											
Pityrogramma calomelanos (L.) Link	Gold fern, silver fern	I	-	-	-	+	-	-	-	-	-
DAVALLIACEAE											
Nephrolepis hirsutula (Forst.) Presl.	Sword fern	X	-	-	-	+	+	-	-	-	-
LINDSAEACEAE											
Sphenomeris chinensis (L.) Maxon	Pala'a	I	-	-	-	+	-	-	-	-	-
POLYPODIACEAE											
Microsorium scolopendria (Burm.) Copel.	Laua'e, lauwa'e	X	-	-	-	+	+	-	-	-	-
PSILOTACEAE											
Psilotum nudum (L.) Beauv.	Moa	I	-	-	-	+	-	-	-	-	-
PTERIDACEAE											
Pteris vittata L.	Kilau-o-pueo	X	-	-	-	-	+	-	-	-	-
THELYPTERIDACEAE											
Christella dentata (Forsk.) Brownsey & Jermy	Downy wood-fern	X	-	-	-	-	+	-	+	-	-
GYMNOSPERMAE											
ARAUCARIACEAE											
Araucaria heterophylla (Salisb.) Franco	Norfolk Island pine	X	-	-	-	-	-	-	-	-	-

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SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	BKt	Us	BKCs	mf	HKPRd	Bq	PNg
MONOCOTYLEDONAE											
AMARYLLIDACEAE											
Agave sisalana Engelm.	Sisal, malina	X	-	-	-	-	+	-	-	-	-
COMMELINACEAE											
Commelina diffusa Burm.	Honohono	X	+	+	+	-	+	-	+	-	-
CYPERACEAE											
Cyperus rotundus L.	Nutgrass, kili'o'opu	X	+	+	-	-	-	-	-	-	-
GRAMINEAE (POACEAE)											
Andropogon pertusus (L.) Willd.		X	-	+	-	+	-	-	-	-	-
Andropogon virginicus L.		X	-	-	-	+	-	-	-	+	-
Andropogon sp.		X	-	-	-	+	-	-	-	+	-
Brachiaria mutica (Forsk.) Stapf	Paragrass, Californiagrass	X	-	-	-	+	-	-	-	+	-
Cenchrus ciliaris L.	Buffelgrass	X	+	+	-	+	-	-	-	-	-
Cenchrus echinatus L.	Common sandbur, 'ume'alu	X	+	-	-	+	-	-	-	-	-
Chloris divaricata R. Br.	Stargrass	X	+	-	-	-	-	-	-	-	-
Chloris inflata Link	Swollen fingergrass, mau-'ulei	X	+	+	-	-	+	-	-	-	-
Chloris radiata (L.) Sw.	Radiate fingergrass	X	+	-	-	-	-	-	-	-	-
Chrysopogon aciculatus (Retz.) Trin.	Golden beardgrass, pili-pili-'ula	X	-	-	-	+	+	-	-	-	-
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	+	+	-	-	+	-	+	-	+
Digitaria adscendens (HBK.) Henr.	Henry's crabgrass	X	-	-	-	+	-	-	-	-	-
Digitaria decumbens Stent	Pangolagrass	X	-	-	-	-	-	-	-	-	-
Digitaria sanguinalis (L.) Heist.	Large crabgrass, kukai-pua'a	X	+	-	-	-	+	-	-	-	-
Echinochloa colona (L.) Link	Jungle rice	X	+	+	-	-	-	-	-	-	-
Echinochloa crusgalli (L.) Beauv.	Barnyard grass	X	+	-	-	-	-	-	-	-	-
Eleusine indica (L.) Gaertn.	Goosegrass, wiregrass, manienie-'ali'i	X	+	-	-	-	-	-	-	-	-

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SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	HKT	US	HKCS	mf	HKPRd	Bg	PNG
Heteropogon contortus (L.) R. & S.	Pili, pili grass	I	-	-	-	-	-	-	-	-	-
Melinis minutiflora Beauv.	Molassesgrass	X	-	-	-	-	-	-	-	-	-
Opismenus hirtellus (L.) Beauv.	Basketgrass, honohono-kukui	X	-	-	-	-	-	-	-	-	-
Panicum maximum Jacq.	Guinea grass	X	+	+	+	+	+	+	+	+	+
Paspalum conjugatum Berg.	Hilo grass, mau'u-Hilo	X	+	+	+	+	+	+	+	+	+
Paspalum dilatatum Poir.	Paspalum grass	X	+	+	+	+	+	+	+	+	+
Paspalum frimbriatum HBK.	Panama paspalum	X	+	+	+	+	+	+	+	+	+
Paspalum orbiculare Forst. f.	Ricegrass, mau'u-laiki	X	+	+	+	+	+	+	+	+	+
Pennisetum purpureum Schumach.	Napiergrass, elephantgrass	X	+	+	+	+	+	+	+	+	+
Rhynchelytrum repens (Willd.) C. E. Hubb.	Natal redtop	X	+	+	+	+	+	+	+	+	+
Saccharum officinarum L.	Sugar cane, ko	P	+	+	+	+	+	+	+	+	+
Setaria glauca (L.) Beauv.	Yellow foxtail	X	+	+	+	+	+	+	+	+	+
Setaria verticillata (L.) Beauv.	Bristly foxtail	X	+	+	+	+	+	+	+	+	+
Sorghum halepense (L.) Pers.	Johnson grass	X	+	+	+	+	+	+	+	+	+
Sorghum sp. (cultivar)	Sorghum	X	+	+	+	+	+	+	+	+	+
Sporobolus indicus (L.) R. Br.	West Indian dropseed	X	+	+	+	+	+	+	+	+	+
Tricachne insularis (L.) Nees	Sourgrass	X	+	+	+	+	+	+	+	+	+
Zea mays L.	Corn, maize, kulina-'ono	X	+	+	+	+	+	+	+	+	+
LILIACEAE											
Allium fistulosum L.	Green onion, 'aka'akai-lau	X	+	+	+	+	+	+	+	+	+
Cordyline terminalis (L.) Kunth	Ti, ki	P	+	+	+	+	+	+	+	+	+
MUSACEAE											
Musa X paradisiaca L.	Banana, mai'a	P	+	+	+	+	+	+	+	+	+
ORCHIDACEAE											
Spathoglottis plicata Bl.		X	-	+	-	+	-	-	-	-	-
PALMAE (ARECACEAE)											
Cocos nucifera L.	Coconut, niu	P	+	-	-	-	-	-	-	-	-
Phoenix sylvestris (L.) Roxb.	Wild date palm	X	+	-	-	-	-	-	-	-	-



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SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	HKT	Us	HKCS	mf	BKPRd	Bq	PNd
PANDANACEAE Pandanus odoratissimus L.	Pandanus, hala	I	-	-	-	-	-	-	+	-	-
ZINGIBERACEAE Zingiber zerumbet (L.) Roscoe	'Awa puhi kuahiwi	P	-	-	-	-	-	-	+	-	-
DICOTYLEDONAE											
ACANTHACEAE Asystasia gangetica (L.) T. Anders.	Asystasia, Chinese violet	X	+	-	-	-	+	-	-	-	-
AMARANTHACEAE Amaranthus spinosus L. Amaranthus viridis L.	Spiny amaranth, pakai kuku Slender amaranth, pakai	X X	++	++	-	-	-	-	-	-	-
ANACARDIACEAE Mangifera indica L. Schinus terebinthifolius Raddi	Mango, manako Christmas berry, wilelaiki	X X	++	+	-	+	+	+	+	+	+
ARALIACEAE Brassaia actinophylla Endl.	Octopus tree, umbrella tree	X	-	-	-	+	+	-	+	-	-
BIGNONIACEAE Spathodea campanulata Beauv.	African tulip tree	X	-	-	-	-	+	-	-	-	-
CAPPARIDACEAE (CAPPARACEAE) Capparis sandwichiana var. sandwichiana DC.	Maiapilo, native caper	E	-	-	-	-	+	-	-	-	-
CARICACEAE Carica papaya L.	Papaya, mikana	X	+	-	-	-	-	-	-	-	-

BOTANICAL SURVEY - KAHUKU AGRICULTURAL PARK

SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	HKT	UA	HKCS	mf	HKPRD	Bg	PNG
<b>CASUARINACEAE</b>											
<i>Casuarina equisetifolia</i> Stickm.	Common ironwood	X	+	-	-	+	+	+	-	-	+
<b>CHENOPODIACEAE</b>											
<i>Atriplex semibaccata</i> R. Br.	Australian saltbush	X	-	-	-	-	-	-	-	-	-
<i>Chenopodium album</i> L.	Lamb's quarter, 'aheahea	X	-	+	-	-	+	-	-	-	-
<b>COMPOSITAE (ASTERACEAE)</b>											
<i>Acanthospermum australe</i> (Loefl.) Ktze.	Spiny-bur, star-bur	X	-	+	-	-	-	-	-	-	-
<i>Ageratum conyzoides</i> L.	Ageratum, maile-hohono	X	+	-	-	+	-	-	-	-	-
<i>Bidens pilosa</i> var. <i>minor</i> (Bl.) Sherff		X	+	+	-	-	+	-	-	-	-
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore		X	+	-	-	-	-	-	-	-	-
<i>Eclipta alba</i> (L.) Hassk.	False daisy	X	+	-	-	-	-	-	-	-	-
<i>Emilia javanica</i> (Burm. f.) C. B. Robins	Red pua-lele	X	+	+	-	+	-	-	-	-	-
<i>Erigeron bonariensis</i> L.	Hairy horseweed, ilioha	X	+	+	-	+	-	-	-	-	+
<i>Pluchea indica</i> (L.) Less.	Indian pluchea	X	+	+	-	-	+	-	-	-	-
<i>Pluchea odorata</i> (L.) Cass.	Pluchea, shrubby fleabane	X	+	-	-	+	-	-	-	-	-
<i>Sonchus asper</i> (L.) Hill	Spiny sow thistle	X	+	+	-	-	-	-	-	-	-
<i>Sonchus oleraceus</i> L.	Sow thistle, pua-lele	X	+	+	-	-	+	-	-	-	+
<i>Tridax procumbens</i> L.	Coat buttons	X	+	+	-	-	-	-	-	-	-
<i>Verbesina encelioides</i> (Cav.) Gray	Golden crown-beard	X	-	+	-	-	-	-	-	-	-
<i>Vernonia cinerea</i> (L.) Less.	Ironweed	X	+	-	-	-	-	-	-	-	-
<i>Xanthium saccharatum</i> Wallr.	Cocklebur, kikania	X	+	-	-	-	-	-	-	-	-
<b>CONVOLVULACEAE</b>											
<i>Ipomoea batatas</i> (L.) Poir.	'Uala, sweet potato	P	+	-	-	-	-	-	-	-	-
<i>Ipomoea congesta</i> R. Br.	Koali-'awania	I	+	-	-	-	-	-	-	-	-
<i>Ipomoea obscura</i> (L.) Ker-Gawl		X	+	-	-	-	-	-	-	-	-
<i>Ipomoea triloba</i> L.	Little bell	X	+	-	-	-	-	-	-	-	-

BOTANICAL SURVEY - KAHUKU AGRICULTURAL PARK

SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	HKT	US	HCS	mf	HKPB	Bq	PNQ
Merremia aegyptia (L.) Urban	Hairy merremia, koali-kua-hulu	I	-	+	-	-	-	-	+	-	-
Merremia tuberosa (L.) Rendle			+	-	-	-	-	-	-	-	-
CRUCIFERAE (BRASSICACEAE)											
Coronopus didymus (L.) Sm.	Swine cress, wartcress	X	+	-	-	-	-	-	-	-	-
CUCURBITACEAE											
Citrullus lanatus (Thunb.) Matsum. & Nakai	Watermelon, ipu	X	+	-	-	-	-	-	-	-	-
Cucurbita pepo L.	Field pumpkin, pala'ai	X	+	-	-	-	-	-	-	-	-
Momordica charantia L.	Balsam pear	X	+	+	-	-	-	-	-	-	-
EPACRIDACEAE											
Styphelia tameiameiae (Cham.) F. Muell.	Pukiawe	I	-	-	-	+	-	-	-	-	-
EUPHORBIACEAE											
Aleurites moluccana (L.) Willd.	Kukui, candlenut tree	P	-	-	-	-	-	-	+	-	-
Euphorbia geniculata Ortega	Wild spurge, kaliko	X	+	-	-	-	-	-	-	-	-
Euphorbia glomeriferae (Millsp.) L.C. Wheeler		X	+	+	-	-	-	-	-	-	-
Euphorbia hirta L.	Garden spurge, koko-kahiki	X	+	+	-	-	-	-	-	-	-
Euphorbia prostrata Ait.	Prostrate spurge	X	-	+	+	-	-	+	-	-	-
Macaranga tanarius (Stickm.) Muell.-Arg.		X	+	+	-	-	-	-	-	-	-
Phyllanthus debilis Willd.	Phyllanthus weed	X	+	-	-	-	+	-	+	-	-
Ricinus communis L.	Castor bean, koli	X	+	-	-	-	+	-	-	-	-
LABIATAE (LAMIACEAE)											
Leonotis nepetaefolia (L.) Ait.	Lions-ear	X	+	+	-	-	-	-	-	-	-
Plectranthus parviflorus Willd.	Spur flower	X	-	-	-	-	-	-	-	-	-
Stachys arvensis L.	Staggerweed	X	+	+	-	-	-	-	-	-	-

BOTANICAL SURVEY - KAHUKU AGRICULTURAL PARK

SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	BK+	US	BKCS	mf	HRPBD	Bg	PNG
<b>LEGUMINOSAE (FABACEAE)</b>											
<i>Acacia confusa</i> Merr.	Formosan koa	X	-	+	-	-	+	+	+	-	-
<i>Caesalpinia major</i> (Medic.) Dandy & Exell	Kakalaioa, grey nickers	I	-	-	-	-	-	-	-	-	-
<i>Canavalia ensiformis</i> (L.) DC.	Jack bean, horse bean	X	+	-	-	-	-	-	-	-	-
<i>Cassia occidentalis</i> L.	Coffee senna, 'auko'i	X	+	+	-	-	+	-	-	-	-
<i>Cassia leschenaultiana</i> DC.	Patridge pea, lauki	X	+	+	-	-	+	-	-	-	-
<i>Cassia surattensis</i> Burm. f.	Kolomona	X	+	-	-	-	-	-	-	-	-
<i>Crotalaria incana</i> L.	Fuzzy rattle-pod, kukae-hoki	X	+	+	-	-	-	-	-	-	-
<i>Crotalaria mucronata</i> Desv.	Virgate mimosa	X	+	+	-	-	+	-	-	-	-
<i>Desmanthus virgatus</i> (L.) Willd.	Three-flowered beggarweed	X	+	-	-	-	-	-	-	-	-
<i>Desmodium triflorum</i> (L.) DC.	Spanish clover, Hawaiian tick-trefoil	X	+	+	-	-	+	-	-	-	-
<i>Desmodium uncinatum</i> (Jacq.) DC.	Willi-willi	E	-	+	-	-	+	-	-	-	-
<i>Erythrina sandwicensis</i> Deg.	Indigo, 'iniko	X	+	+	-	-	+	-	-	-	-
<i>Indigofera suffruticosa</i> Mill.	Koa-haole, haole-koa	X	+	-	-	-	-	-	-	-	-
<i>Leucaena leucocephala</i> (Lam.) de Wit	Bur clover	X	+	-	-	-	-	-	-	-	-
<i>Medicago polymorpha</i> L.	White sweet clover	X	+	+	-	-	+	-	-	-	-
<i>Melilotus alba</i> Desr.	Sensitive plant, puahilahila	X	+	-	-	-	-	-	-	-	-
<i>Mimosa pudica</i> L.	Cow pea	X	+	+	-	-	-	-	-	-	-
<i>Phaseolus lathyroides</i> L.											
<b>MALVACEAE</b>											
<i>Abutilon grandifolium</i> (Willd.) Sweet	Hairy abutilon, ma'o	X	-	-	-	-	+	-	+	-	-
<i>Hibiscus tiliaceus</i> L.	Hau	I	-	-	-	-	-	-	-	-	-
<i>Malva parviflora</i> L.	Little mallow, cheese weed	X	-	-	-	-	-	-	-	-	-
<i>Malvastrum coromandelianum</i> (L.) Garcke	False mallow, hauuoi	X	-	+	-	-	-	-	-	-	-
<i>Sida fallax</i> Walp.	'Ilima	I	-	-	-	-	-	-	-	-	-
<i>Sida rhombifolia</i> L.	Cuba jute	X	+	-	-	-	+	-	-	-	-

BOTANICAL SURVEY - KAHUKU AGRICULTURAL PARK

SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	ACS	HKT	US	HKCS	mf	HRRB	Bg	PNQ
<b>MENISPERMACEAE</b>											
Cocculus ferrandianus Gaud.	Huehue, hue'ie	E	-	-	-	+	+	-	-	-	-
<b>MORACEAE</b>											
Ficus microcarpa L. f.	Chinese banyan	X	-	+	+	-	+	+	+	-	-
Ficus rubiginosa Desf.	Port Jackson fig	X	-	-	-	-	+	+	+	-	-
<b>MYRTACEAE</b>											
Eugenia cumini (L.) Druce	Java plum, palama	X	-	+	+	+	+	-	+	+	-
Psidium cattleianum Sabine	Strawberry guava, waiawi-'ula'ula	X	-	-	-	+	+	-	-	-	-
Psidium guajava L.	Guava	X	+	+	+	+	+	+	+	+	+
<b>NYCTAGINACEAE</b>											
Boerhavia diffusa L.	Alena	I	-	-	-	-	+	-	-	-	-
Bougainvillea spectabilis Willd.	Bougainvillea	X	-	-	-	-	+	-	-	-	-
Mirabilis jalapa L.	Common four o'clock	X	-	-	-	-	+	-	-	-	-
<b>ONAGRACEAE</b>											
Ludwigia octovalvis (Jacq.) Raven	Primrose willow, kamole	I	+	-	-	-	-	-	-	-	-
<b>OXALIDACEAE</b>											
Oxalis corniculata L.	Yellow wood sorrel, 'ihi	I	+	+	-	-	-	-	-	-	-
Oxalis martiana Zucc.	Pink wood sorrel, 'ihi pehu	X	-	+	-	-	-	-	-	-	-
<b>PASSIFLORACEAE</b>											
Passiflora edulis f. flavicarpa Deg.	Yellow liliko'i, passion fruit	X	+	+	+	-	+	-	-	-	-
Passiflora foetida L.	Scarlet-fruited passion-flower, pohapoha	X	-	+	-	+	+	+	-	-	-
Passiflora suberosa L.	Huehue-haole	X	-	+	-	+	+	-	-	-	-

BOTANICAL SURVEY - KAHUKU AGRICULTURAL PARK

SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	AGS	HKT	UB	HKCS	mf	HKPRd	Bq	PNd
PIPERACEAE Peperomia leptostachya H. & A.	'Ala'ala-wai-nui	I	-	-	-	-	+	-	-	-	-
PLANTAGINACEAE Plantago lanceolata L.	Narrow-leaved plantain	X	+	+	-	-	-	-	-	-	-
PLUMBAGINACEAE Plumbago zeylanica L.	'Ilie'e, hille'e	I	-	-	-	-	+	-	-	-	-
POLYGONACEAE Coccoloba uvifera (L.) L.	Sea grape	X	-	-	-	-	+	-	-	-	-
PORTULACACEAE Portulaca oleracea L.	Common purslane, 'ihi	X	+	+	-	-	-	-	-	-	+
PRIMULACEAE Anagallis arvensis L.	Scarlet pimpernel	X	+	+	-	-	-	-	-	-	-
PROTEACEAE Grevillea robusta A. Cunn.	Silk oak, 'oka-kilika	X	-	-	-	-	+	-	-	-	-
ROSACEAE Osteomeles anthyllidifolia Lindl.	Uulei, 'ulei	E	-	-	-	+	+	-	-	+	-
RUBIACEAE Canthium odoratum (Forst. f.) Seem.	Alahe'e, walahe'e	I	-	-	-	+	+	-	+	-	-
Morinda citrifolia L.	Noni	P	-	-	-	+	-	-	+	-	-
RUTACEAE Murraya paniculata (L.) Jack	Mock orange	X	-	-	-	-	+	-	-	-	-

BOTANICAL SURVEY - KAHUKU AGRICULTURAL PARK

SPECIES CHECKLIST

SCIENTIFIC NAME	COMMON NAME	STATUS	C	AGS	HKT	US	HKCS	mf	HKPRd	Bg	PNG
SANTALACEAE											
Santalum ellipticum var. littorale (Hbd.) Skottsbo.	'Ili-ahi-a-lo'e, coast sandalwood	E	-	-	-	+	-	-	-	-	-
Santalum freycinetianum Gaud.	'Iliahi	E	-	-	-	+	-	-	-	-	-
SOLANACEAE											
Lycopersicon pimpinellifolium Mill.	Current tomato, 'ohi'a-ma-kanahale	X	+	+	-	-	-	-	-	-	-
Solanum melogena L.	Eggplant, laho-pipi	X	+	+	-	-	-	-	-	-	-
Solanum nigrum L.	Black nightshade, popolo	I?	+	+	-	-	-	-	-	-	-
STERCULIACEAE											
Walteria americana L.	Hi'aloa, 'uhaloa, kanakalao	I	-	-	-	+	+	-	-	-	-
THYMELAEACEAE											
Wikstroemia sp.	'Akia	E	-	-	-	+	+	-	-	-	-
UMBELLIFERAE (APIACEAE)											
Apium tenuifolium (Moench) Hegi	Fir-leaved celery	X	+	-	-	-	-	-	-	-	-
Centella asiatica (L.) Urban	Asiatic pennywort	X	+	+	-	-	-	-	-	-	-
VERBENACEAE											
Lantana camara L.	Lantana, lakana	X	+	+	-	+	+	+	-	-	-
Stachytarpheta jamaicensis (L.) Vahl	Jamaica vervain, owi	X	+	+	-	+	+	-	-	-	-
Verbena littoralis HBK.	Weed verbena, ha'uowi	X	+	-	-	-	-	-	-	-	-

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APPENDIX B - ARCHAEOLOGICAL SURVEY

CULTURAL RESOURCES RECONNAISSANCE  
OF THE  
KAHUKU AGRICULTURAL PARK PROJECT AREA

for

Wilson Okamoto and Associates  
1150 S. King St.  
Honolulu, Hawaii

by

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JUNE 1981

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I. INTRODUCTION

During June 1981 an archaeological reconnaissance survey and literature search were conducted at Kahuku, Oahu [Figure 1]. The purpose was to determine the presence or absence of significant historic or prehistoric remains in the area of a proposed agricultural park development. The field reconnaissance involved two levels of effort: a brief reconnaissance of three separate parcels totalling 2,500 acres and a more intensive reconnaissance of a single 500 acre parcel [Figure 2].

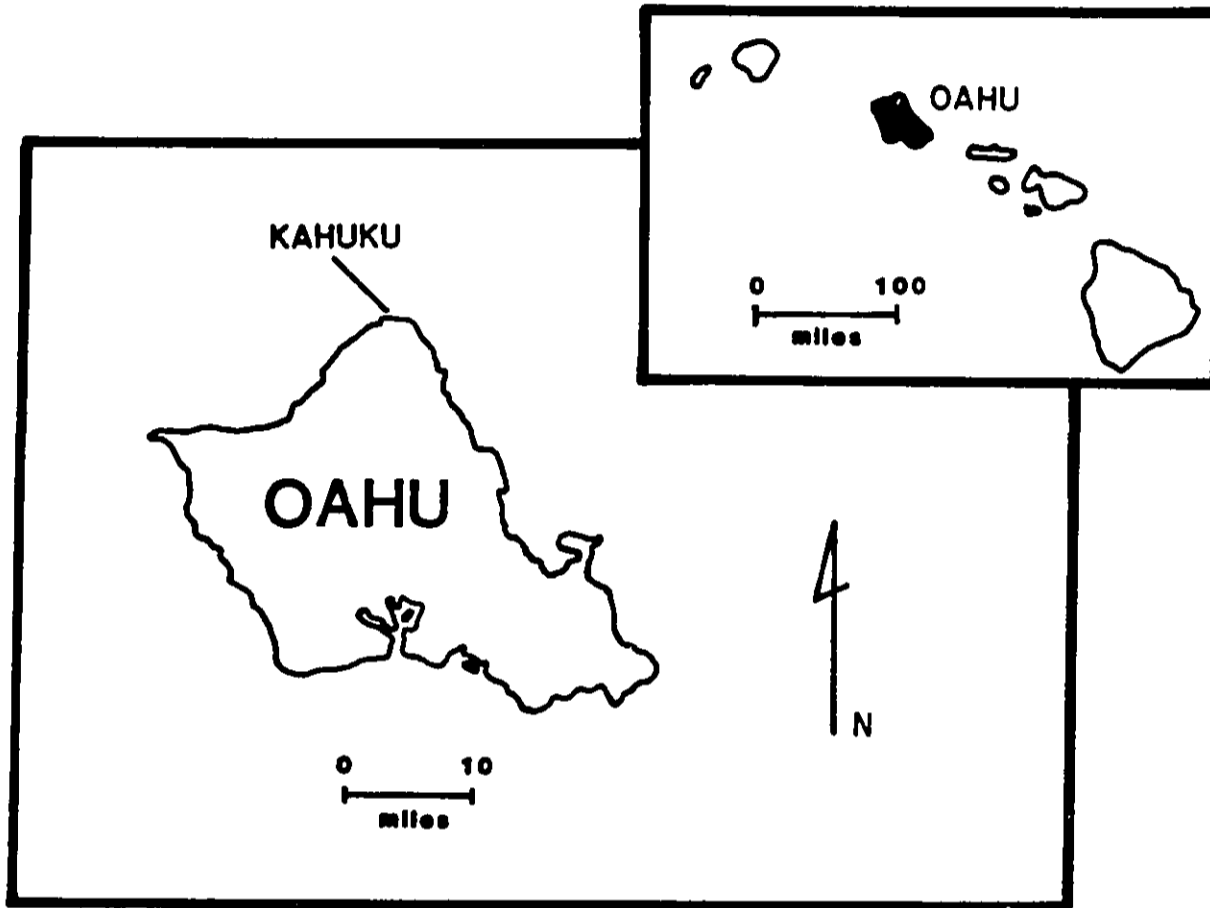


FIGURE 1. Map of Oahu, Showing Location of Survey Area

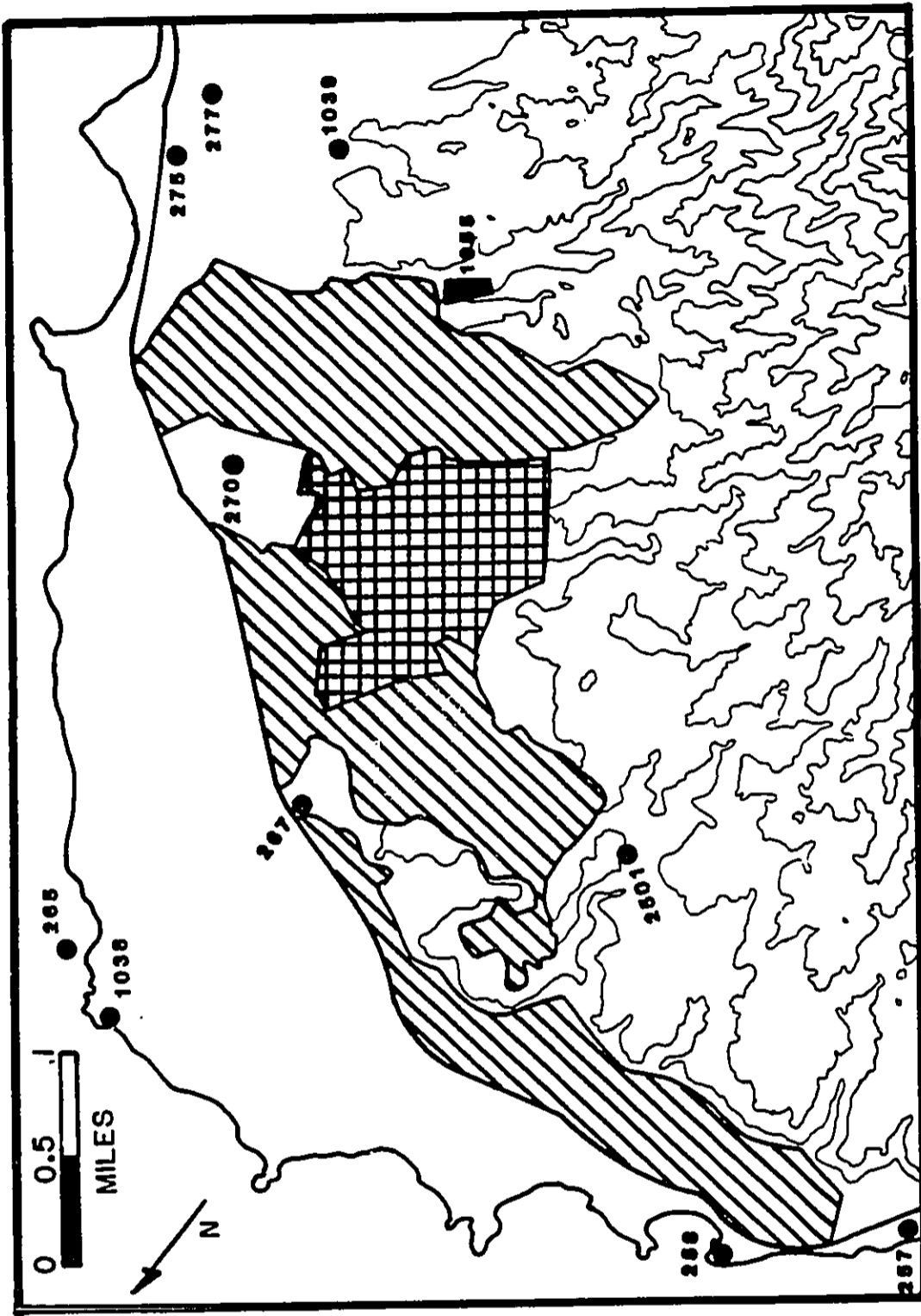


FIGURE 2. Map of Survey Areas, Showing Existing Sites  
 (cross-hatching indicates area of primary concentration)

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## II. LITERATURE SEARCH

### A. McAllister

In 1930 J. Gilbert McAllister conducted a survey of the more prominent archaeological remains on Oahu. His report includes the following descriptions of the area:

"She (Mrs. John Kaleo) remembers the time when trees, now found only on the mountains, covered the Kahuku plain, now a rather desolate, windswept area.

"It hardly seems possible that this barren region could have been otherwise, yet Captain King who saw only the northern tip of Oahu (from Kaneohe Bay to Waialua), says: 'It (Oahu) is by far the finest island of the whole group. Nothing can exceed the verdure of the hills, the variety of wood and lawn, and the rich cultivated valleys, which the whole face of the country displayed.' Thirteen years later (1801?) Vancouver says of Kahuku and the surrounding territory: 'Our examination confirmed the remark of Capt. King except in that in point of cultivation or fertility, the country did not appear in so flourishing a state, nor to be so numerously inhabited, as he represented it to have been at that time, occasioned most probably by the constant hostilities that had existed since that period.' In 1838 Hall makes the general statement in regard to Koolauloa: 'Much taro land now lies waste, because the diminished population of the district does not require its cultivation.'" [McAllister 1930: 153].

The following entries are his descriptions of the sites found in the Kahuku area [Figure 3].

Site 257 - Fishpond known as Kalou, sea side of the Waialeale Industrial School.

Said to have been in its best condition when Kaluhi was konohiki of this district. There was formerly a 'Kane stone' in the immediate vicinity. This is also the place where Kahuku is attached to Waialeale.

Site 258 - Small fresh-water fishpond known as Kapi or Punaulua, Waimea side of Kawela Bay. Not more than 100 ft.

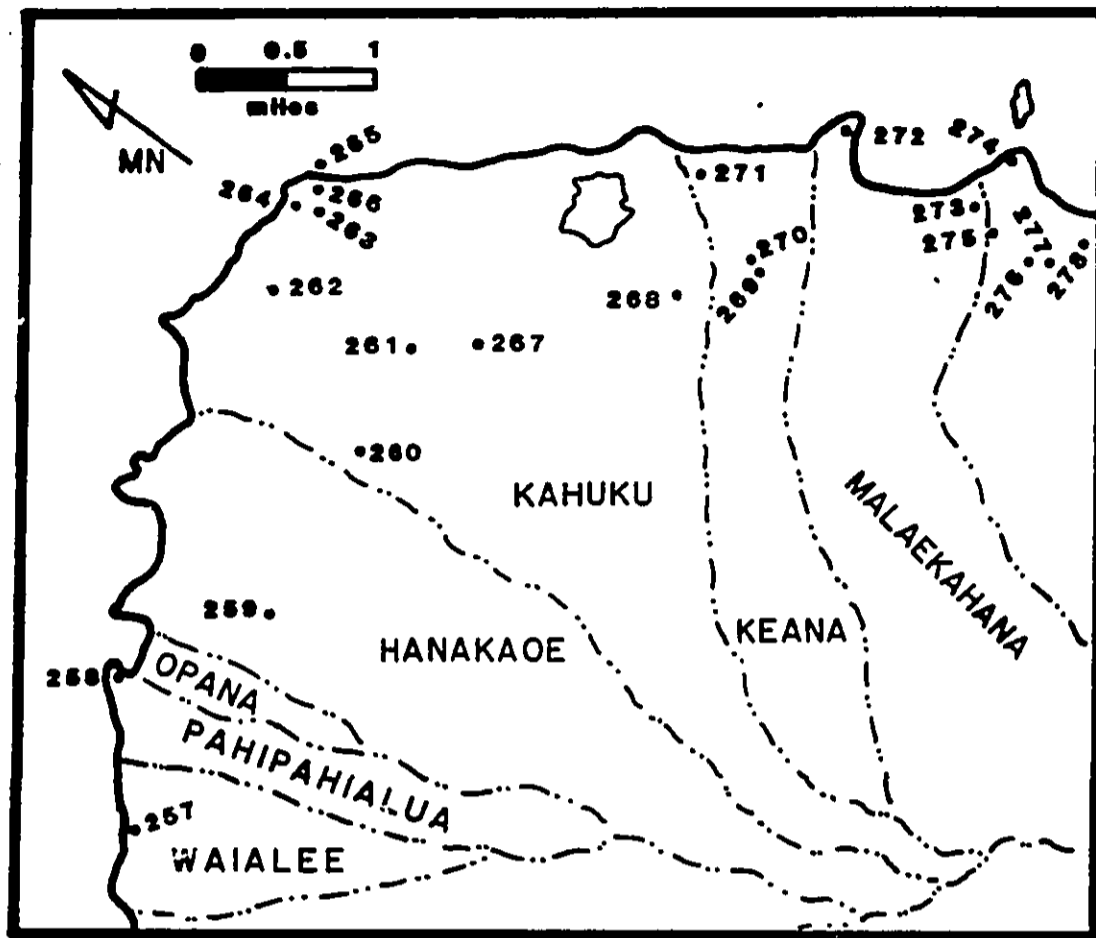


FIGURE 3. Map of Kahuku Vicinity, Showing McAllister's Sites

wide. The legend concerning it, according to Luika Kaio and Kahiona Apuakehau who drove with me to the site, and Plunket, the Hawaiian forest ranger who acted as interpreter, is as follows:

There were once gathered on the beach near this site a great many people. This was long before Europeans had come and when there were not many Hawaiians, so that a gathering of this size was enough to occasion the comments of a stranger who approached. This was Kane, but the people did not recognize him. 'Why are so many of you gathered here?' he inquired. 'To catch the oio. A large school swims near in the water,' they replied. 'Those are not oio,' said Kane, 'they are eel.'

But the people only laughed. Certainly they knew oio when they saw them. Who was this stranger to dispute the words of kamaainas? So Kane wagered that they were eel, and the people wagered against him. The canoes with the long, large nets were launched and the school surrounded. Great was their surprise when they found the fish to be eel. Who could this strange man be? That evening Kane accompanied them up to the mountains. It was a long trip up the valley to reach the springs of fresh water, and the people were tired. They stopped at the entrance of the valley for rest, and here in the presence of all the people, Kane struck the stone known as Waikane, from which the water immediately poured forth and has been flowing almost to this day.

Site 259 - Large stone, known as Waikane, beside the stream bed on the mountain side of Kawela Bay and at the foot of the palis in the land of Hanakaoe.

Long ago the Hawaiians had to go far up the valley in order to get fresh water, but when Kane struck the stone, water flowed from it and continued to flow up to the time the plantation built a pump just below the rock.

Near the beach and in line with Waikane was a fishing shrine called Pahipahialua.

Site 260 - Puuala Heiau, said to have been located on the ridge overlooking Kahuku ranch. There is now no evidence of any type of a structure on this bare hill.

Site 261 - Small water hole, called Punamano, pointed out by Kahiona, Kaleo, and Luika Kaio in the flat limestone plain of Kahuku Point. It is about 15 ft. in diameter and brackish in taste. My informants told this story:

One time when the people of Kanuku were fishing they caught a small shark. Putting him in a calabash of water they carried him to their house near the beach. Here he was cared for and put in larger and large calabashes as he grew bigger. Finally having outgrown even the largest calabash that could be found, it was decided to place him in one of the pools of brackish water which came to be known as Punamano. A man and woman living



near the pool became guardians. They had lived in their grass huts with a breadfruit tree near the pool and taro and potato patches near the mountains for several years when the brother of the woman came to live with them. Sometime after, the man and his wife went to the mountains to gather taro and potatoes. The brother, who was staying at home, thought that he would like to have some food prepared when his sister and her husband returned. He climbed the breadfruit tree and gathered several, throwing the fruit into the water instead of on the ground, where it would have been bruised in the fall. After picking enough for a few days he descended the tree and gathered most of the fruit from the bank.. Two had floated to the middle of the pond and he could not reach them. Now this man knew of the shark that lived in the water, but he had frequently bathed in the pool and no thought of fear crossed his mind as he swam to the breadfruit. He did not know, however, that his sister had warned the shark not to allow anyone to steal breadfruit when they were gone. When the sister and her husband returned they could not find the brother. Neither was the shark to be found, but they saw the breadfruit floating in the pool and a reddish color to the water. They guessed what had occurred. For nearly a mile they followed the bloody trail until they came to the spring known as Punanoolapa. Not only was the brother never seen, but the shark has never been seen to this day. A plantation pump now marks the site of the spring, near the sea side of the road.

Site 252 - Kukio pond, a natural basin filled with brackish water, located about 300 ft. from the sea, Kahuku point.

The pond was formerly much larger and contained many kinds of fish. It is said to have been surrounded by a large Hawaiian settlement.

Mrs. John Kaleo is probably the only survivor and her former friends and relatives have been buried in shallow graves in the sand between the pond and the sea.

Site 253 - Keanakua fishing shrine (ko'a) Kahuku Point.

Flat coral rocks, 1 ft. to 2 ft. in size, are

standing on end inclosing an area 5.5 ft. wide by 11 ft. long. The stones stand 1.5 ft. high. The interior has been filled with smaller coral stones and is said formerly to have been evenly paved. Recently relic hunters have mistaken this shrine for a grave and disturbed the paving when digging in search of curios.

This was the shrine resorted to when the weather was bad and the seas high. Here the Hawaiians made offerings to propitiate the gods of the sea and if everyone was in proper condition and the ceremony correctly performed, the waves would be calmed.

Site 264 - Natural depressions in the stones on the coral outcrops, Kahuku beach. Formerly used for making salt, according to Mrs. Kaleo.

Site 265 - Two stones known as Kanoa in the water about 250 ft. from the beach just opposite from Kalaewila neiau, Kanuku Point.

Many years ago a woman who lived on this beach was frequently seen to swim to these stones and disappear. At times she would be gone for as much as a week. Sometimes she was seen to put her clothes in a watertight calabash and swim away. When she returned she usually wore a kou lei. It was finally discovered that this was the entrance to another land, known as Ulukaa or Kanuna Moku.

Site 266 - Kalaewila neiau, on a slight elevation at Kanuku Point.

A foundation of large coral rocks, 1 ft. to 2 ft. in size, can still be traced, marking off a rectangle 42 ft. by 44 ft. A low line of coral stones 20 ft. from the sea end indicates an interior division. From its small size and location one would assume that it was a fishing shrine, but Mrs. Kaleo emphatically states it to be a neiau, the drums of which she has heard many times.

Site 267 - The many caves in the porous formation were used as places of burial by the old Hawaiians. On the Waimea side is an overhanging ledge where formerly hung two stalactites

from which water continually dripped. They very closely resembled the breasts of a woman, and this was said to be Nawaiuolewa, a goddess of the region. Some years ago, a white man removed one of the stalactites, or breasts, according to the story, and the water immediately stopped dripping from the other.

Site 268 - Old fishpond known by the name of its guardian (mo'o), Kaahelemaoa, once located on the Waimea side of Kanuku.

Kaahelemaoa was half man and half chicken, a being of supernatural power who could change himself at will into a man or a chicken. The pond is said to have been fed by a spring. The area has now been turned into cane.

Site 269 - Platform, near the mountain side of the Kanuku mill in Keana on elevation near cave.

A rectangular platform measuring 16.5 by 10 ft. with the long side facing due north. The sea side is from 3.5 to 4 ft. high, and the mountain side averages around 3 ft. It is a solid mass of flat coral slabs. Around the base the stones are standing on end to a height of about 1.5 ft. Above this the stones are placed horizontally, one on top of the other. This platform has been there for many years. The exposed surfaces of the stones are weathered and old-looking. Mrs. Barker remembers that around 1900 it was considered an old Hawaiian altar. Jerry Fisher, who drew my attention to the site, says that it is known as a heiau among Europeans. None of the Hawaiians who drove about with me to point out places of interest mentioned this site. It is unlike any Hawaiian platform that I have seen, as it is exceptionally high and has a combination of stones placed vertically and horizontally. Stones are usually either placed vertically, joining what is called an unu, or horizontally, forming a fishing shrine (ko'a). If it were closer to the sea, there would be little hesitation in saying that it was probably a fisherman's altar. It is at least three-quarters of a mile from the shore in a direct line.

Site 270 - Rock shelter known as Keana, near the mountain

side of the public school, Kahuku.

In former times this cave was the home where lived a mother and her two sons. One day, having occasion to journey to a distance, she left them with this injunction: 'If during my absence you hear the sound of thunder, keep still, make no disturbance, don't utter a word. If you do it will be your death.' During her absence there sprang up a violent storm of thunder and lightning, and the young lads made an outcry of alarm. Thereupon a thunderbolt struck them dead, turning their bodies into stone, two pillar-shaped stones standing at the mouth of the cave are pointed out in confirmation of the truth of the legends. [Emerson: 1925: 233

The rocks stand out prominently; one is much larger than the other and can easily be seen from the school grounds.

Site 271 - Polou, formerly a pool of water, sea side of the Kahuku mill.

A story is told that Kahuku was once a land afloat, wafted about by the winds, drifting over the ocean. Just now it came to Oahu is not told, but old Hawaiians point out Polou, the place where Kahuku is fastened to Oahu. Formerly it was possible to dive into the pool and when a depth of 40 fathoms was reached, a shelf of rock was found upon which to rest. Forty fathoms deeper Punakea (white lime from coral) was reached and on looking toward Malaekahana, the hook by which Kahuku was made fast could be seen. This hook was intricately fashioned of Kawila. Seaward of the Waialeale Industrial School, in another pool of water, known as Kalou, is the spot where Kahuku is attached to Waialeale. In the immediate vicinity of Polou was a stone known as Kanaloa.

Site 272 - A few rocks at Makahoa, all that remain of a fishing shrine which was on the point. The fish brought here were the oio.

Formerly a fishpond was located near the point and was known as Waipunaea. There are traditions about the mullet coming to this point from Pearl

Harbor. To this day schools of mullet come around the island to this northern point of Malaekahana. They go no farther, and their apparent disappearance still mystifies the Hawaiians.

Site 273 - Foundation of the house (kanuahale) of Manuwani, keeper of the god of Malaekahana.

Only a few large rocks remain by the site of the railroad track, but the site has great importance in the eyes of the natives because of the prominence of the kahuna Manuwahi. About this area is said to have been a rather large Hawaiian settlement, which formerly was level land, but which owing to the removal of flora has formed into dunes. The site was pointed out by a descendant of Manuwahi, Kahiona Apuakehau, a very old Hawaiian living in Laie. The Hawaiians are still proud that the district of Malaekahana was never conquered by Kamehameha I. This is not recorded in Hawaiian history so far as I know.

The legend collect by Rice (Hawaiian Legends pg. 113) tells the story of Kamehameha's sending out Kanalau, who was unable to subdue Manuwahi because this powerful kahuna was aided in battle by the gods. After the battle, Kanalau joined forces with Manuwahi and is still spoken of by the older natives as the chief who revolted against Kamehameha. Many skeletons were unearthed in plowing the cane fields of the region and in digging the foundations for the beach houses, indicative, some think, of many battles in the region.

Site 274 - Site known to Hawaiians as a fishing shrine on the land known as Kalanai, which is now included in the division of Laie but formerly belonged to Malaekahana.

The fish brought to this shrine were the kala and enene. Several flat rocks have been placed on end; one is placed flat. Innumerable remains of fish were found about the stones and on the west side of the rocks.

Skeletal remains were found on the northwest side at an average depth of 2 feet. The body was partially flexed. The upper portion of the body

was lying on its back, with the head thrown back so that the mandible was uppermost. The legs had been flexed. The entire length of the burial, from head to knee, was 4 feet. The maximum length of the right femur was 17 inches. The head was lying toward the south, and the lower portion was toward the sea.

Site 275 - Waiapuka, a pool on the Kanuku side of Laie in Malaekahana, inland from the road in the midst of a cane field.

Waiapuka is made famous by the legend of Laieikawai. Without guidance it is difficult to find, for it is hidden from sight even from the surrounding elevations or from the tops of the highest pines which line the road. The pool is oval in shape, measuring about 30 ft. by 60 ft. with the water about 10 ft. below the level of the surrounding plain. Tides are said to affect the pool. On the Laie side is a small crevice in the rock, which is said to open into the cavern in which Laieikawai was hidden. Natives of the region remember when it was possible to swim through an underwater entrance, and it is said that the chamber could accommodate three or four people. Within the last 25 years silt has filled the pool, and it is no longer possible to enter the hidden chamber. The pool is significant in the minds of the Hawaiians because it was here that Waka'nihi Laieikawai until she reached maturity.

Site 276 - Waikuukuu, Kanuku side of the old Paeo fishpond, about 100 ft. up on the low ridge.

A narrow but deep crevice in the ground with water at the bottom. This is affected by the tides and the depth of the water in Waiapuka may be judged by the height of the water in this opening. The place is now being used for dumping garbage.

Site 277 - Paeo fishpond, mountain side of the bridge on the Kahuku side of Laie.

This was once a large horseshoe-shaped pond that was famous for the size of its fish. It is now dry and overgrown with weeds. On the Kahuku bank is a chalice-shaped stone about 3 ft. high, where

Hauwahine, the goddess (moo) of the pond, is said to have been frequently seen combing her long black hair. This was a very sacred stone and could not be approached, nor would the old Hawaiians use the pond when a blanket of leaves and other refuse (aamoo) covered the water, for it was believed that then Hauwahine was present. When the water was clear, Hauwahine had departed to Kailua.

Site 278 - Hanapepe, elevation near the first bridge on the Kahuku side of Laie.

A portion of this elevation was once a very sacred place where the akua stone, Kamenaihana, was worshipped. This is said to have been a female fish god, and the first fish were brought as an offering.

In addition to the sites enumerated above, McAllister mentions two places of legendary or mythological interest, to which he did not assign site numbers:

"Kane and Kanaloa lived in the vicinity of the ridge [near Site 267]; but that was at the time when the Kahuku plain was still under water, and waves lapped about Kalaiokahipa. The brothers are said to have obtained fish by dipping into two holes on opposite sides of a large rock which now lies in the cane field."

"Apparently Kane, who was joined by Kanaloa, lived at Opana for some time, for just outside of Kawela Bay there are rocks, horseshoe in shape and known as Papaamui, where these brothers were wont to scoop for fish."

## B. Handy

The following statements are from E. S. Craighill Handy's 1940 survey of Hawaiian horticultural practices.

Waialea - There is a small group of terraces formerly known as Kanealii, now abandoned for lack of water, around the house of Mrs. John Baker, just east of the Boys' Industrial School and inland of Kamehameha Highway. The large terraces now cultivated seaward of the Industrial School are of recent construction.

Pahipahialua - According to Judge Rathbourn there were no terraces along this stream.

Opana - Touching Opana and extending into Hanakoa'e was a small spring-watered terrace area named Kawela (same name as the bay). McAllister (sites 258, 259) says that according to legends told him by his informants there was 'formerly' no fresh water at Kawela Bay (in Opana), but that the gods Kane and Kanaloa struck water from a rock now 'known as Waikane, and at the foot of the cliff in the land Hanakoa'e', and that water 'continued to flow up to the time the plantation built a pump just below the rock.'

Hanakoa'e - According to Judge Rathbourn there were no terraces along the Hanakoa'e, Oio, or Kaalaea stream beds in this ahupua'a; the only terraces were those watered by the springs, mentioned under Opana.

Kahuku - Inland from the Kahuku ranch house is Kaainapele Spring. Terrace symbols are shown south of the ranch house (U.S.G.S. topographic map, 1917), but Judge Rathbourn says that these flats were built by Chinese before 1890 for rice paddies. They were irrigated with artesian water, but the water turned brackish and the paddies were abandoned. They were never used for taro. The 1917 map shows extensive terrace areas in the swampland seaward of the Oahu Railway, stretching 1.5 miles south of Kukio Pond. These were originally terraces, were later planted to rice, and are now under sugar cane. According to John Kaleo, there is a small group of terraces, south of this swampland, named Kaukana. North of Kukio



Pond was also a small area. It is reported that there were no terraces up Kahuku Stream or Kaohia-ae, its upland branch. Kaleo names 11 localities where terraces were formerly cultivated.

Keana - There are said to have been no terraces up this stream, and Kaleo knows of none on the level land below.

Malaekahana - There were terraces in this anupu-a'a, irrigated by Kaukanalaau Stream.

C. Thrum

"A kapa-beating log of peculiar sound, unlike any other known on the island, which was placed in its waters at the close of kapa-making season to keep it smooth and free from cracks that would impart an impression to the cloth in its manufacture, was missed, and, believing it to have been stolen, search was made all through the Koolau, Waialua and other districts 'til at last it was found in use at Waipahu. Recognizing it by its resonant tone, it was claimed by the searching owner, and right thereto by those in possession was vigorously maintained. To test the truth of ownership as claimed, the Ewa people accompanied the claimant back to Kahuku to visit the scene and witness a test of the underground stream theory. A bundle of ti leaves were gathered, which was wrapped together and consigned to the waters of Punahoolapa. In the course of a few days they were lost to sight, whereupon the party set out for Ewa, and after careful watching, as predicted, the bundle of ti leaves came forth on the bosom of the waters of the Waipahu stream. The kapa log was thereupon recognized as the rightful property of the Kahuku claimant" [Thrum 1911: 130].

D. Sterling and Summers

In 1962, Elspeth Sterling and Catherine Summers published a compilation of information concerning Hawaiian archaeological and historical sites, legends, myths, and tales. The following quotations are taken from this publication, rather than from the original sources.

The following describes a trip through Kahuku in 1826.

Started from Oio...Taking about an Eastern course we walked over a level country and considerably extended....The mountains along here do not rise very abruptly near the shore but are seen towering in a Southern and Eastern direction. The land over which we travelled 'til breakfast time, the distance of 5 or 6 miles in length and from 1 to 2 miles in breadth, the natives say floated in from the sea and connected itself with the shores of the island....This tract is beautified with lau-hala and some other trees, and is the only scenery of the kind we have met with, most of our course on the West and Northern part of the island laying over barren sand.... (Chamberlain n.d.)

The following was taken from an 1861 newspaper article.

In Kahuku is a spring called Puna-mano and it was there that a man was destroyed by a shark. The shark was found when it was small by a man and a woman who went fishing at the beach with a draw net at night. They wanted to save the shark so they let it go free in the spring. On the bank of the spring, they planted a breadfruit tree. Later as the shark grew in size so did the breadfruit tree till it bore fruit. They wondered at the disappearance of the breadfruit, and thought that the fruits might have been blown down by the gusts of wind. Upon looking under the tree, they came to the conclusion that they must have been stolen for not one was found there.

One day they wanted to go to the upland to farm but were a little worried about the breadfruits lest all be stolen by the thief. Therefore they spoke certain words in command to the shark, 'We are going to the upland, so watch our breadfruit tree.' They went up.

The own brother of the woman who owned the shark was the one who went after the breadfruit as soon as they were gone and so he was killed. The man went to get some taro, lighted the imu and because he longed for roasted breadfruit he climbed the tree in secret. When he threw fruits down they rolled and fell into the spring. He descended and reached out into the spring out before he seized them, the shark leaped and devoured him. The sister returned with her husband from their farming and while on the plain love for her brother welled up in her, and it seemed as though he were dead. When they reached the brother's house, the imu and taro were seen there but he was not to be seen. Instead a new spring had appeared near by, about ten fathoms from the shark's spring. There they saw the water reddened with blood and the man's cluster of love (scrotum) was also found there. It seemed as though there was a passage beneath from one spring to the other. The shark was never seen again after that." [Kuapuu 1861]

The following is from a 1952 newspaper article.

"During World War II, the Army threw up an airfield at Kahuku, Oahu, and built barracks about the runway....The runways faced the sea and were in line with the main barracks, a building placed upon a knoll which looked right down onto the runway. In fact, the door of the barracks was on a line with the runway.

Boys recruited and drafted in Hawaii were placed in the barracks along with Mainland soldiers. The Hawaii Nisei were soon dissatisfied and asked their captain to be moved out of the main barracks into smaller barracks off to one side. The captain asked why they were dissatisfied. The boys said they were being disturbed in their sleep. Some said they were choked in their sleep. Others said they had bad dreams. The captains dismissed their plea with a laugh.

The Hawaii soldiers persuaded a group of haoles who lived in a smaller barracks to change places with them. The captain had no objection. Soon the haole boys were complaining to the captain of being choked in their sleep. The captain inquired about and tried to learn why there should be



#### E. Miscellaneous Sources

The site map for the Kahuku area on file at the State Historic Preservation Office indicates that many of McAllister's sites are no longer in existence. The only ones shown are Sites 257 and 258, 265, 267, 270, 275 and 277, all of which are outside of the present survey area. This same map shows four additional sites, none of which are in the survey area, as follows:

SITE 1038 - "Near Kahuku Point, on the northern tip of Oahu, a sub-surface midden deposit lies exposed by the waves. A few coral blocks form a small circle among the vegetation on the surface and fragments of historic glass show that the site was occupied into relatively recent times. The cultural level below the surface however, shows evidence of a prehistoric occupancy for the site. The soil is dark with the charcoal from fires, and packed with the remains of Hawaiian foods: shellfish, fish and sea urchin. The deposit measures some 20 cm. in thickness and covers an area of approximately 300 meters."

SITE 1039 - "Large cave with internal retaining wall."

SITE 1055 - "Shelter Cave."

SITE 2501 - "This burial platform is located on a small Air Force installation in Kahuku and is well hidden in a dense thicket of Haole Koa and Christmas Berry. It is one of the few burial platforms known to exist on the island of Oahu.

"The main section of the platform is rectangular shaped. It is about 8 meters wide along the NE edge and narrows to about 4 meters just north of the slope. The length from these two points is 16.5 meters. The SW end of the platform has a slope that is three meters long and ends in a point. The total height difference between the top of the slope and the bottom is 5 meters."

Thomas Dye conducted a reconnaissance survey adjacent to the Kuilima Resort at Kahuku in 1977, and recorded two sites:

50-Oa-F4-14 - "This site was discovered as an

extensive, grey-to-greyish-brown sandy deposit exposed in several places along the windblown makai face of the high sand dunes at Kahuku Point."

50-0a-F4-15 - "A black layer, 26 cm thick, was found exposed in a backhoe cut along an old railway alignment."

Barrera [1979] conducted a survey and salvage excavations in an area being developed by the Kahuku Housing Corporation just inland of the post office at Kahuku. Five sites were recorded:

SITE 1425 - "This site consists of two walls constructed of multiple-stacked limestone slabs, situated...adjacent to the limestone cliff."

SITE 1426 - "This is a coral-slab-lined depression measuring 4.1 meters in length, 0.95 meter in width and 1.05 meters in depth. A large metal pipe enters the feature in the southeast corner and this fact, taken with the presence of concrete at the west end, indicate that the feature was most probably associated with irrigation of the surrounding sugarcane fields."

SITE 1427 - "This is a complex of seven features [three walls, three mounds and one cave] situated on the north slope of [a] limestone knoll."

SITE 1428 - "This is a wall of limestone fragments located at the top of the limestone cliff on the south side of the survey area."

SITE 1429 - "This is a mound of earth enclosed on two sides by crude limestone fragment walls."

Finally, J. Halley Cox (1970: 97) mentions a boulder on the beach at Keana on which is found a single petroglyph of a human figure.

### III. FIELD INVESTIGATIONS

The field reconnaissance discovered no structural remains, undoubtedly because of the extent of previous agricultural utilization of virtually the entire project area. Remains that were located consist of the following [Figure 4]:

Location 1 - A single unidentified marine mollusk shell, a fragment of coral and some possibly flaked fragments of dense basalt located in a grove of ironwoods at the point where the road to the DOE-NASA windmill branches from the road to the Kahuku Training Area.

Location 2 - A single shell of a cowrie [Cypraea caputserpentis], a favorite Hawaiian food species, on the inland side of a recently plowed field.

Location 3 - A concentration of broken bottles and ceramic fragments, most of which probably do not pre-date the 1930s, situated at the base of a limestone ledge amongst a stand of coconut trees.

Locations 2 and 3 are situated adjacent to a limestone outcrop and ledge which appear to be relatively undisturbed [Figure 5]. The potential for in situ Hawaiian remains being present here is high.



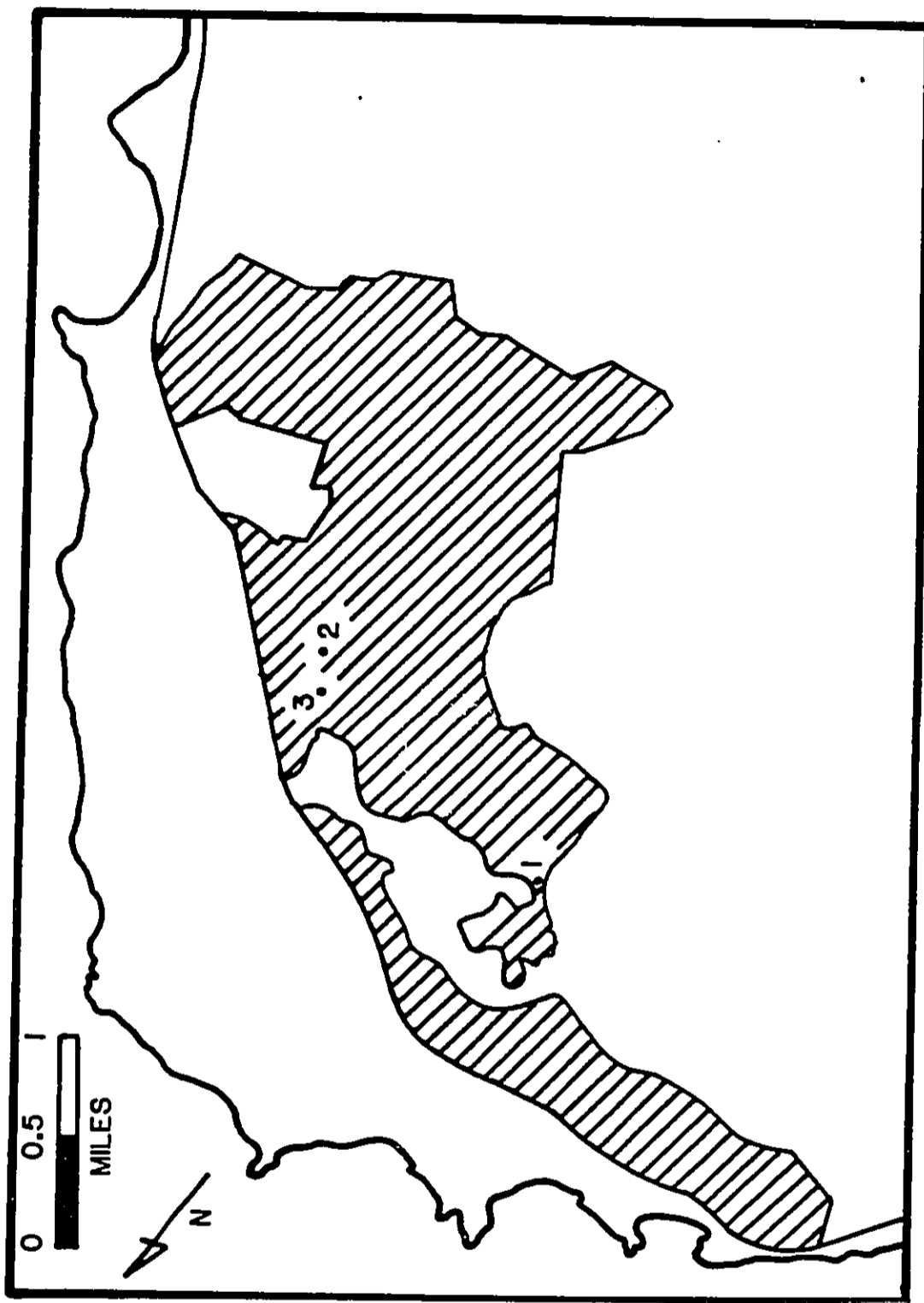


FIGURE 4. Map of Survey Areas, Showing Locations 1 Through 3



FIGURE 5. Limestone Bluff Adjacent to Locations 2 and 3

#### IV. CONCLUSIONS AND RECOMMENDATIONS

The literature search phase of the project demonstrated without a doubt that the Kanuku area had been the locus of considerable prehistoric Hawaiian activity. The paucity of remains of such activities located during the field reconnaissance phase of the project suggests that much data have been lost due to agricultural practices during the present century. Much information about the daily life of the Hawaiians has undoubtedly been destroyed in the seaward portions of the survey area where intensive agriculture is still being conducted, but the findings discussed in the previous section suggest that there may be relatively untouched sites further inland in two places. If these particular areas are to be impacted by development of the proposed agricultural park it is recommended that intensive surveys be conducted, as follows:

1. The cluster of ironwood trees at Location #1 should be surveyed with special attention being made to clear the thick leaf litter on the ground which could be obscuring extensive Hawaiian remains.

2. The undisturbed limestone ledge and bluff adjacent to the places where the bottles, ceramics and the mollusk shell were found [Locations 2 and 3] should be surveyed intensively. This area would appear to be a promising location for human burials and/or habitation sites.

If significant remains are found in either of these places, it would then be necessary to make a decision whether to remove that area from consideration for development or to continue into a test pit phase to determine the nature of the Hawaiian occupation at the site. Depending upon the results of this test pit phase, there might be the necessity for a further decision as to whether to continue development or to move into an excavation phase to mitigate the adverse effects of the agricultural park development.

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APPENDIX C - BACTERIOLOGICAL REPORTS

BACTERIOLOGICAL REPORT  
FOR PUMP NO. 1

CONTAMINANTS	MAXIMUM CONTAMINANT LEVELS*	LAB RESULTS*	DATE ANALYSED	LAB NUMBER
ARSENIC	0.05	0.02	8/2/79	P7-9-19
SELENIUM	0.01	0.01	8/2/79	P7-9-19
MERCURY	0.002	0.0005	7/26/79	P7-9-18
CADMIUM	0.05	0.02	7/27/79	P7-9-19
LEAD	0.05	0.02	7/27/79	P7-9-19
CHROMIUM	0.05	0.01	7/27/79	P7-9-19
BARIUM	1.0	0.8	7/27/79	P7-9-19
SILVER	0.05	0.03	7/27/79	P7-9-19
NITRATE (AS N)	10.0	1.0	7/25/79	P7-9-19
FLUORIDE				
CHLORIDE	250.0			
TOTAL DISSOLVED SOLIDS	500.0			
PH	6.5 - 8.5 SCALE			
CORROSIVITY	NON-CORROSIVE			
SODIUM		42	7/27/79	

\*Measured in milligrams per liter (mg/l) unless otherwise specified.

SOURCE: State Department of Health

# CORRECTION

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



BACTERIOLOGICAL REPORT  
FOR PUMP NO. 1

CONTAMINANTS	MAXIMUM CONTAMINANT LEVELS*	LAB RESULTS*	DATE ANALYSED	LAB NUMBER
ARSENIC	0.05	0.02	8/2/79	P7-9-19
SELENIUM	0.01	0.01	8/2/79	P7-9-19
MERCURY	0.002	0.0005	7/26/79	P7-9-18
CADMIUM	0.05	0.02	7/27/79	P7-9-19
LEAD	0.05	0.02	7/27/79	P7-9-19
CHROMIUM	0.05	0.01	7/27/79	P7-9-19
BARIUM	1.0	0.8	7/27/79	P7-9-19
SILVER	0.05	0.03	7/27/79	P7-9-19
NITRATE (AS N)	10.0	1.0	7/25/79	P7-9-19
FLUORIDE				
CHLORIDE	250.0			
TOTAL DISSOLVED SOLIDS	500.0			
PH	6.5 - 8.5 SCALE			
CORROSIVITY	NON-CORROSIVE			
SODIUM		42	7/27/79	

\*Measured in milligrams per liter (mg/l) unless otherwise specified.

SOURCE: State Department of Health

BACTERIOLOGICAL REPORT  
FOR PUMP NO. 1

CONTAMINANTS	MAXIMUM CONTAMINANT LEVELS*	LAB RESULTS*	DATE ANALYSED	LAB NUMBER
ARSENIC	0.05	0.02	9/22/80	P9-0-167
SELENIUM	0.01	0.01	9/23/80	P9-0-168
MERCURY	0.002	.005	9/26/80	P9-0-167
CADMIUM	0.010	.02	9/24/80	P9-0-167
LEAD	0.05	.01	9/24/80	P9-0-167
CHROMIUM	0.05	.8	9/24/80	P9-0-167
BARIUM	1.0	.03	9/18/80	P9-0-167
SILVER	0.05	1.05	9/19/80	P9-0-169
NITRATE (AS N)	10.0	.20	9/22/80	P9-0-170
FLUORIDE				
CHLORIDE	250.0	92	9/22/80	P9-0-170
TOTAL DISSOLVED SOLIDS	500.0	309	9/22/80	
PH	6.5 - 8.5 SCALE			
CORROSIVITY	NON-CORROSIVE			
SODIUM		45	9/18/80	P9-0-167

\*Measured in milligrams per liter (mg/l) unless otherwise specified.

SOURCE: State Department of Health

BACTERIOLOGICAL REPORT  
FOR PUMP NO. 1

CONTAMINANTS	MAXIMUM CONTAMINANT LEVELS*	LAB RESULTS*	DATE ANALYSED	LAB NUMBER
ARSENIC	0.05	0.02	10/21/81	P10-1-61
SELENIUM	0.01	0.01	10/21/81	P10-1-61
MERCURY	0.002	0.005	10/16/81	P10-1-62
CADMIUM	0.010	0.005	10/19/81	P10-1-61
LEAD	0.05	0.2	10/19/81	P10-1-61
CHROMIUM	0.05	0.01	10/19/81	P10-1-61
BARIUM	1.0	0.8	10/20/81	P10-1-61
SILVER	0.05	0.03	10/15/81	P10-1-61
NITRATE (AS N)	10.0	0.98	10/16/81	P10-1-63
FLUORIDE		0.2	10/15/81	P10-1-64B
CHLORIDE	250.0	49	10/19/81	P10-1-64B
TOTAL DISSOLVED SOLIDS	500.0	307	10/19/81	P10-1-64A
PH	6.5 - 8.5 SCALE			
CORROSIVITY	NON-CORROSIVE			
SODIUM		42	10/20/81	P10-1-61

\*Measured in milligrams per liter (mg/l) unless otherwise specified.

SOURCE: State Department of Health

BACTERIOLOGICAL REPORT  
FOR PUMP NO. 1

CONTAMINANTS	MAXIMUM CONTAMINANT LEVELS*	LAB RESULTS*	DATE ANALYSED	LAB NUMBER
ARSENIC	0.05			
SELENIUM	0.01			
MERCURY	0.002			
CADMIUM	0.010			
LEAD	0.05			
CHROMIUM	0.05			
BARIUM	1.0			
SILVER	0.05			
NITRATE (AS N)	10.0			
FLUORIDE				
ALKALINITY (as CaCO <sub>3</sub> )		70	7/20/82	P2-2-22
HARDNESS (as CaCO <sub>3</sub> )		91	7/21/82	P7-2-24
CHLORIDE	250.0			
TOTAL DISSOLVED SOLIDS	500.0	245.4	7/20/82	P7-2-23
PH	6.5 - 8.5 SCALE	7.50		
CORROSIVITY	NON-CORROSIVE	-0.57		
TEMPERATURE (°C)		23°C	10/20/81	P10-1-61

\*Measured in milligrams per liter (mg/l) unless otherwise specified.

SOURCE: State Department of Health