BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

November 13, 2000

Ms. Genevieve Salmonson
Director
Office of Environmental Quality Control
Department of Health
235 South Beretania Street, Suite 702
Honolulu, Hawai`i 96813

Dear Ms. Salmonson:

Subject: LUC Docket No. A00-732/TSA INTERNATIONAL, LIMITED

This is to inform you that at its meeting on November 2, 2000, the State Land Use Commission accepted the Final Environmental Impact Statement ("FEIS") for the subject docket, from Petitioner TSA INTERNATIONAL, LIMITED. The Commission's Findings of Fact, Conclusions of Law, and Decision and Order Accepting An Environmental Impact Statement For A State Land Use District Boundary Amendment will be forwarded to you at a later date under separate cover.

In accordance with Section 343-5 (c), Hawaii Revised Statutes, we are filing four copies of the FEIS and one copy of the Publication Form, a written narrative of the project summary, a diskette with the project summary file, and the distribution list for the FEIS. The file name of the project summary is "Project Summary.doc".

We request that the notice of the FEIS be published in the Office of Enviromental Quality Control's The Environmental Notice.

We ask that the diskette be returned to our office after the information has been transferred to your system, in order to utilize the diskette for future announcements.

Should you have any questions, please feel free to call me or Russell Kumabe of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

c: Wilson Okamoto & Associates, Inc.

Enclosures: Four (4) copies of the FEIS
OEQC Publication Form
Written narrative of the Project Summary
Diskette with the Project Summary file
FEIS distribution list

CC # 2000(FEIS)
Kaloko Industrial Park
Phases III & IV

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STATE OF HAWAII
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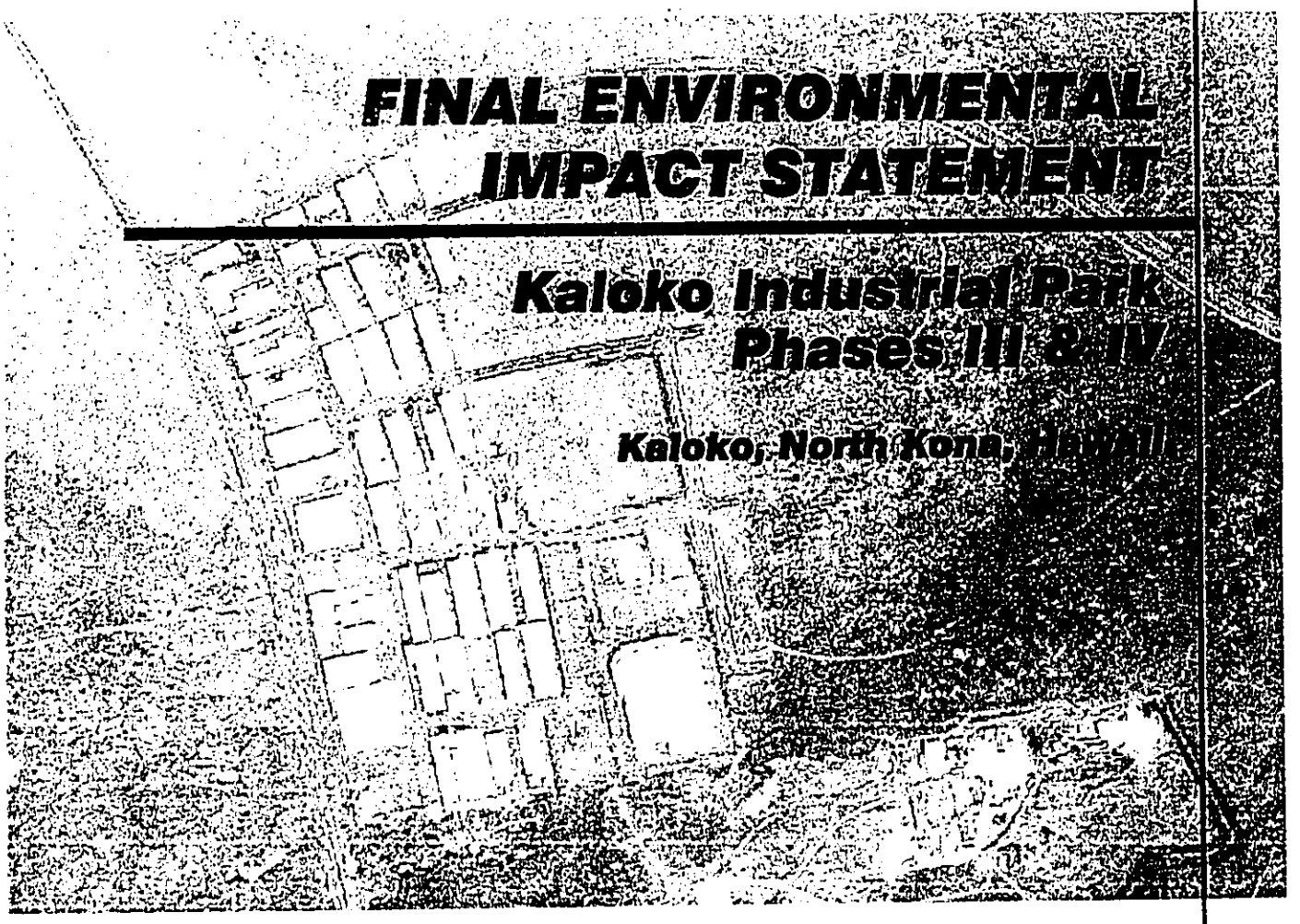

FINAL ENVIRONMENTAL IMPACT STATEMENT

Kaloko Industrial Park Phases III & IV

Kaloko, North Kona, Hawaii

Prepared for:

TSA INTERNATIONAL, LIMITED

Prepared by:

Wilson Okamoto & Associates, Inc.
Engineers and Planners

OCTOBER 2000

Office of Environmental Quality Control
235 S. Beretania #702
Honolulu HI 96813
586-4185

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STATE OF HAWAII

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Final Environmental Impact Statement

Kaloko Industrial Park, Phases III and IV

Kaloko, North Kona, Island of Hawaii

This document was prepared under my direction pursuant to the requirements of Chapter 343, Hawaii Revised Statutes

Petitioner/Applicant: _____ Date: OCTOBER 18, 2000

Hideki Hayashi, President
TSA International, Limited

Prepared By:

Wilson Okamoto & Associates, Inc.
Engineers and Planners
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

October 2000

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PREFACE

This ~~Draft~~ Final Environmental Impact Statement (EIS) is prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Title 11, Chapter 200, Administrative Rules, Department of Health, State of Hawaii. Proposed is an applicant action by TSA International, Limited to complete the planned development of the existing Kaloko Industrial Park by developing an approximately 102~~.3~~-acre parcel into approximately 82 lots comprising Phases III and IV of the light industrial park in Kaloko, North Kona, Island of Hawaii.

The proposed development is situated on lands within the State Conservation District, necessitating a petition for State Land Use District Boundary Amendment and a subsequent County of Hawaii Zone Change. The preparation of this EIS is due to the Conservation designation of this parcel. The accepting authority for the EIS will be the State Land Use Commission.

This Final EIS incorporates responses to comments received during the 45-day comment period following the publication of the Draft EIS. In this Final EIS text, deletions are indicated by a line through the text, and additions are shaded.

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PROJECT SUMMARY

Petitioner/Applicant:	TSA International, Limited 1441 Kapiolani Boulevard, Suite 1905 Honolulu, Hawaii 96814-4408
Accepting Authority:	State of Hawaii Land Use Commission 235 South Beretania Street, 4th Floor Honolulu, Hawaii 96813 Contact: Esther Ueda Phone: (808) 587-3822 Fax: (808) 587-3827
EIS Preparer:	Wilson Okamoto & Associates, Inc. 1907 South Beretania Street, Suite 400 Honolulu, Hawaii 96826 Contact: Rodney Funakoshi, AICP Phone: (808) 946-2277 Fax: (808) 946-2253
Location:	Kaloko, North Kona, Island of Hawaii
Tax Map Key:	7-3-51: Portion 60
Land Area:	Approximately 102.3 Acres (Revised per State Land Use Commission Boundary Interpretation No. 00-21)
Recorded Fee Owner:	TSA International, Limited
Existing Use:	Vacant, undeveloped
State Land Use District:	Conservation
County of Hawaii General Plan:	Industrial
Keahole to Kailua Development Plan:	Limited Industrial and Urban Expansion
County Zoning:	Open District

PROPOSED ACTION:

TSA International, Limited proposes to complete the planned development of the existing Kaloko Industrial Park by developing an approximately 102.3-acre parcel which comprises Phases III and IV of the light industrial park in Kaloko, North Kona, Island of Hawaii. The Kaloko Industrial Park, Phases III and IV, is proposed to consist of approximately 82 improved one-acre lots. The proposed development will allow for light industrial and industrial-commercial mixed uses within a fee-simple subdivision. The site would be mass graded with all necessary infrastructure provided, including roadways, water, sewer, drainage, electrical, and communications systems.

SIGNIFICANT BENEFICIAL AND ADVERSE IMPACTS AND PROPOSED MITIGATION MEASURES:

Ground Water: Short-term construction activities associated with the proposed project are not likely to introduce, nor release from the soil, any materials which could adversely affect ground water. Construction permit requirements, in particular, the National Pollutant Discharge Elimination System (NPDES) permit administered by the State Department of Health, are expected to limit the area of excavation at any one time and require erosion-control, dust-control and other best management practices to minimize the off-site transport of excavated materials.

Long-term operations of light industrial and commercial activities could potentially impact ground-water quality. The proposed drainage system consists of drain inlets and dry wells at selected areas along the project roadways. Within the individual lots, dry wells are also expected to be used as part of the development of light industrial and commercial facilities.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, individual lot owners will be required to ~~develop~~ implement Best Management Practices in developing storm drainage systems, ~~that~~ such as employing filtration or infiltration methods or the use of oil-water separators prior to discharge. Best Management Practices such as flow-through based treatment from such methods as vegetated filters, grass swales, other media filters, and infiltration ~~will~~ could be required and imposed on the owners and operators of the industrial-commercial lots.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

On-site wastewater disposal systems such as septic tanks, leach fields, and individual wastewater systems are planned to service the proposed development until such time that the municipal sewer system is extended north to the Kaloko area. Provisions will be made in the proposed development to provide sewer lines within the project roadways to enable such connection to the municipal system once it becomes available. This will eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

Marine and Pond Environments: An assessment of the marine and pond environments in the vicinity of the Petition Area was conducted to evaluate the potential impacts of the proposed project on brackish ponds and near-shore environments makai of Kaloko Industrial Park. The assessment focused on the existing conditions observable in marine environments within the Kaloko-Honokohau National Historical Park, located immediately west of the Petition Area on the makai side of Queen Kaahumanu Highway. More than half of the area of the 1,160-acre park is comprised of ocean waters and contained within its boundaries are two large brackish fishponds, Kaloko and Aimakapa Ponds.

Kaloko and Aimakapa Ponds are brackish bodies of water separated from the ocean by a basaltic rock wall (Kaloko Pond) and a sand beach berm (Aimakapa Pond). Kaloko Pond is approximately 11 acres in size; Aimakapa Pond is approximately 15 acres in size. Both ponds function in a similar manner to smaller anchialine ponds that can be found along the west coast of Hawaii Island. Kaloko Pond, however, is not technically an anchialine pond because it contains direct connections to the ocean. It is separated from the ocean by a highly permeable rock wall that was constructed with channels built into the structure to promote the exchange of water between the pond and ocean. Water in the pond is near oceanic in salinity, indicating that ground water comprises a very small component of the pond makeup.

Aimakapa Pond can be considered an anchialine pond because it is sealed from direct exchange with the ocean by a continuous sand berm approximately 20 meters wide. The sand berm has low permeability, with a substantial fraction of the water in the pond comprised of ground water. Water within this enclosed basin tends to be subject to a long residence time. The chemical composition of Aimakapa Pond describes levels of inorganic nutrients that are nearly depleted, and high levels of organic nutrients.

While both ponds contain sediment bottoms, bottom composition of Aimakapa Pond consists of soft flocculent silty mud that is penetrable for at least one meter. Bottom composition of Kaloko Pond is hard sand/mud mixture that is largely covered with marine algae.

According to the assessment, there is little potential for increased sedimentation and runoff affecting the ponds and marine environments down slope (makai) of the Petition Area. The climate of the Kaloko area is one of the driest in the Hawaiian Islands, with infrequent surface runoff from storms. The basaltic composition of the land surface is highly porous and is capable of absorbing rainfall with little or no surface runoff.

The assessment also concludes that the potential for impact to marine and pond communities as a result of the proposed development appears to be minimal. The Kaloko and Aimakapa Ponds within the Kaloko-Honokohau National Historical Park are similar in that thick sediment lining the floors of the ponds effectively plugs the ponds from the free exchange of ground water. As a result, the major flow of ground water appears to be around the ponds rather than through them.

It is also unlikely that there would be any effect to the nearshore marine environment as a result of the increase in nutrient concentrations in ground water. A 1992 study that modeled the four-year nutrient input to the ocean down gradient of two golf courses in West Hawaii found that since nutrients from fertilizer were retained in the surface layer of the receiving

body, in this case, Keauhou Bay, there was no exposure to benthos. These results indicated that even with long-term input of extremely high nutrient subsidies, there are situations where there are no negative effects to the receiving environment. Keauhou Bay is an embayment with restricted circulation relative to open coastal shorelines. Thus, a similar lack of impact would be expected in the Kaloko-Honokohau region where circulation is not restricted and nutrient subsidies would be less than have occurred at Keauhou.

Short-term construction activities associated with the proposed project are not likely to introduce, nor release from the soil, any materials which could adversely affect ground water. Construction permit requirements, in particular, the NPDES permit, are expected to limit the area of excavation at any one time and require erosion-control, dust-control and other best management practices to minimize the off-site transport of excavated materials.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, individual lot owners will be required to ~~develop~~ implement Best Management Practices in developing storm drainage systems, ~~that~~ such as employing filtration or infiltration methods or the use of oil-water separators prior to discharge. Best Management Practices such as flow-through based treatment from such methods as vegetated filters, *grass swales, other media filters, and infiltration* ~~will~~ could be required and imposed on the owners and operators of the industrial-commercial lots.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

On-site wastewater disposal systems such as septic tanks, leach fields, and individual wastewater systems are initially required to service commercial-industrial developments until such time that the municipal sewer system is extended north to the Kaloko area. Provisions will be made in the development to provide sewer lines to enable such connection to the municipal system once it becomes available. This will eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

Archaeological/Historic Resources: Forty (40) sites were identified during the archaeological inventory survey of the Petition Area which yielded information important for understanding late prehistoric and historic land use. Mapping, written descriptions, photography, and test excavation at 32 of the sites adequately documents them and no further work or preservation is recommended. Limited data recovery is recommended for the remaining eight sites if these sites are not preserved, which entails a Data Recovery Plan to be approved by the State Department of Land and Natural Resources (DLNR) Historic Preservation Division.

Native Culture: Based on an assessment of the impacts of the proposed project on resources, beliefs and practices identified in the cultural impact assessment, the proposed project will have a minimal negative cultural impact upon native Hawaiian cultural resources, beliefs and practices.

Wastewater and storm water discharged from surrounding businesses and industrial areas into cesspools and dry wells have the potential to affect ground-water resources and, ultimately the fishponds and anchialine ponds within the Kaloko-Honokohau National Historical Park. Mitigation measures for storm water runoff and wastewater disposal are discussed in Sections 3.5, 3.17.2 and 3.17.3 of this ~~Draft~~ Final EIS. The National Park Service should continue to monitor ground-water resources and conduct water quality testing for the fishponds and anchialine ponds within the National Park.

Residential, business and industrial development on the slopes of Hualalai may alter the terrain and obstruct or destroy landmarks used by fishermen in a traditional fishing method whereby fishing grounds are located by aligning known reference points. Although none of these features or landmarks are within the Petition Area, the proposed development should be designed to mitigate the visual impacts to the existing terrain and landscape, as well as the obstruction of natural features or landmarks. Fishermen knowledgeable of traditional reference points used in locating fishing grounds, and National Park Service personnel, should be afforded the opportunity to consult on the development of building and landscaping design guidelines for the proposed project.

Flora and Fauna: There are no threatened or endangered species of plants or animals on the Petition Area. One candidate endangered species plant identified as the ko'oko'olau (*Bidens micrantha* subspecies *ctenophylla*), was found within the Petition Area. A buffer zone will be established in the immediate vicinity of the *Bidens* plant located along the Petition Area's eastern boundary. Seeds and cuttings will be propagated from the other three *Bidens* plants located within the Petition Area to preserve its genetic material.

Exterior lighting will be shielded within the proposed development, reducing the potential for interactions between the endangered endemic, nocturnally flying Dark-rumped Petrels with external lights and man-made structures.

Socio-Economic Characteristics: The proposed project will result in short- and long-term beneficial socio-economic impacts. In the short-term, the proposed project will confer positive economic benefits in the local area. Direct economic benefits will result from construction expenditures both through the purchase of materials from local suppliers and through the employment of local labor, thereby stimulating that sector of the economy. Indirect economic impacts may include benefits to local retail businesses resulting from construction activities. During the project's total build-out phase, an estimated 19,345 direct full-time equivalent and 9,673 indirect full-time equivalent jobs will be created.

Upon full build-out, the proposed development is anticipated to provide an estimated 2,789 direct full-time equivalent jobs, with an additional approximately 1,399 indirect full-time equivalent jobs to be created.

Visual Resources: Although there are no significant impacts affecting views or visual resources, development of the Petition Area will alter the visual landscape from its natural, barren state to one of urban use. Due to the elevated topography of the Petition Area, buildings within the proposed development will be visible beyond the existing Kaloko Industrial Park development as viewed from makai areas. As the proposed project will be similar in visual character to that of the adjacent light industrial uses, the change in views

from the various public vantage points, primarily the mauka-makai views, will be of an intensification of the existing uses.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Appropriate plant material and variety will be established for the proposed development. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

Traffic: Traffic generated by the proposed project together with a conservative assumption of growth in non-project related traffic will cumulatively impact future traffic conditions on roadways in the vicinity of the Petition Area. However, by incorporating the following measures to mitigate the project-generated traffic, the development of the proposed project is expected to have minimal impact on traffic operations in the project vicinity:

1. Maintain adequate sight distances for motorists to safely enter and exit all project driveways and roadways.

2. Restripe Hina Lani Street at the intersection with Kamanu Street to create a left-turn refuge lane for vehicles turning left onto Hina Lani Street. Since the left-turn refuge lane will provide a median on the westbound approach of Hina Lani Street, a left-turn lane could be provided to accommodate vehicles turning left onto Kamanu Street.

3. Restripe Kamanu Street at the intersection with Hina Lani Street to provide exclusive left-turn and right-turn lanes for the approach.

ALTERNATIVES CONSIDERED:

The No Action Alternative was analyzed for the proposed project.

UNRESOLVED ISSUES:

Entitlements: This ~~Draft~~ ~~Final~~ EIS was prepared in support of a State Land Use District Boundary Amendment Petition to reclassify the subject lands from the Conservation to the Urban District. A subsequent zone change from the County of Hawaii is also required. These entitlements are being pursued and are unresolved at this time.

Municipal Sewer System: Extension of the County of Hawaii's wastewater system service north of the Kealakehe Wastewater Treatment Plant (WWTP) is in the preliminary planning stages. The planned extension of the system will enable the Kaloko Industrial Park developments to connect with the municipal sewer system to convey wastewater to the Kealakehe WWTP and terminate on-site wastewater discharges. The timetable and alignment of this sewer system extension are as yet unresolved. Phases III and IV of the

Kaloko Industrial Park will employ on-site treatment systems until such time that the municipal system becomes available.

Queen Kaahumanu Highway Widening: The widening of the Queen Kaahumanu Highway from two to four lanes by the State Department of Transportation Highways Division is expected to be undertaken by the year 2010, but a more precise timetable has not yet been determined.

Coordination with National Park Interests: The proposed developments in the area, in particular, Kaloko Industrial Park, Phases III and IV, and the adjacent Kaloko-Honokohau Business Park, have sparked heightened interest from those concerned with the protection and preservation of the Kaloko-Honokohau National Historical Park. Coordination meetings and discussions are planned with interested and affected groups, including in particular the National Park Service and the Na Kokua Kaloko-Honokohau, Inc., an advisory committee to the National Park.

A pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots to control the potential transport of pollutants which could adversely impact the ground-water system. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

COMPATIBILITY WITH LAND USE PLANS AND POLICIES:

The proposed project will generally conform with the various land use plans, policies and regulatory controls, including but not limited to, the Hawaii State Plan, Five-Year State Land Use District Boundary Review, Hawaii Coastal Zone Management Program, West Hawaii Regional Plan, County of Hawaii General Plan, and Keahole to Kailua Development Plan.

The Petition Area is designated within the State Conservation District. A State Land Use District Boundary Amendment Petition to reclassify the approximately 102~~.3~~-acre site for Phases III and IV of the Kaloko Industrial Park from the Conservation District to the Urban District is being requested of the State Land Use Commission.

The 1992 State Office of Planning's *State Land Use District Boundary Review* undertaken for the Island of Hawaii recommended the reclassification of lands from the Conservation and Agricultural Districts to the Urban District in the region extending from Keahole to Kailua, which includes the Petition Area.

The Petition Area's reclassification to the Urban District is consistent with the intent of the State Office of Planning's *West Hawaii Regional Plan* (November 1989) in identifying areas that are appropriate for future urban expansion. The Petition Area is located within the Subregional Planning Area of Kailua-Kona to Keahole, a designated area that could be planned and developed to accommodate urban growth without encroaching upon natural and cultural resources that are important to the continued vitality of the area.

The proposed project conforms with the County of Hawaii's current and proposed revised General Plan Land Use Pattern Allocation Guide Map (LUPAG) designation of Industrial.

The proposed development is consistent with the County of Hawaii's *Keahole to Kailua Development Plan* (April 1991), which designates the Petition Area on the Land Use Plan for "Limited Industrial" and "Urban Expansion".

The Petition Area is zoned Open District according to the Hawaii County Zoning Code. A zone change will be requested to reclassify the Petition Area from Open District to ML, Limited Industrial District (approximately 66~~.5~~ acres) and MCX, Industrial-Commercial District (approximately ~~35.8~~ 36 acres).

REQUIRED PERMITS AND APPROVALS:

The following is a list of permits and approvals which may be required prior to construction and operation of the proposed project, including the respective anticipated filing dates.

List of Permits and Approvals

Permit/Approval	Anticipated Filing Date
State of Hawaii	
Land Use Commission • State Land Use District Boundary Amendment • Environmental Impact Statement	• May 2000 • November 2000 (Final EIS)
Department of Health • National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Associated with Construction Activity • Noise Permits • Air Quality Permits	• Summer 2001 • Fall 2001 • Fall 2001
Department of Land and Natural Resources Historic Preservation Division • Chapter 6E, HRS Historic Preservation	• May 2000 (submitted Archaeological Inventory Survey report to DLNR Historic Preservation Division)
County of Hawaii	
Hawaii County Council • Zone Change	• November 2000
Planning Department • Subdivision Approval	• Summer 2001
Department of Public Works • Grading, Grubbing and Stockpiling Permits	• Fall 2001
Other	
Utility Companies • Utility Service Requirements • Permit Regarding Work on Utility Lines	• Fall 2001 • Fall 2001

1. INTRODUCTION

1.1 Introduction

TSA International, Limited is proposing to complete the planned development of the existing Kaloko Industrial Park by developing an approximately 102.3-acre parcel which comprises Phases III and IV of the light industrial park in Kaloko, North Kona, Island of Hawaii. These final phases are situated just mauka of the initial Phases I and II which began in 1981 and have recently been completed. The proposed development will allow for light industrial and industrial-commercial mixed uses within a fee-simple subdivision.

The development is situated on lands within the State Conservation District, necessitating a State Land Use District Boundary Amendment to the Urban District and a subsequent County of Hawaii Zone Change. The preparation of this Environmental Impact Statement (EIS) is due to the Conservation designation of this parcel and accompanies the Petition for the State Land Use District Boundary Amendment.

1.2 Background

The Kaloko Industrial Park was conceived to provide industrial fee simple lands suitable to the needs of wholesale merchants, light manufacturers, and others seeking such space in West Hawaii.

Phases I and II of the Kaloko Industrial Park, consisting of 85 lots within 130.1 acres, have been successful at fulfilling the need for a light industrial subdivision in the growing region of North Kona. This region has grown from a 1980 population of 13,748 to a current population exceeding 26,000. The existing Kaloko Industrial Park has provided many new jobs and public resources to the region. Phases III and IV of the Industrial Park will provide approximately 82 additional improved lots and continue to strengthen the region's economic base.

Entitlement History: In May 1981, Phases I and II of the Kaloko Industrial Park (130.1 acres) were reclassified from the Conservation District to the Urban District by the State Land Use Commission (Docket A80-482).

In May 1981, Phases III and IV of the Kaloko Industrial Park were also approved for Urban reclassification under the "incremental districting" provisions of the Land Use Commission rules, provided there was substantial completion of on-site and off-site improvements for the first two phases within five (5) years of the approval (Docket A80-482). Since these improvements could not be completed within this timeframe, the property has remained in the Conservation District.

An approximately 8.5-acre roadway parcel was also reclassified from the Conservation District to the Urban District in May 1986 by the Land Use Commission (Docket A80-482), following a motion to redistrict the mauka-makai roadway portion of the Second Increment in Docket A80-482).

1.3 Project Location

The Petition Area is located adjacent to and east (mauka) of the existing Kaloko Industrial Park, Phases I and II, in the Kaloko, North Kona District on the Island of Hawaii (see Figure 1-1). The site is approximately 3 miles south of the Kona International Airport at Keahole and 3.4 miles north of the town of Kailua-Kona. It consists of approximately 102.3 acres and is identified by Tax Map Key: 7-3-51: portion 60 (see Figure 1-2). The site is located one mile mauka of the coastline and lies between elevations ranging from approximately 170 feet above mean sea level (MSL) at the western end to 300 feet above MSL at the eastern end. Access to the site is from Queen Kaahumanu Highway and Hina Lani Street.

1.4 Existing and Surrounding Uses

1.4.1 Existing Use

The Petition Area is presently vacant and undeveloped. The site consists of large, barren masses of pahoehoe and aa lava and is overgrown with scrub vegetation consisting mostly of koa haole and fountain grass.

1.4.2 *Surrounding Uses*

Land uses bordering the Petition Area include the existing Kaloko Industrial Park development to the west; Hina Lani Street and privately-owned undeveloped land to the north; privately-owned undeveloped land to the east; and, a quarry and privately-owned undeveloped land to the south.

The existing and proposed uses in the project vicinity are depicted in Figure 1-3 and further described below.

1.4.2.1 Existing Uses Within the Project Vicinity

The existing Kaloko Industrial Park, Phases I and II, consists of 85 lots and includes industrial and business establishments such as light manufacturing, warehousing and distribution operations, and a Costco Wholesale facility. The adjacent quarrying operations to the south, ongoing since 1967, encompass an area of approximately 261.7 acres and is currently operated by West Hawaii Concrete. Portions of the undeveloped land adjacent and east of the quarry are intermittently used for cattle grazing.

Located approximately 0.4 mile west of the Petition Area, makai of Queen Kaahumanu Highway is the Kaloko-Honokohau National Historical Park. Administered by the U.S. National Park Service, the 1,160-acre park contains extensive natural and cultural resources, such as fishponds, wetlands and archaeological sites. Nearly all of the land has been designated a national historical landmark.

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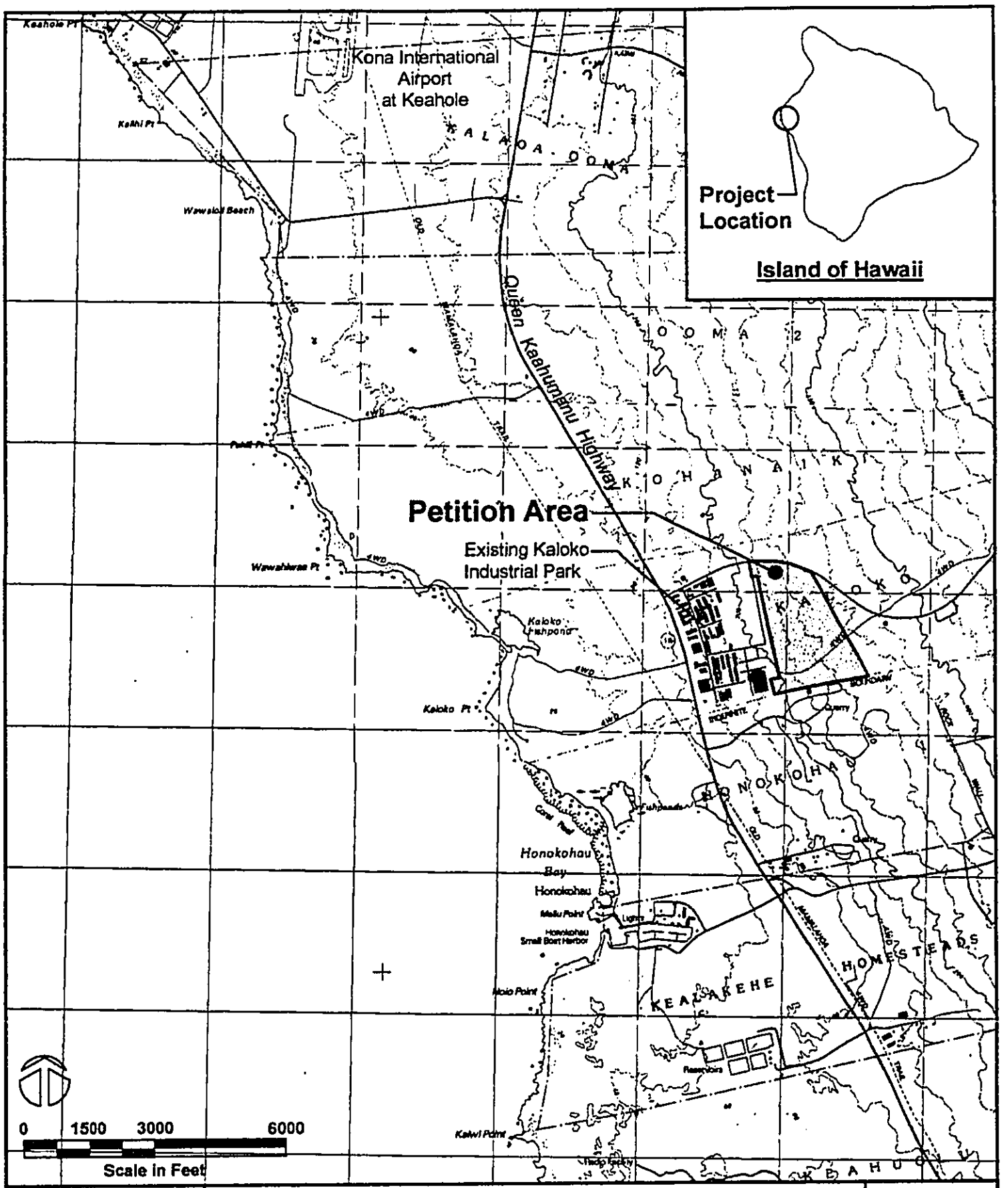

WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	KALOKO INDUSTRIAL PARK, PHASES III & IV LOCATION MAP	FIGURE 1-1

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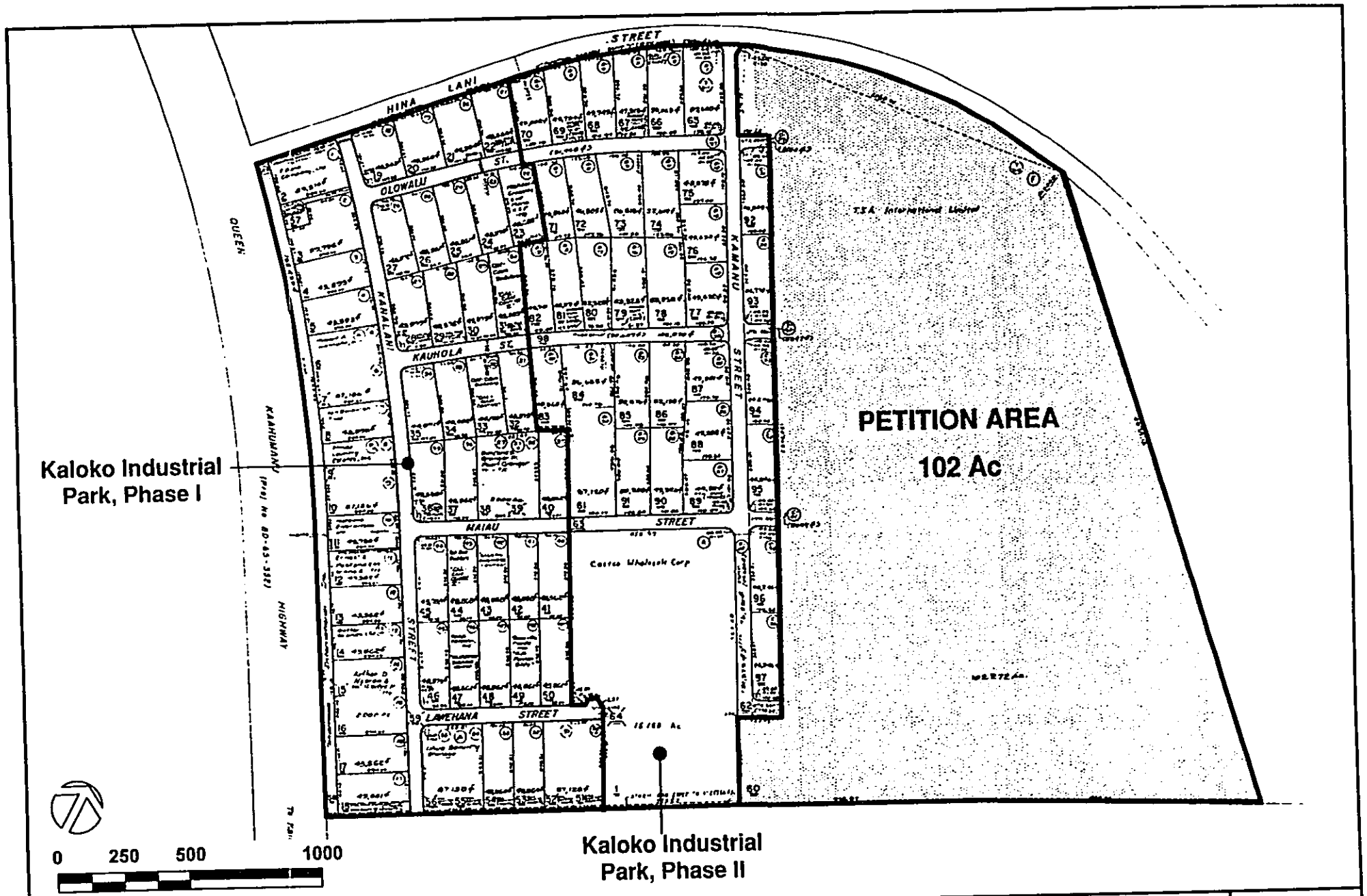
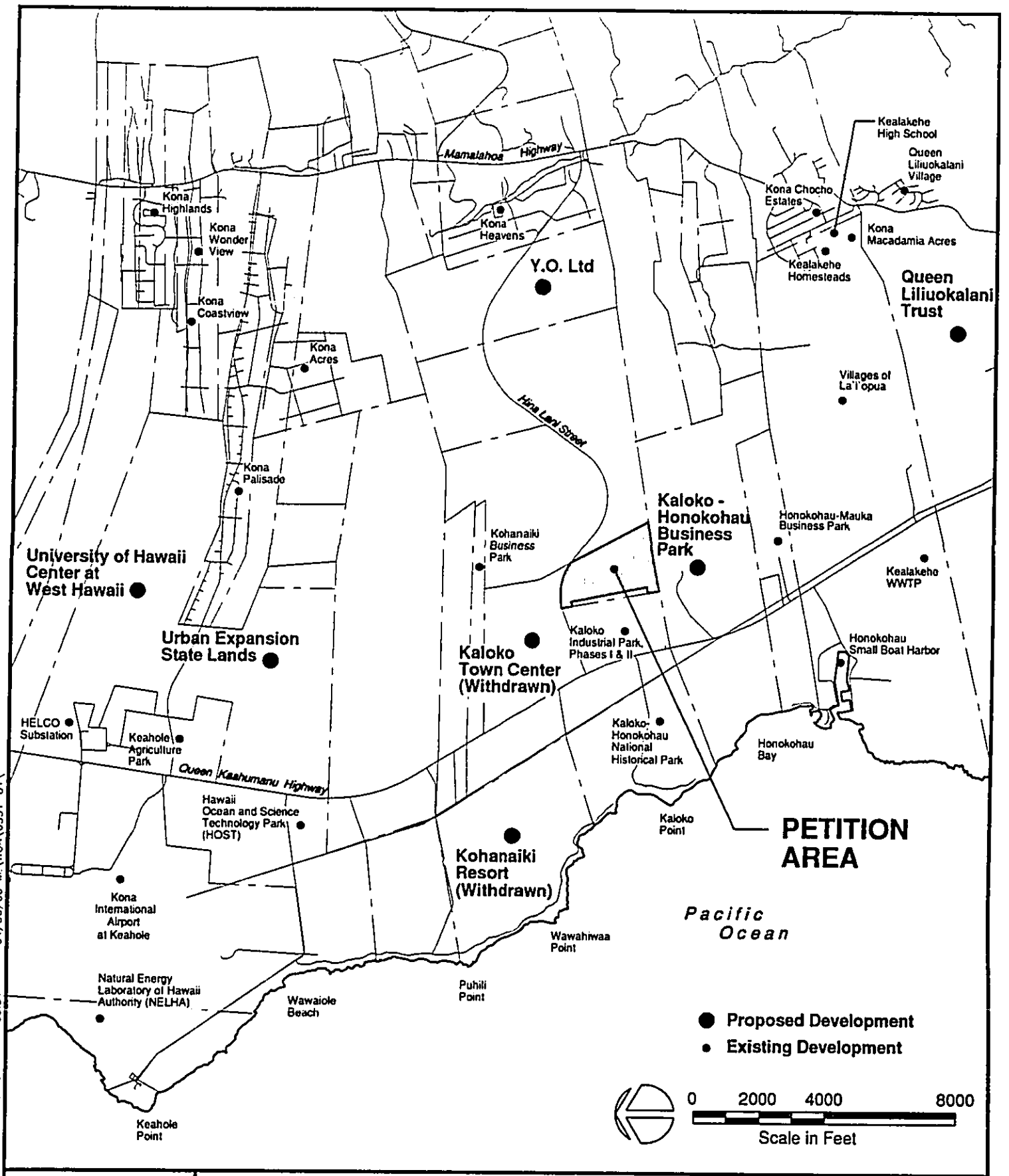


WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	KALOKO INDUSTRIAL PARK, PHASES III & IV TAX MAP KEY 7-3-51: PORTION 60	FIGURE 1-2



WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS · PLANNERS

KALOKO INDUSTRIAL PARK, PHASES III & IV

EXISTING AND PROPOSED USES WITHIN THE PROJECT VICINITY

FIGURE 1-3

To the north approximately 3 miles from the Petition Area is the Kona International Airport at Keahole operated by the State Department of Transportation, Airports Division. Immediately west (makai) of the Airport is the Natural Energy Laboratory of Hawaii (NELH), a publicly-funded research facility. The Hawaii Ocean and Science Technology Park (HOST) is located adjacent to and south of the Airport. Mauka of the Airport and Queen Kaahumanu Highway is the State-developed Keahole Agricultural Park.

The Kohanaiki Business Park, a 26-lot light industrial development, is located approximately 0.5 mile north of the Petition Area.

Approximately 0.5 mile south of the Petition Area is the 26-lot Honokohau-Mauka Business Park, a light industrial development. Further south of the Petition Area and makai of Queen Kaahumanu Highway are the State Department of Transportation, Harbors Division's 450-slip Honokohau Small Boat Harbor and the County of Hawaii's Kealakehe Wastewater Treatment Plant, located approximately 1.1 mile and 1.5 miles from the Petition Area, respectively.

The State-developed Villages of La'i'opua project is located approximately 0.9 mile southeast of the Petition Area. When fully developed, the project will include residential units, an elementary and high school, commercial areas, parks, churches/day care, a golf course, and archaeological and botanical preserves.

Further south, approximately 3.4 miles from the Petition Area, is Kailua-Kona town which is the major commercial and business hub of the region.

Mauka of the Petition Area are a number of residential developments located in the vicinity of Mamalahoa Highway. These include Kona Palisade, Kona Acres, Kona Coastview, Kona Wonder View, and Kona Highlands to the north/northeast; Kona Heavens to the east; and, Kealakehe Homesteads, Kona Chocho Estates, Kona Macadamia Acres, and Queen Liliuokalani Village to the southeast.

1.4.2.2 Proposed Developments Within the Project Vicinity

Currently, the nearby vicinity surrounding the Petition Area is largely undeveloped, with the exception of the Kaloko Industrial Park, Phases I and II. However, a number of major new developments are either planned or have been planned for the region. Although some of these planned projects may be in various stages of development, the timetables for development of most of the projects are unknown at this time.

Adjacent to and south of the Petition Area, Lanihau Partners L.P. is currently pursuing State Land Use District reclassification of approximately 337 acres of land from the State Conservation District to the Urban District for development of the Kaloko-Honokohau Business Park. The development is proposed to include a mixture of light industrial and commercial uses and to allow the retention and expansion of the existing quarry and quarry-related uses. Development of the project is anticipated to commence by year 2010.

Further south, approximately 1.6 miles from the Petition Area, the Queen Liliuokalani Trust is planning to develop some 546 acres near the intersection of Palani Road and Queen

Kaahumanu Highway. The project was granted State Land Use District reclassification from the Agricultural and Conservation Districts to the Urban District in 1991.

Immediately north of the Petition Area across of Hina Lani Street, Tokyo Green Hawaii, Inc. planned to develop the Kaloko Town Center on approximately 224 acres of land. The proposed development sought to urbanize the property into a mixture of office/commercial/retail, multi-family and single-family residential units, a school, and a park. In May 1997, the petition to reclassify the property from the Conservation District to the Urban District was withdrawn from the State Land Use Commission by Tokyo Green Hawaii, Inc.

Further north of the Petition Area, approximately 2,640 acres of State-owned land were reclassified from the State Conservation and Agricultural Districts to the Urban District in 1993. Possible development scenarios include residential, neighborhood commercial, civic, employment center, light industrial, parks, golf courses, and a university. Currently, a facility for higher education identified as the University of Hawaii Center at West Hawaii (UHCWH) is proposed on an approximately 33-acre site within the State-owned land. The new facility will be used to transition existing programs currently operating in leased facilities at the Kealakekua Business Plaza and provide sufficient expansion capability for projected future growth characterized by a head count enrollment of 1,500 students. In addition to the UHCWH, n[N]o other ~~further~~ development plans have been undertaken since the Urban District reclassification.

Northwest of the Petition Area and makai of Queen Kaahumanu Highway, Nansay, Inc. proposed to develop the Kohanaiki Resort on approximately 470 acres of land. Included in the development were two hotels, a golf course, marina, and residential units. Reclassification of the land from the State Conservation District to the Urban District was obtained in 1987. Subsequently, a contested Special Management Area Use Permit from the County of Hawaii Planning Commission was withdrawn by the developer in 1996.

Located on the mauka slopes approximately 1.2 miles east of the Petition Area, the Y-O Limited Partnership has plans for 408 acres of land to include single-family and multi-family residential units, commercial and park development.

1.5 Project Need

Following an extended period of low activity in the early to mid-1990s, the West Hawaii economy and industrial real estate sector have shown substantial recovery and growth since late 1996, with particular strength over the past nine months. The actual number of lots absorbed in 1999 far outpaced the finished space land requirement. Two projects, the Kaloko Industrial Park, Phase II (35 one-acre lots) and Kohanaiki Business Park (26 one- to five-acre lots) sold more than 80 percent of their available inventory during 1999, indicating a continuing demand for additional lots (The Hallstrom Group, Inc., May 2000).

The region has successfully absorbed some 240.2 gross acres of industrial lands through 1999, averaging 8.9 acres annually since 1979. Regional demand is expected to increase annually by mid-decade, with demand for about 15 new finished lots each year.

There is currently an estimated 5.5 percent vacancy rate of industrial floor space in the regional market. This is the lowest availability of space since 1991, and the lowest vacancy rate since 1990. Recently, absorption of available space quickened significantly, with the vacancy rate dropping by more than 1.5 points in the last quarter of 1999.

In summary, the existing in-place supply of industrial/business land in the Keahole to Kailua-Kona corridor, which includes the Petition Area, will be sufficient to meet market demands only for another three or four years. After that time, additional developments will be required if the sector is to maintain an appropriate demand/supply balance. The recent offerings at the Kaloko Industrial Park, Phase II, and Kohanaiki Business Park developments, while serving to fill pent-up demand which built during the past decade, are almost fully absorbed. While there are large acreage industrial additions proposed in the region, virtually all would have to be developed in a timely manner to meet demand levels.

1.6 Histotric Perspective

The Petition Area is situated in the ahupua'a of Kaloko, an area of lava-covered land north of Kailua. Kaloko is well-known for its large fishpond for which the ahupua'a is named.

In the periods between pre-contact to 1800, the Kaloko ahupua'a was in the southern end of an area known as Kekaha. Prior to the ascendancy of Kamehameha, the lands were apportioned by the ali'i and Kekaha was held by the kahuna class of Kauahi and Nahulu. During the 1770s, Kekaha and the lands of the section were held by descendants of the Nahulu line, Kame'eiamoku and Kamanawa, the twin half brothers of Ke'eaumoku, the Hawai'i Island chief (Ibid.:310). In the last decades of the 18th century, following western contact, Kaloko, as a portion of the larger Kekaha area, remained under the control of Kame'eiamoku (Kamakau, 1992).

In the 1800s to 1850s, western contact became a major influence in changing the traditional Hawaiian social structure and government. The Mahele of 1848 indicates that Kaloko was claimed by and awarded (LCA 7715) to Lot Kamehameha (Kamehameha V). Houses were built on lava along the coast, along with small cultivated plots (Haun & Associates, May 2000). Kaloko continued to be held by the ali'i throughout the remainder of the 19th century, passing after the death of Lot Kamehameha successively to Bernice Pauahi Bishop, Kalākaua and Kapi'olani.

Missionary and later census data document a decline in the population of North Kona in the 1800s (Kelly, 1971). In 1906, Kaloko was sold to John A. Maguire and subsequently became part of Huehue Ranch (Cordy et al. 1991). The Kaloko fishpond was leased from the Ranch and used as a commercial fishing operation until the 1950s. Over the years, the lands between Queen Ka'ahumanu Highway and Māmalahoa Highway were subdivided and purchased by various parties. On the mauka lands, residential subdivisions were developed.

Regionally, 40 years ago West Hawai'i was a stable agrarian culture, with scattered villages, a resident population of about 14,000, little tourism, and limited commercial and industrial development. Over the past 40 years, the trend towards an urban economy has been exceptional, though cyclical. The region boomed in the mid- to late-1980s, with major

development of all types, particularly those associated with resort and commercial uses, along with industrial and residential uses. In the early to mid-1990s, the deep recession resulted in a stagnation of virtually all economic activity. In recent years, several factors have contributed to growth in the region, notably a resurgence of tourism, an increase in construction activity, and a general strengthening (though limited) of the Statewide economy. (The Hallstrom Group, Inc., May 2000).

Unique Environmental Resources of the Kaloko-Honokōhau National Park: The Kaloko-Honokōhau National Historical Park contains extensive natural and cultural resources and nearly all of the land has been designated a national historical landmark. Along with archaeological sites, the Park contains wetlands and fishponds, with the two prominent ponds being Kaloko and 'Aimakapā Ponds. The wetlands and ponds are nesting and feeding habitat for two species of waterbirds, the Hawaiian coot (*Fulica americana alai*) and the Hawaiian stilt (*Himantopus mexicanus knedseni*) which are on the Federal list of endangered species. Anchialine ponds in the Park provide a habitat for native species. The freshwater component of ground-water flow in the Park through the anchialine ponds are considered important in sustaining wetland and pond ecosystems. (U.S. Geological Survey, 1999). Further discussion of the marine and pond environments at the Park is included in **Section 3.6 Marine and Pond Environments.**

2. PROJECT DESCRIPTION

2.1 Project Description

The Kaloko Industrial Park, Phases III and IV, is proposed to consist of approximately 82 improved one-acre lots (see Figure 2-1). The site would be mass graded with all necessary infrastructure provided, including roadways, water, sewer, drainage, electrical, and communications systems.

The general site concept for the proposed development will be similar to Phases I and II of the Kaloko Industrial Park. The primary access to the proposed project will be from Hina Lani Street via Kamanu Street, a two-lane primary collector roadway providing north-south access. Kamanu Street will be extended approximately 350 feet to the south boundary of the property. The roadway layout within the proposed development will be an extension of the completed industrial park in a grid and block pattern similar to the existing improvements. Three roadways in the east-west direction will be extended from the existing Olowalu, Kauhola and Maiau Streets.

Landscaping will be implemented within the proposed development for visual purposes. Each lot will be improved and landscaped separately by the individual lot owners and/or their tenants. The general appearance of the individual properties, such as architectural design criteria and landscaping requirements, will be controlled through restrictive covenants for the proposed development.

The intended uses in Phases III and IV of the Kaloko Industrial Park include light industrial, business and commercial uses generally consistent with the existing light industrial uses in the developed Phases I and II. As discussed in Section 4.8, a rezoning of the Petition Area will be sought from the Open District to Light Industrial and Industrial-Commercial Mixed Use zoning to allow for these uses. As depicted in Figure 2-1, approximately 66~~.5~~ acres will be designated for light industrial use and ~~35.8~~ 36 acres will be designated for industrial-commercial mixed use. Examples of uses permitted under the respective County zoning designations are identified in Table 2-1.

2.2 Project Schedule

Development of the project is anticipated to commence in March 2001, with completion by mid-2003, exclusive of the individual lot improvements to be undertaken by the respective property owners or tenants.

	Start	Completion
Subdivision Design/Permits	March 2001	December 2001
On-Site Infrastructure (mass grading, roadways, utilities)	December 2001	June 2003
Off-Site Infrastructure (traffic-related improvements at Hina Lani Street/Kamanu Street)	January 2003	June 2003

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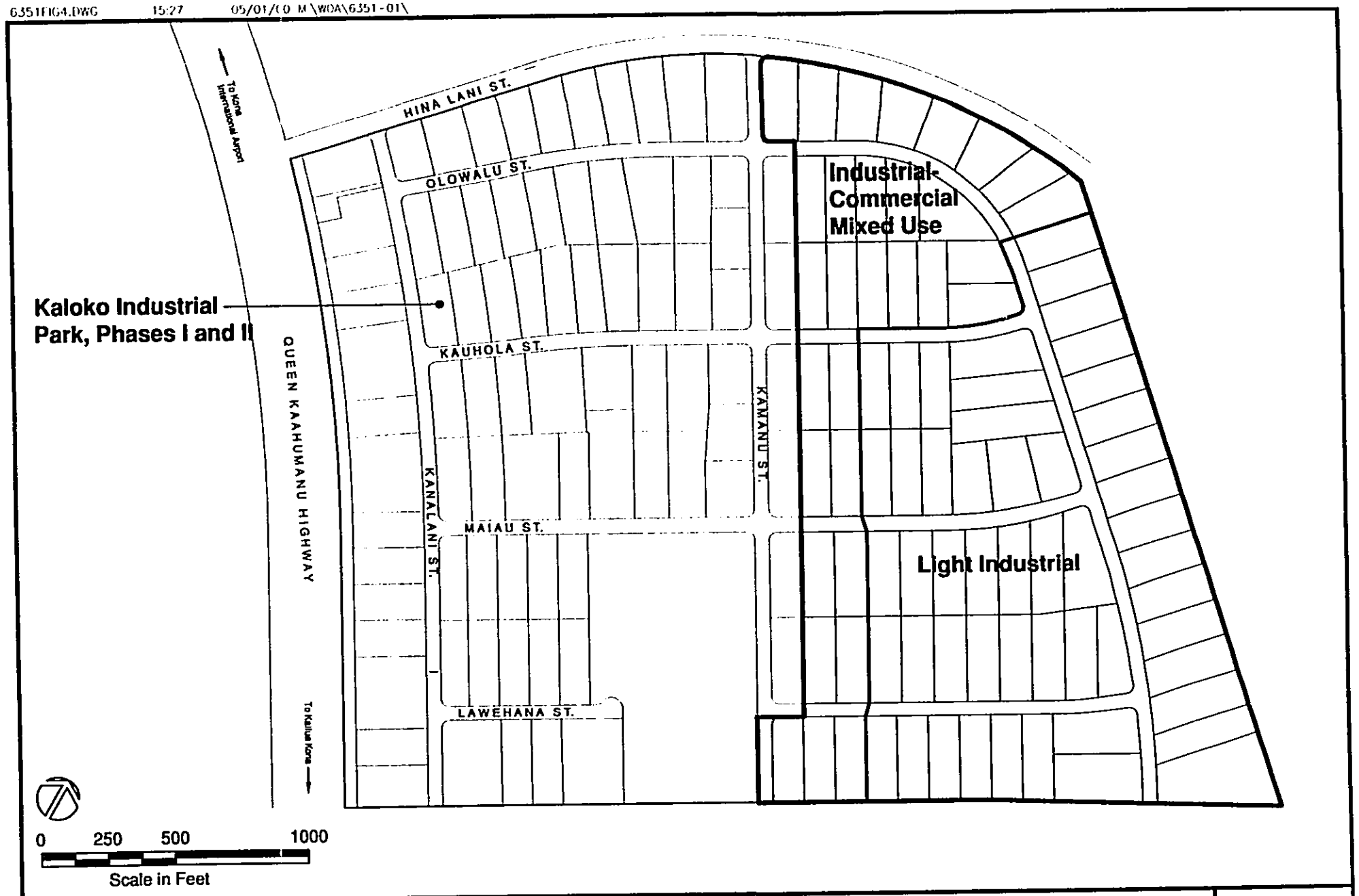

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KALOKO INDUSTRIAL PARK, PHASES III & IV

SITE PLAN

FIGURE 2-1

Table 2-1
Examples of Permitted Uses
Light Industrial and
Industrial-Commercial Mixed Use Districts

Permitted Use	Light Industrial	Industrial-Commercial Mixed-Use
Automobile sales and rentals	✓	✓
Automobile service stations	✓	✓
Car washing	✓	✓
Food manufacturing and processing	✓	✓
Home improvement centers	✓	✓
Light manufacturing, processing and packaging establishments	✓	✓
Plant nurseries	✓	✓
Restaurants	✓	✓
Self-storage facilities	✓	✓
Automobile and truck storage facilities	✓	
Contractors' yards	✓	
Heavy equipment sales	✓	
Lumberyards and building material yards	✓	
Transportation and tour terminals	✓	
Utility facilities, public and private	✓	
Business services		✓
Convenience stores		✓
Offices		✓
Retail establishments		✓
Schools (photography, art, music, dance)		✓
Theaters		✓

3. DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES

This chapter describes the existing environment, anticipated project impacts resulting from the proposed project, and the associated mitigative measures. As appropriate, cumulative impacts resulting from the proposed project and other developments in the project vicinity are also addressed in this chapter.

The evaluation of the cumulative impacts considers the proposed project with other major proposed projects in the nearby region. These projects include the following and are also described in **Section 1.4.2.2 Proposed Developments Within the Project Vicinity** in the EIS:

- Kaloko-Honokohau Business Park: A light industrial/commercial development on approximately 337 acres to be developed by Lanihau Partners L.P. Located adjacent to and south of the Petition Area.

- Liliuokalani Trust (Keahuolu Lands of Kailua-Kona): A mixed-use development by Liliuokalani Trust Estate on approximately 1,135 acres. Proposed uses include retail, commercial, office, residential, civic and cultural center, a regional hospital, and park space. Located approximately 1.6 miles south of the Petition Area.

- Urban Expansion State Lands: Approximately 2,640 acres of State-owned land with possible uses to include residential, neighborhood commercial, civic, employment center, light industrial, parks, golf courses, and a university. Located approximately 1.2 miles north of the Petition Area.

- University of Hawaii Center at West Hawaii: A facility for higher education located on an approximately 33-acre site within the aforementioned Urban Expansion State Lands.

With the exception of the Kaloko-Honokohau Business Park, the potential environmental impacts and mitigation measures for the other projects were obtained from the environmental impact statements prepared for the respective projects. Information on Kaloko-Honokohau Business Park was obtained from preliminary reports prepared in conjunction with the project's EIS.

It should be noted that predicting the cumulative future of the nearby region is highly speculative in light of the development phasing of the projects being dependent on favorable market conditions.

Two other projects previously proposed for the area, the Kaloko Town Center and Kohanaiki Resort, are not included in the assessment of cumulative impacts since the projects' respective land use requests were withdrawn from the State Land Use Commission and County of Hawaii Planning Commission.

3.1 Climate

The Kona region experiences a mild climate year-round. The average annual temperature is 75° (Fahrenheit), with an average high of 83°, and an average low of 67°. Median annual rainfall is approximately 25 inches, with areas along the coast experiencing less than 10 inches of rainfall annually.

The area is largely sheltered from the predominant northeasterly tradewinds by the land masses of Mauna Loa, Mauna Kea and Hualalai, resulting in light, variable winds. The prevailing winds are scutherly and westerly. During the day, a pressure gradient between the warmer land and cooler ocean waters causes warm air to be moved inland by light sea breezes. In the evening, the convection cells reverse direction as the land cools and night breezes blow out toward the warmer ocean. Typical wind velocities range between 3 to 14 knots. Relative humidity is generally stable year-round, with the daily average ranging from 71 to 77 percent.

3.2 Geology and Topography

Geology: The Petition Area is located on the lower western slope of Hualalai, a dormant shield-type volcano. Hualalai Volcano last erupted in 1801 along its northwest rift zone, which represents the major geologic structure in the area.

The western slopes of Hualalai Volcano consist predominantly of alkalic olivine basalt flows that poured out of the northwest rift zone. Some of the flows, however, are gradational to Hawaiite (andesite). The basalt flows are typically thin-bedded, dip 10 to 15 percent, and average 4 or 5 feet in thickness on the upper slopes. These flows, however, probably average 10 feet in thickness on the more gentle (2 percent) slopes near the coast. The flows consist of both pahoehoe and aa types and belong to the prehistoric member (Holocene age) of the Hualalai volcanic series.

Topography: The Petition Area occupies an area of relatively uniform slope, ranging from 5 to 8 percent. The lowest elevation along the makai boundary of the site is approximately 170 feet above mean sea level (MSL). Along the mauka boundary, the site reaches an elevation of about 300 feet above MSL. The site has a generally irregular surface with localized mounds and depressions throughout, as is characteristic of non-eroded lava flows.

Impacts and Mitigation Measures

No significant impacts on the geology or topography of the Petition Area are anticipated during the construction and operation of the proposed project.

Construction of the proposed improvements will involve grading, excavation and trenching of presently undeveloped areas within the Petition Area. Pahoehoe lava which covers the majority of the site is typically solid and contains few voids, making it more difficult to crush and shape for site improvements. The surface of the aa lava typically consists of loose material which can more easily be graded by bulldozers in most places. Within the site, there are areas of fairly uniform terrain which would require relatively little mass grading and filling operations. Other areas within the site characterized by a generally irregular surface with localized mounds and depressions would require more extensive grading and filling

activities, resulting in an alteration of the existing lava terrain. Mass grading of the site will require a National Pollutant Discharge Elimination System (NPDES) permit from the State Department of Health (DOH) for storm water construction activities greater than 5 acres, including Best Management Practices to minimize off-site impacts.

Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts on the geology or topography are anticipated as a result of the proposed projects in the nearby region. Development of the proposed projects will require site work, including localized alteration of the existing lava terrain for roadways and buildings sites. For the Urban Expansion State Lands, it is recommended that the master plan site land uses, including roadways, to minimize grading and reduce the need to large-scale reshaping of the underlying landform (*Urban Expansion State Lands FEIS*, July 1993).

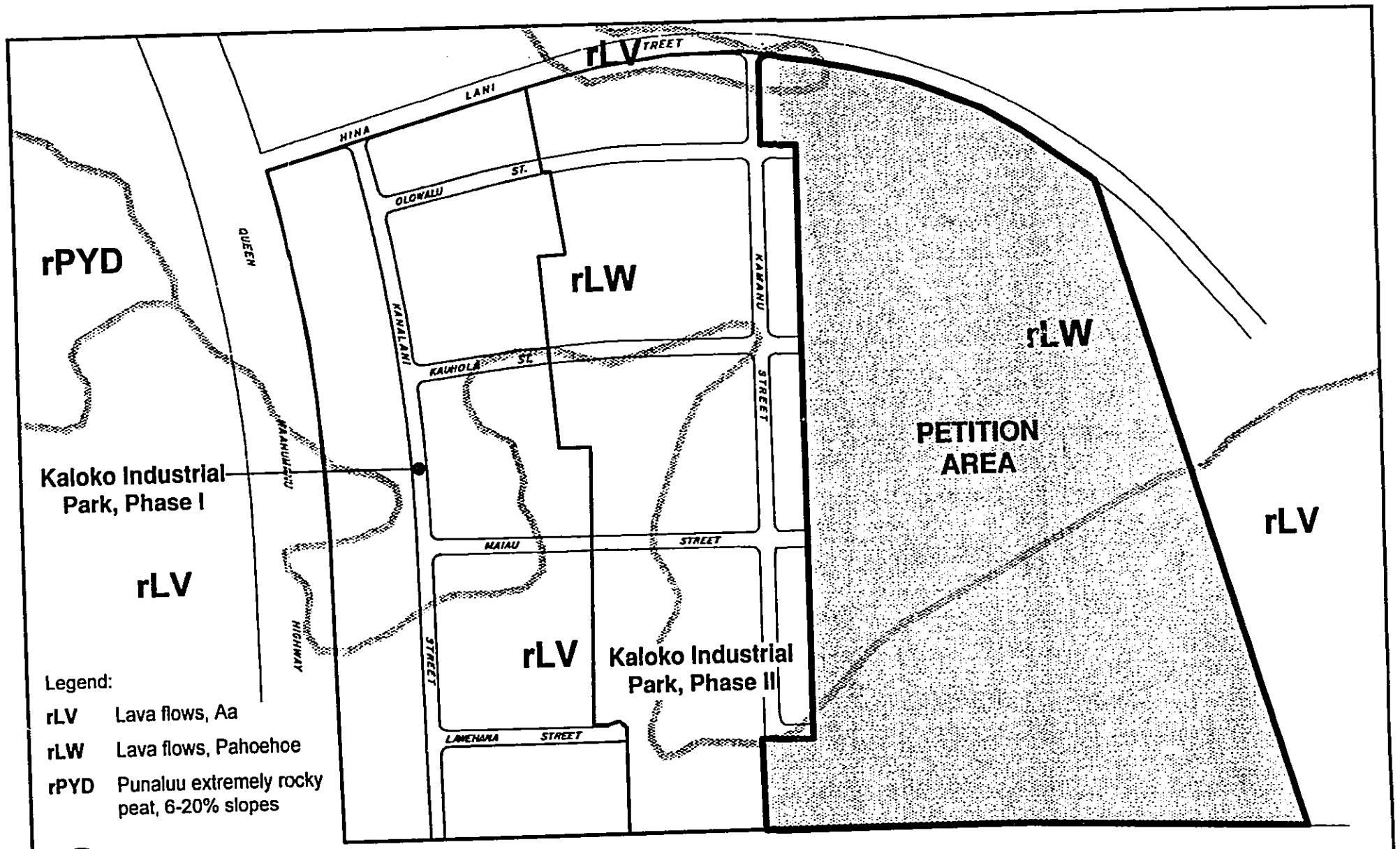
3.3 Soils

The U.S. Department of Agriculture Natural Resources Conservation Service classifies the soil in the Petition Area as pahoehoe lava flows (rLW) and aa lava flows (rLV) (see Figure 3-1). Lava flows are considered "miscellaneous land types". Pahoehoe lava, which occurs over approximately 65 percent of the site, is characterized by a billowy, glassy surface that is relatively smooth, although the surface may be rough and broken in some areas, with hummocks and pressure domes. The remaining 35 percent of the site consists of aa lava, which is characterized by clinkery, hard, glassy pieces piled in tumbling heaps. Both of these land types have no soil covering and are virtually devoid of vegetation. The lava is very slowly permeable, although water moves rapidly through the cracks. Runoff is slow and erosion hazard is slight.

The soil capability class rating for both aa and pahoehoe lava is VIII, indicating that the soils have severe limitations that make them unsuited for cultivation and commercial plants, and restrict their non-urban use largely to pasture, woodland, wildlife, water supply, and aesthetic purposes.

The *Detailed Land Classification – Island of Hawaii* prepared by the University of Hawaii Land Study Bureau (LSB), evaluates the quality or productive capacity of certain lands on the Island for selected crops and overall suitability in agricultural use. A five-class productivity rating system was established with "A" representing the highest productivity and "E" the lowest. According to the study, the Petition Area consists mostly of bare pahoehoe lava flows with no soil cover. The site is classified as "E," or very poorly suited for agricultural productivity.

The *Agricultural Lands of Importance in the State of Hawaii* (ALISH) map, prepared by the State Department of Agriculture, classifies lands into three categories: 1) Prime Agricultural Land, 2) Unique Agricultural Land, and 3) Other Important Agricultural Land. None of the land within the Petition Area has been identified as "Important Agricultural Land" under the State ALISH system.



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KALOKO INDUSTRIAL PARK, PHASES III & IV

SOILS CLASSIFICATION

FIGURE 3-1

Impacts and Mitigation Measures

No significant impacts on soils within the Petition Area are anticipated as a result of the construction and operation of the proposed project. The soils are unsuitable for agriculture. Following construction, exposed soils will have been graded, built over, paved over, or landscaped.

Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts on soils are anticipated as a result of the proposed projects in the nearby region. Following construction, exposed soils will have been graded, built over, paved over, or landscaped. Currently, there is very little soil cover throughout the region. It is likely that soils would be imported for landscaping purposes which, over time, would cumulatively change the soil characteristics of the nearby region.

3.4 Surface Water

The natural drainage system of the Petition Area consists of rainfall percolating through the layers of very porous lava to the ground-water table. There are no definable streams or natural drainageways within or in the immediate vicinity of the site as the basaltic rocks of the substrata are highly permeable. There are no wetlands located within or in the immediate vicinity of the Petition Area.

The Kaloko-Honokohau National Historical Park, located makai of the Petition Area and Queen Kaahumanu Highway, contains anchialine ponds (saltwater or brackish-water ponds) and wetlands. Two principal fishponds in the Park, the Kaloko and Aimakapa Ponds, are large brackish ponds separated from the ocean by basaltic rock walls. Water in these ponds is a mixture of seaward-flowing, low-salinity ground water, and landward-flowing seawater. These two ponds are described in further detail in Section 3.6.1. Wetland areas of approximately 15 acres exist adjacent to the Aimakapa Pond.

Impacts and Mitigation Measures

No significant impacts to the natural drainage system in the vicinity of the Petition Area, including the nearshore marine and pond systems at the Kaloko-Honokohau National Historical Park, are anticipated as a result of the construction and operation of the proposed project.

Grading, excavation, trenching, and filling activities associated with construction of the proposed project will potentially result in increased storm runoff and soil erosion from exposed loose lava particles and fill material. The potential impacts to the marine and pond environments at the Kaloko-Honokohau National Historical Park resulting from construction activities associated with the proposed project are discussed in Section 3.6.3 below.

Toward further mitigating potential storm runoff impacts, construction site work activities will be regulated by the County of Hawaii's grading ordinance and the National Pollutant Discharge Elimination System (NPDES) permit requirements administered by the State Department of Health (DOH). The grading ordinance includes provisions related to reducing and minimizing the discharge of pollutants associated with soil-disturbing activities in grading, grubbing and stockpiling. A NPDES General Permit for Storm Water Associated

with Construction Activity will be required to control storm water discharges since the area of soil disturbance from activities such as grading, grubbing and stockpiling will be in excess of five (5) acres. The permit requires compliance with a Best Management Practices (BMP) plan which, in turn, requires compliance with County ordinances pertaining to grading, grubbing, stockpiling, soil erosion, and sedimentation. The BMP plan typically includes appropriate structural or non-structural mitigative methods such as containment berms and filtration/detention basins that would control the discharge of storm water resulting from construction activities.

Due to the undeveloped nature of the Petition Area, development of the proposed project will increase the impervious area of the site. The proposed drainage improvements described in Section 3.17.3 will minimize any potential impacts to surface waters in the project vicinity.

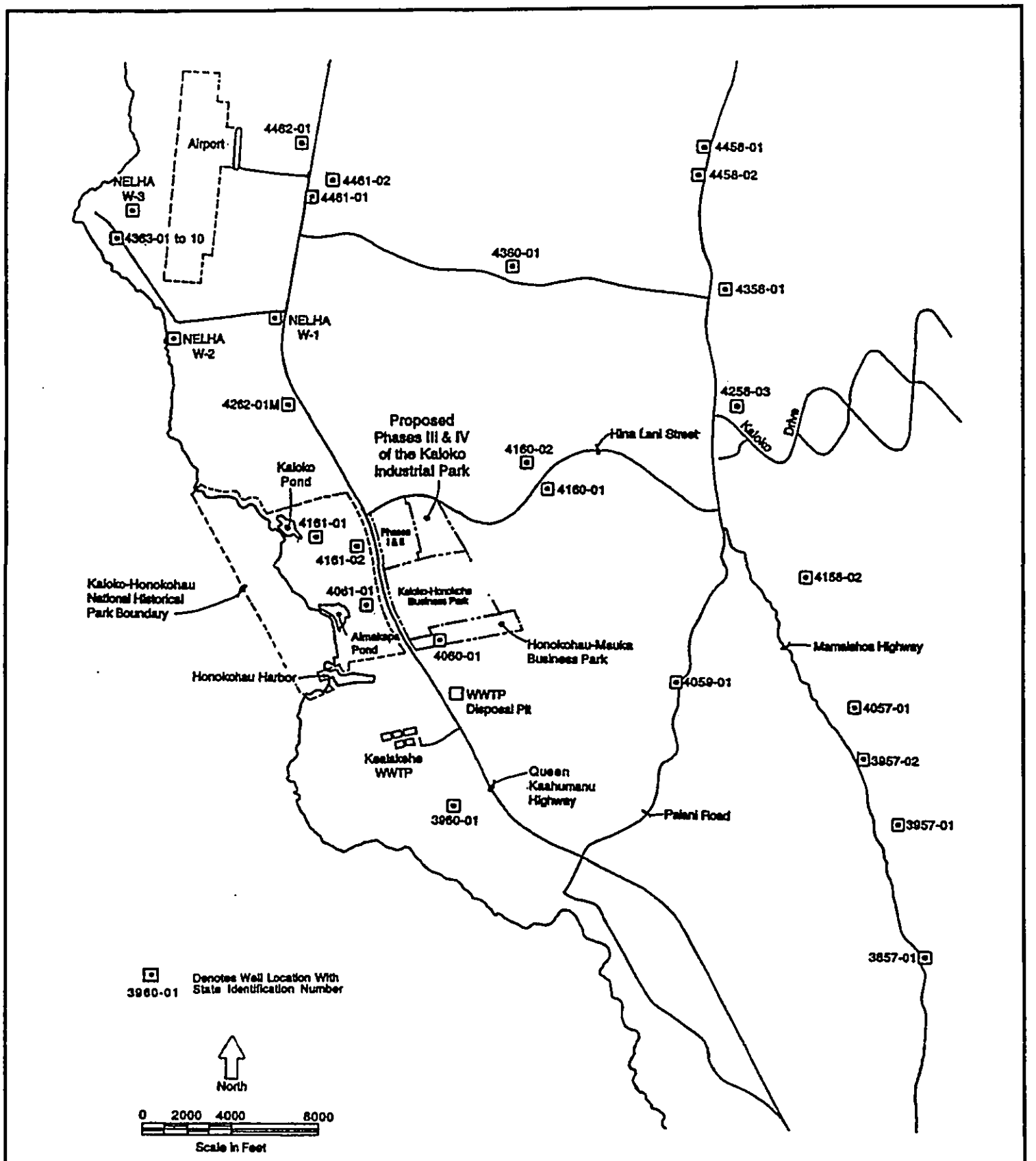
Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts to the natural drainage system in the nearby vicinity, including the nearshore marine and pond systems at the Kaloko-Honokohau National Historical Park, are anticipated as a result of the proposed projects in the nearby region. Due to the undeveloped nature of the project sites, development of the proposed projects will increase the impervious areas of the sites. The proposed drainage system improvements for the respective projects will minimize any potential impacts to surface waters in the project vicinity.

3.5 Ground Water

An assessment of ground-water resources and impacts relative to the Petition Area was conducted by Tom Nance Water Resource Engineering. The assessment of ground-water resources is included in Appendix A and is summarized below.

The Petition Area overlies the Keauhou ground-water Aquifer System within the Hualalai Aquifer Sector. Knowledge of ground-water conditions comes primarily from wells shown on Figure 3-2 and listed in Table 3-1. These depict two distinctly different modes of ground-water occurrence. Ground water occurs beneath the Petition Area as a thin, brackish to saline basal lens in hydraulic contact with seawater at depth and at the shoreline. However, further inland, along an alignment that is generally coincident with that of Mamalahoa Highway, there is a sudden change from the brackish basal lens to high-level ground water of exceptionally good quality. High level ground water is a relatively recent (1990) discovery in North Kona. The geologic feature, which causes groundwater to be impounded to high levels behind it, is not yet known. In addition to it creating a substantial reservoir of potable quality water, this feature also controls the location and manner of groundwater movement into the basal lens downgradient.

The top of the brackish basal lens stands one to two feet above sea level and fluctuates in response to ocean tides. Its sources of recharge are leakage from the high level aquifer further inland, local rainfall-recharge, and inputs from residential and commercial-industrial developments such as seepage from cesspools and landscape irrigation return flow.



Source: Tom Nance Water Resource Engineering, July 2000

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KALOKO INDUSTRIAL PARK, PHASES III & IV

EXISTING WELLS IN THE VICINITY

FIGURE 3-2

Table 3-1
Available Data for Wells in the Kaloko Area

State No.& Present Use[1]		Elevation[1]		Ground Water Level[2]		Chloride[2]		Salinity[3]	
		Feet MSL	Year Drilled	Feet MSL	Date	mg/L	Date Tested	PPT	Date Tested
Basal Wells of Brackish Salinity									
3960-01*[4]	Irrigation	40	1982	ND	ND	3,400	1982	ND	ND
4059-01*[4]	None	800	1958	1.72	1958	3,475	1958	ND	ND
4060-01	Dust Control	121	1995	2.0	1995	>500	1995	0.875	1995
4061-01	Observation	37	1996	0.50*	1996	*5,560	1997	**10.500	1996
4160-01	Unused	565	1985	2.50	1985	941	1985	1.645	1985
4160-02	Unused	543	1985	1.40	1985	955	1985	1.734	1994
4161-01	Observation	23	1996	0.50*	1996	*3,190	1998	**6.125	1996
4161-02	Observation	54	1996	-0.80*	1996	*2,710	1998	**4.900	1996
4262-01M	Observation	90.5	1992	0.81	1993	2,500	1993	7.962	1996
4360-01*[4]	None	863	1968	2.54	1995	740	1968	ND	ND
4363-01 to 10*[4]	Aquaculture	ND	ND	ND	ND	15,000	ND	ND	ND
4461-01*[4]	Irrigation	165	1990	ND	ND	2,600	ND	ND	ND
4461-02*[4]	Cooling (future)	210	1993	ND	ND	5,900	1993	ND	ND
4462-02*[4]	None	ND	1993	ND	ND	3,825	1993	ND	ND
W-1 (NELHA)*[4]	Monitoring	105	1988	0.81	1991	ND	ND	ND	ND
W-2 (NELHA)*[4]	Monitoring	8	1988	1.25	1991	ND	ND	ND	ND
W-3 (NELHA)*[4]	Monitoring	21	1988	0.95	1991	ND	ND	ND	ND
Basal Wells of Potable Quality									
4458-01*[4]	None	1,799	1991	10.1	1995	17	1990	ND	ND
4458-02*[4]	None	1,799	1992	10.5	1995	15	1991	ND	ND
Wells Tapping High-Level Ground Water									
3857-01*[4]	Abandoned	1,542	1993	62	1993	ND	ND	ND	ND
3957-01*[4]	None	1,674	1993	47	1993	10	1993	ND	ND
3957-02*[4]	Monitoring	1,600	1991	42.8	1993	ND	ND	ND	ND
4057-01*[4]	Municipal	1,720	1994	189	1994	5.6	2000	ND	ND
4158-02	Municipal	1,675	1991	109.50	1991	8	1991	0.212	1994
4258-03	Unused	1,681	1993	292.44	1993	8	1993	0.008	1993
4358-01*[4]	Observation	1,799	1991	236	1991	6.5	2000	ND	ND

Source: [1] *Ground-Water Resources in Kaloko-Honokohau National Historical Park, Island of Hawaii, and Numerical Simulation of the Effects of Ground-Water Withdrawals*, U.S. Geological Survey, Water-Resources Investigations Report 99-4070, 1999.
[2] *Geohydrology and Numerical Simulation of the Ground-Water Flow System of Kona, Island of Hawaii*, U.S. Geological Survey, Water-Resources Investigations Report 99-4073, 1999.
[3] Estimated salinity in parts per thousand using general relationship between chloride concentration and salinity, 20,000 ppm chloride = 100% salinity of seawater = 35 ppt salinity (Source: Glenn Bauer, State Department of Land and Natural Resources, Commission on Water Resource Management, April 20, 2000).
[4] Tom Nance Water Resource Engineering. *Potential Impact on Water Resources of Phases III and IV of the Kaloko Industrial Park in North Kona, Hawaii*. July 2000

Notes: *Reflects more recent data from Source 1.
**Estimated salinity in parts per thousand, from data presented in Source 1 as a percentage of seawater salinity, using relationship described in Source 3.
ND = No data available.
*[4] All data for these wells is as shown in Source 4.

The brackish basal lens is too saline and does not have sufficient flux to sustain significant irrigation use. However, it does have a role in supporting the biological communities in the anchialine pools and fishponds in the Kaloko-Honokohau National Historical Park which are directly downgradient of the Petition Area.

Impacts and Mitigation Measures

Four aspects of the proposed development have the potential to impact ground-water resources:

- Supplying potable water to the project from wells located in the high level aquifer directly inland will decrease the recharge to the basal lens.
- Disposal of wastewater in individual onsite systems such as septic tanks and leach fields will create a nutrient-rich source of local recharge to the basal lens.
- Collection of surface runoff from impervious surfaces and its disposal in dry wells and seepage pits will create a source of local recharge with potential water quality consequences.
- Percolation of excess landscape irrigation and other miscellaneous outdoor uses of water are another source of local recharge with the potential to impact ground-water chemistry.

The potential impact of the project on ground-water flow rate and chemistry was determined using results of numerical modeling of ground water done by the U.S. Geological Survey, an analysis of the County's disposal of treated effluent from the Kealakehe Wastewater Treatment Plant (WWTP) in a pit upgradient of Honokohau Harbor, and laboratory analyses of ground-water chemistry in samples from accessible wells in the general vicinity.

No significant impacts on ground water are anticipated as a result of the construction and operation of the proposed project, with the incorporation of proposed mitigation measures.

Within the northern half of the National Park, the ground-water flow rate would be increased in the range of 7 to 10 percent. Such a change is within the seasonal and year-to-year variability of ground water. It is unlikely to result in observable changes of water level in the anchialine pools or Kaloko Pond.

Salinity of the ground water in this same area would be decreased by 6 to 8 percent. This change is also within the range of natural variability and therefore not likely to be observable.

Levels of nitrogen (as nitrate and total nitrogen) would be increased in the range of 9 to 17 percent. The higher end of this range is greater than the seasonal and year-to-year variability in ground water.

Phosphorus (as phosphate and total phosphorus) would be increased by the greatest amount, in the range of 16 to 26 percent. This change would also be greater than the natural variability of ground water.

The potential impacts to biological communities in the anchialine ponds, fishpond, and the marine environment, including cumulative impacts, are discussed in Section 3.6.

Short-term construction activities associated with the proposed project are not likely to introduce, nor release from the soil, any materials which could adversely affect ground water. Construction permit requirements, in particular, the NPDES permit, are expected to limit the area of excavation at any one time and require erosion-control, dust-control and other best management practices to minimize the off-site transport of excavated materials.

Long-term operations of light industrial and commercial activities could potentially impact ground-water quality. The proposed drainage system consists of drain inlets and dry wells at selected areas along the project roadways. Within the individual lots, dry wells are also expected to be used as part of the development of light industrial and commercial facilities. To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, individual lot owners will be required to develop storm drainage systems that employ filtration or infiltration methods prior to discharge. Flow-through based treatment from such methods as vegetated filters, grass swales, other media filters, and infiltration will be required and imposed on the owners and operators of the industrial-commercial lots.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

On-site wastewater disposal systems such as septic tanks, leach fields, and individual wastewater systems are planned to service commercial-industrial developments until such time that the municipal sewer system is extended north to the Kaloko area. Based on discussions with the County of Hawaii Department of Public Works (Personal Communication, July 2000), planning is being initiated for the extension of service north from the Kealakehe WWTP. The anticipated timeframe for sewer improvements is five to 10 years, at which time Kaloko Industrial Park developments would be required to connect to the system. Provisions will be made in the development to provide sewer lines within the project roadways to enable such connection to the municipal system once it becomes available. This will eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

Cumulative Impacts and Mitigation Measures: The Kaloko Industrial Park, Phases III and IV, is one of several existing and planned commercial-industrial developments upgradient of the Kaloko-Honokohau National Historical Park. Entitlements are currently being pursued for the Kaloko-Honokohau Business Park to the south and build-out of the Honokohau Business Park will continue. Beyond these near-term projects, other urbanization in the area from Kailua Town to Kona International Airport at Keahole will ultimately occur, some of which will impact ground water flowing through the National Park. Using a series of conservative assumptions regarding these developments, the cumulative impact of these projects on ground water flowing through the entire width of the National Park was computed.

These calculations indicate a 7 percent decrease in ground-water flow rate, with a 10 percent increase in salinity. Both changes are within the range of the natural variability of ground water. Nitrogen levels would be expected to increase by 45 to 50 percent, which is a large increase over the present levels which are already relatively high. Similarly, phosphate would be expected to increase by 30 to 45 percent.

3.6 Marine and Pond Environments

An assessment of the marine and pond environments in the vicinity of the Petition Area was conducted by Marine Research Consultants in July 2000 to evaluate the potential impacts of the proposed project on brackish ponds and near-shore environments makai of Kaloko Industrial Park. The assessment of marine and pond environments is included in Appendix B and is summarized below. The assessment incorporates the results of the water resource assessment by Tom Nance Water Resource Engineering (Appendix A).

The assessment provides the information to make valid estimates of the potential for impacts to the marine and pond environments at Kaloko-Honokohau National Historical Park, as well as the Natural Energy Laboratory of Hawaii Authority (NELHA), from development of the Kaloko Industrial Park, Phases III and IV, and from future developments in the area. The study provides the basis to understand the processes that are operating in the existing pond-ocean system, and to specifically address the concerns raised in the planning process.

The assessment focused on the existing conditions observable in marine environments within the Kaloko-Honokohau National Historical Park, located immediately west of the Petition Area on the makai side of Queen Kaahumanu Highway. More than half of the area of the 1,160-acre park is comprised of ocean waters and contained within its boundaries are two large brackish fishponds, Kaloko and Aimakapa Ponds.

3.6.1 Pond Environment

The National Parks and Recreation Act of 1978 provided for the establishment of the Kaloko-Honokohau National Historical Park to preserve the integrity of the many archaeological features and fishponds found in the area. Kaloko Pond and Aimakapa Pond are large brackish bodies of water separated from the ocean by a basaltic rock wall (Kaloko Pond) and a sand beach berm (Aimakapa Pond) (see Figure 3-2). Kaloko Pond is approximately 11 acres in size; Aimakapa Pond is approximately 15 acres in size. At the present time, the rock wall at Kaloko Pond is being reconstructed, with the new wall incorporating channels which afford a direct connection between the pond and ocean. Just north of Honokohau Harbor, the Aiopio fish trap is an embayment approximately 1.7 acres in size with four rectangular walled enclosures which were probably used as holding pens for netted fish.

Kaloko and Aimakapa Ponds function in a similar manner to smaller anchialine ponds that can be found along the west coast of Hawaii Island. By definition, anchialine ponds are surface exposures of the water table with no direct connection to the ocean. These ponds contain brackish water that is a mixture of seaward flowing ground water and landward flowing seawater. Anchialine ponds in their early successional stages usually have sediment-free bottoms which allow for relatively rapid exchange of water. In the later stages

of the anchialine pond cycle, infilling by sediment reduces the rate of water exchange and the balance between production and consumption is lost. Ultimately, during the final stages, infilling is completed and the pond becomes a wetland area.

Kaloko Pond is not technically an anchialine pond because it contains direct connections to the ocean. Kaloko Pond is separated from the ocean by a highly permeable rock wall that was constructed with channels built into the structure to promote the exchange of water between the pond and ocean. Water in the pond is near oceanic in salinity, indicating that ground water comprises a very small component of the pond makeup. If ongoing construction of the new rock wall separating the pond from the ocean includes more open channels, it is likely that salinity in the pond will increase even further, lowering the contribution from ground water.

Aimakapa Pond can be considered an anchialine pond because it is sealed from direct exchange with the ocean by a continuous sand berm approximately 20 meters wide. The sand berm has a very low permeability, with a substantial fraction of the water in the pond comprised of ground water. Water within this enclosed basin tends to be subject to a long residence time. The chemical composition of Aimakapa Pond describes levels of inorganic nutrients that are nearly depleted, and high levels of organic nutrients. The organic nutrients are metabolic byproducts of plants living in pond waters. The slow rate of exchange between ocean and pond water also contributes to the buildup of these nutrients.

While both ponds contain sediment bottoms, bottom composition of Aimakapa Pond consists of soft flocculent silty mud that is penetrable for at least one meter. Bottom composition of Kaloko Pond is a hard sand/mud mixture that is largely covered with marine algae. Sand/mud bottoms in both ponds were distinctly anaerobic beneath the surface layer as evidenced by the strong odor of H_2S when the bottom was disturbed.

A 1997 biological survey found 64 anchialine pools/pool complexes in the Kaloko-Honokohau National Historical Park boundaries (Brock and Kam). In summary, the biological resources of most anchialine pools in the Park have been impacted by the introduction of alien fish species and, in a few cases, impacted by collecting for human consumption. There was no evidence of water pollution from human sources using the limits of detection available to the study. In 21 of these ponds (33 percent), the *opae'ula (Halocaridina rubra)* was present, a small red shrimp species usually indicative of biologically undisturbed anchialine systems in Hawaii. But, in only 10 (16percent) of these ponds was *Halocaridina rubra* consistently present during daylight hours. Thus, 67 percent of the anchialine pools inventoried in the study did not have the usual array of anchialine hypogeal species. Obvious deterrents include predatory fish, both native and nonnative. Twenty-eight (44 percent) of the pools contained alien fish species, mostly guppies (*Poecilia reticulata*) that lowered the value of this habitat for the suite of important hypogeal species.

A group of pools clustered around the milo thicket in a mauka-makai depression near the jeep access road have a unique mix of native marine species along with several anchialine species. Some of these more normally marine species such as the yellowstripe goatfish or weke (*Mulloides flavolineatus*) have successfully survived in reduced salinities. Despite the presence of fish, these ponds have retained several unique anchialine features including the limpets or hihiwai-kai (*Theodoxus cariosus* and *T. neglectus*) and glass shrimp or 'opae (*Palaemon debilis*).

3.6.2 Marine Environment

Marine community structure can be defined as the abundance, diversity, and distribution of benthos (bottom dwelling organisms), including stony and soft corals, marine plants (algae), motile benthos such as echinoderms, pelagic species such as reef fish, and federally protected species.

There are three predominant regions of the marine habitat. Beginning at the shoreline and moving seaward, the shallowest zone is comprised of a seaward extension of the basaltic shoreline bench. *Pocillopora meandrina*, a sturdy hemispherical coral, is the dominant colonizer of the nearshore area. This species is able to flourish in areas that are physically too harsh for most other species, particularly due to wave stress. Beyond the nearshore bench, bottom topography consists of a reef platform typical of West Hawaii. As wave stress in this region is less than in shallower areas, the area provides an ideal locale for colonization by attached benthos, particularly reef corals, and generally the widest assortment of species and growth forms are encountered in this region. The predominant coral in the area is *Porites lobata*. In the deep slope zone starting beyond 50 feet in depth, substratum changes to generally unconsolidated sand and rubble. The predominant coral cover in the slope zone is typically interconnected mats of finger coral *Porites compressa*.

The predominant taxon of macrobenthos (bottom-dwellers) throughout the reef zones off of Kaloko Pond are Scleractinian (*reef-building*) *corals*. In total, twelve species of "stony" corals, and two "soft" corals were observed throughout the region of study. The dominant species in the all of the zones off Kaloko-Aimakapa was *Porites lobata*.

Other benthic macroinvertebrates are dominated by sea urchins (Class Echinoidea), sea cucumbers (Holothurians), and sponges. The reef fish community off Kaloko-Aimakapa is typical of that found along most of the Kona coast, with surgeonfish (*Acanthuridae*) the most abundant fish family. Other fish commonly observed included parrotfish (uhu, *Scarus spp.*), planktivorous damselfish, potters angelfish (*Centropyge potteri*), rudderfish (nenue, *Kyphosus bigibbus*), and unicornfish (mostly umaumalei, *Naso lituratus*).

Several species of marine animals that occur off the Kona Coast have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) occurs commonly along the Kona Coast, and is known to feed on selected species of macroalgae. The area off Aimakapa Pond appears to be a preferred habitat for green sea turtles. The endangered hawksbill turtle (*Eretmochelys imbricata*) is known infrequently from waters off the Kona Coast, and humpback whales (*Megaptera novaeangliae*) are known to winter in the Hawaiian Islands from December to April.

3.6.3 Impacts to Ponds and Marine Environment

Kaloko Industrial Park, Phases III and IV, does not include any plans for alteration of the shoreline or offshore areas. As such, there is no potential for blasting or excavation that might affect the behavior of endangered and protected marine species such as whales or turtles. Potential impacts to the marine environment can only be considered from activities on land that may result in delivery of materials to the ocean through infiltration to ground water, changes in surface runoff, and wind transport. The project may have an impact on

ground water as a result of: 1) disposal of wastewater generated on-site; 2) disposal of storm water runoff; and 3) percolating water from landscape irrigation.

The potential for impact to marine and pond communities as a result of the proposed development appears to be minimal. The two large fishponds within the park are similar in that thick sediment lining the floors of the ponds effectively plugs the ponds from the free exchange of ground water. As a result, the major flow of ground water appears to be around the ponds rather than through them. Water in Kaloko Pond is presently almost completely seawater with little vertical or horizontal stratification. Aimakapa Pond contains a greater percentage of ground water than Kaloko and is also unstratified. The lack of stratification, along with substantially damped tidal oscillations, indicates a reduced rate of ground-water input compared to what would occur without the sediment plugs. Inorganic nutrients entering the pond from ground water-input are removed from the water column by plant uptake.

There is little potential for increased sedimentation and runoff affecting the ponds and marine environment. The climate of the Kaloko area is one of the driest in the Hawaiian Islands, with infrequent surface runoff from storms. The basaltic composition of the land surface is highly porous and is capable of absorbing rainfall with little or no surface runoff.

Within the marine environment, the nearshore area contains locally high regions of cover of calcareous sands of marine origin. Because of the existence of natural sands, and the normally turbulent conditions which continually resuspend natural sediment, biotic community structure is presently adapted to extremes in sediment stress from natural conditions. Organisms that do occur in the region are capable of withstanding the stress associated with large natural sediment loads, such that any additional input from land activities would probably not have the potential to accumulate to the point where organisms could be buried.

Water quality sampling of the two fishponds indicate that there is no build-up of nutrients within the ponds or nearshore ocean resulting from ground-water subsidies that may be a result of human activities. With the proposed development, predicted potential increases in the levels of nitrogen (9 to 17 percent) and phosphorus (16 to 26 percent) are not likely to result in changes to the ponds or nearshore ocean. Healthy anchialine ponds are not nutrient limited, and already contain an excess of nutrients that are not used within the biogeochemical cycles within the ponds. As such, as long as there are no changes to the physical structure of healthy anchialine ponds (e.g., infilling), or changes to the balance of native biotic assemblages (e.g., introduction of alien species), an increase in nutrient concentrations in ground water entering the ponds would have no effect. Kaloko Pond consists primarily of seawater such that the nutrient increases are within the natural variability. Aimakapa Pond has a greater proportion of ground water, thus nitrogen levels could increase within the pond by 11 percent. However, due to restricted circulation, Aimakapa Pond already has large excesses or organic nutrients. As a result, input of more inorganic nutrients to the low-exchange pond should result in no further changes.

It is also unlikely that there would be any effect to the nearshore marine environment as a result of the increase in nutrient concentrations in ground water. A 1992 study that modeled the four-year nutrient input to the ocean down gradient of two golf courses in West Hawaii found that since nutrients from fertilizer were retained in the surface layer of the receiving

body, in this case, Keauhou Bay, there was no exposure to benthos. These results indicated that even with long-term input of extremely high nutrient subsidies, there are situations where there are no negative effects to the receiving environment. Keauhou Bay is an embayment with restricted circulation relative to open coastal shorelines. Thus, a similar lack of impact would be expected in the Kaloko-Honokohau region where circulation is not restricted and nutrient subsidies would be less than have occurred at Keauhou.

3.6.4 Effects of Toxic Materials and Mitigation Measures

In a 1999 study entitled *Ground Water Resources in Kaloko-Honokohau National Historical Park* (U.S.G.S. Report 99-4070), testing for 151 trace metals and organic contaminates detected chromium, copper, and one semi-volatile organic compound (phenol) in the three monitoring wells within the Park. Chromium and copper were also detected in a well up gradient of the commercial area mauka of the Park. As a result, phenol was the only compound that could be assumed to be delivered to ground water from human activities at the existing commercial developments. Regardless of the low number of potentially toxic materials that have been detected within the ground water, there are concerns regarding increased contamination as a result of future development.

The analyses performed by Marine Research Consultants were directed at understanding the effects to aquatic systems through alteration in ground-water nutrients and salinity that might arise from the proposed project. These analyses were based on the premise that nutrients and salinity are natural components of the systems and that existing communities utilize these materials within ongoing biogeochemical cycling. As natural components of the system, changes in concentrations may or may not have an effect, depending on a variety of circumstances.

Toxic substances, such as the contaminants tested for in the 1999 study discussed above, are not part of the natural composition of the ponds and ocean. Thus, it is not possible to predict the effects of varying concentrations of these materials on natural systems, as is the case for nutrients. Rather, the implementation of effective "best management practices" (BMPs) and engineering solutions incorporated into the planning, construction, and operation of the proposed project should be the primary consideration for the mitigation of potential impacts from toxic materials. BMPs should provide methods to eliminate any potential impacts to ground water and pond and marine biota.

Short-term construction activities associated with the proposed project are not likely to introduce, nor release from the soil, any materials which could adversely affect ground water. Construction permit requirements, in particular, the NPDES permit, are expected to limit the area of excavation at any one time and require erosion-control, dust-control and other best management practices to minimize the off-site transport of excavated materials.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, individual lot owners will be required to address storm water quality through the development of storm drainage systems that employ filtration or infiltration methods prior to discharge. Flow-through based treatment from such methods as vegetated filters, grass swales, other media filters, and infiltration will be required and imposed on the owners and operators of the industrial-commercial lots.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

On-site wastewater disposal systems such as septic tanks, leach fields, and individual wastewater systems are initially required to service commercial-industrial developments until such time that the municipal sewer system is extended north to the Kaloko area. Provisions will be made in the development to provide sewer lines to enable such connection to the municipal system once it becomes available. This will eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

3.6.5 Impacts to NELH and HOST Park

A concern that has been raised regarding development in the Kaloko-Honokohau region is the effect to water chemistry at the Natural Energy Laboratory of Hawaii (NELH) and Hawaii Ocean Science and Technology (HOST) Park mariculture facilities located at Keahole Point, approximately 3.5 miles north of the Petition Area. These concerns are apparently based on suppositions regarding upwelling and current-driven transport of materials emanating from the Petition Area to the Keahole area. The concern is without merit for several reasons. First, the premise on which the NELH concept is based is to use the high nutrient content in cold deep seawater from below the photic zone to stimulate production in mariculture ventures. The close proximity of land to deep water afforded by the steeply sloping nearshore topography off Keahole Point makes this area uniquely suited as a site for the facility. Most of the water used at NELH is pumped from a depth of 1,995 feet, far below the thermocline which restricts exchange between deep and surface waters. Deep water that might be upwelled to the surface that could be influenced by the project could not be returned to the depth of intake. Hence, there is virtually no chance for contact between any water that might be influenced by activities on land and intake of cold water at NELH.

Secondly, while it is extremely unlikely that any increases in nutrients in coastal seawater would be detectable 3.5 miles away from the Petition Area, it must be recognized that the purpose of the NELH facility is to utilize high nutrient water for productive purposes. Hence, any increased nutrient concentrations at NELH cannot be considered a negative effect. NELH and HOST Park tenants discharge all of their used nutrient-rich water into on-site trenches which percolates to the water table and eventually to the nearshore. Hence, while extremely remote, any effects from nutrient subsidies that may result from the proposed project are overshadowed by the standard operation of the NELH facilities.

3.6.6 Cumulative Impacts and Mitigation Measures

The Kaloko Industrial Park, Phases III & IV, is one of several existing and planned commercial-industrial developments upgradient of the Kaloko-Honokohau National Historical Park. Entitlements are currently being pursued for the Kaloko-Honokohau Business Park to the south and build-out of the Honokohau Business Park will continue. Beyond these near-term projects, other urbanization in the area from Kailua Town to Kona International Airport at Keahole will ultimately occur, some of which will impact ground water flowing through the

National Park. Using a series of conservative assumptions regarding these developments, the cumulative impact of these projects on ground water flowing through the entire width of the National Park was computed.

These calculations indicate a 7 percent decrease in ground-water flow rate, with a 10 percent increase in salinity. Both changes are within the range of the natural variability of ground water. Nitrogen levels would be expected to increase by 45 to 50 percent, which is a large increase over the present levels which are already relatively high. Similarly, phosphate would be expected to increase by 30 to 45 percent.

Estimates of cumulative changes to ground water from the total assemblage of existing and proposed projects in the greater Kaloko area do not appear to have the potential for alterations to pond or marine habitats. Thick sediment lining the floors of the two large fishponds effectively plugs the ponds from free exchange of ground water. Thus the major flow of ground water appears to be around the ponds rather than through them. The natural progression of pond development (primarily a reduction in circulation through sediment deposition) demonstrates the functional aspects of the ponds, and will largely negate any effects of changes in nutrient concentrations. The predominantly seawater composition and perhaps increased exchange with the ocean should mitigate any ground-water effects to Kaloko Pond. The restricted circulation in the enclosed basin of Aimakapa Pond has resulted in a present condition that is already beyond the level of impact by nutrient enrichment. Aquatic and marine environments are routinely subjected to natural stresses that can be much more destructive than the changes that may result from any development activity. Tolerance to such human-induced changes appears to already be a part of the physiological range of the marine community.

Mitigation measures through Best Management Practices and engineering solutions should be the primary considerations for eliminating potential impacts from toxic materials to pond and marine biota.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project. A similar pollution prevention plan with recommended Best Management Practices is also being considered for the adjacent proposed Kaloko-Honokohau Business Park.

3.7 Flood Hazard

The Flood Insurance Rate Map (FIRM) of the U.S. Federal Emergency Management Agency (FEMA) identifies the Petition Area as lying within Zone X, areas determined to be outside the 500-year flood plain.

The Petition Area is not subject to coastal hazards such as tsunami inundation due to its elevation and distance from the shore. The site is also not subject to floods resulting from heavy rainstorms due to the highly porous nature of the existing lava substrate.

Impacts and Mitigation Measures

Construction and operation of the proposed project are not anticipated to result in flooding of the Petition Area or lower elevation properties. Due to the undeveloped nature of the Petition Area, development of the proposed project will increase the impervious area of the site. The proposed drainage improvements described in Section 3.17.3 will minimize any potential flood hazard.

Cumulative Impacts and Mitigation Measures: Due to the highly porous lava terrain, development of the proposed projects in the nearby region is not anticipated to result in flooding of lower elevation properties. Proposed drainage improvements for the respective projects will minimize any potential flood hazard.

3.8 Earthquake/Seismic Hazards

The Island of Hawaii is susceptible to seismic activities originating in fault zones under and adjacent to it. Two fault zones have been identified in the Kona region, the Kealakekua and Kaloko faults, both located in South Kona. The Hawaii County Code relating to the Uniform Building Code (1991 edition) was amended in July 1999 to upgrade the seismic zone for the Island of Hawaii from Zone 3 to Zone 4. The rating system is based on a scale of 1 to 4, with a rating of 4 having the highest risk associated with seismic activity. The Hawaii County Building Code requires that all new structures be designed to resist forces to seismic Zone 4 standards.

Impacts and Mitigation Measures

The occurrence of earthquakes or seismic activities would pose a risk to property and possibly life within the Petition Area depending upon the intensity of each event. The proposed structures in the Kaloko Industrial Park, Phases III and IV, will be designed and built to resist forces to seismic Zone 4 standards in accordance with the Hawaii County Building Code.

Cumulative Impacts and Mitigation Measures: In accordance with the Hawaii County Building Code, the proposed structures for the respective proposed projects in the nearby region would be designed and built to resist forces to seismic Zone 4 standards.

3.9 Lava Flow Hazards

According to the volcanic hazard zones map for the Island of Hawaii prepared by the U. S. Geological Survey, the Petition Area is in Zone 4. The zones are ranked from 1 through 9 based on the probability of coverage by lava flows, with Zone 1 being the highest hazard and Zone 9 being the lowest. The lava flow hazard for Zone 4 is attributed to Hualalai, one of three volcanoes which have been active in historic times on the Island of Hawaii. About 5 percent of the area within Zone 4 was covered by lava since 1800, and less than 15 percent of the area was covered by lava in the last 750 years. In this zone, frequency of eruptions is lower than on Kilauea and Mauna Loa and flows typically cover large areas.

Impacts and Mitigation Measures

Although the likelihood of eruption of the Hualalai volcano is more remote than that of the Kilauea and Mauna Loa volcanoes, the occurrence of lava flow hazards associated with such a natural disaster could potentially pose a risk to property within the Petition Area, depending on the intensity of the event and terrain features. As the Hawaii County Code relating to the Uniform Building Code does not address lava flows, any potential property damage within the Petition Area would be succumbed by the forces of nature. Measures to address potential risk to life could be devised by the individual businesses within the proposed Kaloko Industrial Park, Phases III and IV, such as developing emergency evacuation procedures.

Cumulative Impacts and Mitigation Measures: In the remote event of lava flow occurrence, any potential property damage within the proposed projects in the nearby region would be succumbed by the forces of nature. It would be incumbent upon the individual developments to devise emergency evacuation procedures for such a situation.

3.10 Natural Environment

3.10.1 Flora

A botanical survey of the Petition Area was conducted by Char & Associates in April 2000 to inventory the flora and determine the potential presence of any listed threatened or endangered, proposed, or candidate species, or species of concern. The botanical survey is included in Appendix C and is summarized below.

A total of 44 plant species were identified within the Petition Area. Of these plant species, 28 (64 percent) are introduced, one (2 percent) is originally of Polynesian introduction, and 15 (34 percent) are native. Of the native species, nine are indigenous (native to the Hawaiian Islands and elsewhere) and six are endemic (native only to the Hawaiian Islands).

Two vegetation types are predominant within the Petition Area. The older, more weathered pahoehoe lava flows which encompass about 75 percent of the Petition Area are predominantly vegetated with koa haole and fountain grass scrub vegetation. Scattered throughout this scrub vegetation are shrubs such as noni (*Morinda citrifolia*), maiapilo, Christmas berry, and naio. A few kiawe trees (*Prosopis pallida*) along with the shrub klu (*Acacia farnesiana*) are also scattered among the scrub vegetation. Within the shallow pockets of soil are found plants of *portulaca pilosa*, ʻuhaloa (*Waltheria indica*), hairy spurge (*Chamaesyce hirta*), Nata redtop grass, partridge pea (*Chamaecrista nictitans*), ʻilima (*Sida fallax*), and a thin layer of dried out mosses. Within a collapsed lava tube along the eastern boundary of the site is an ʻohe tree (*Reynoldsia sandwicensis*) and a few clumps of ʻala‘ala wai nui or the native lowland peperomia (*Peperomia blanda* variety *floribunda*).

The ʻa‘a lava flow is sparsely vegetated with most of the plants occurring along the margins of flow where it abuts the older pahoehoe flow. Native shrubs found on the ʻa‘a flow include maiapilo or native caper (*Capparis sandwichiana*), naio or false sandalwood (*Myoporum sandwicense*), alahe‘e (*Psydrax odorata*), and kolomona (*Senna gaudichaudii*). Other species include a lama tree (*Diospyros sandwicensis*) and huehue vines (*Cocculus*

orbiculatus) which are locally abundant in places. Introduced or alien plants include Christmas berry shrubs (*Schinus terebinthifolius*), fountain grass (*Pennisetum setaceum*), and hairy swordfern (*Nephrolepis multiflora*). An area within the southern portion of the site previously disturbed in conjunction with the adjacent quarry operation is also vegetated with Natal redtop grass (*Melinis repens*), koa haole (*Leucaena leucocephala*), and 'ohi'a trees (*Metrosideros polymorpha*).

Rare Plants: None of the plants found within the Petition Area during the survey is a listed threatened or endangered species protected by Federal and State Endangered Species Laws.

One candidate endangered species, the ko'oko'olau (*Bidens micrantha* subspecies *ctenophylla*) was found within the Petition Area. A member of the daisy family (Asteraceae), the *Bidens* is an erect, much-branching perennial herb, 3 to 6 feet tall. A total of four *Bidens* plants were found on the site; three on the 'a'a substrate and one on the pahoehoe substrate (see Figure 3-3). *Bidens* #1 (5 feet tall and healthy) is located approximately 20 feet from the Petition Area's east boundary, along the edge of the 'a'a lava flow. *Bidens* #2 (6 feet tall with half of its branches dead) is located near the southwest boundary on a low 'a'a ridge and is visible from Kamanu Street. *Bidens* #3 (3 feet tall and in very poor condition) is located in the northwest portion of the site on an 'a'a outcrop. *Bidens* #4 (6 feet tall and in excellent condition) is located near the Hina Lani Sreet boundary on paheohoe lava at about the 250-foot elevation.

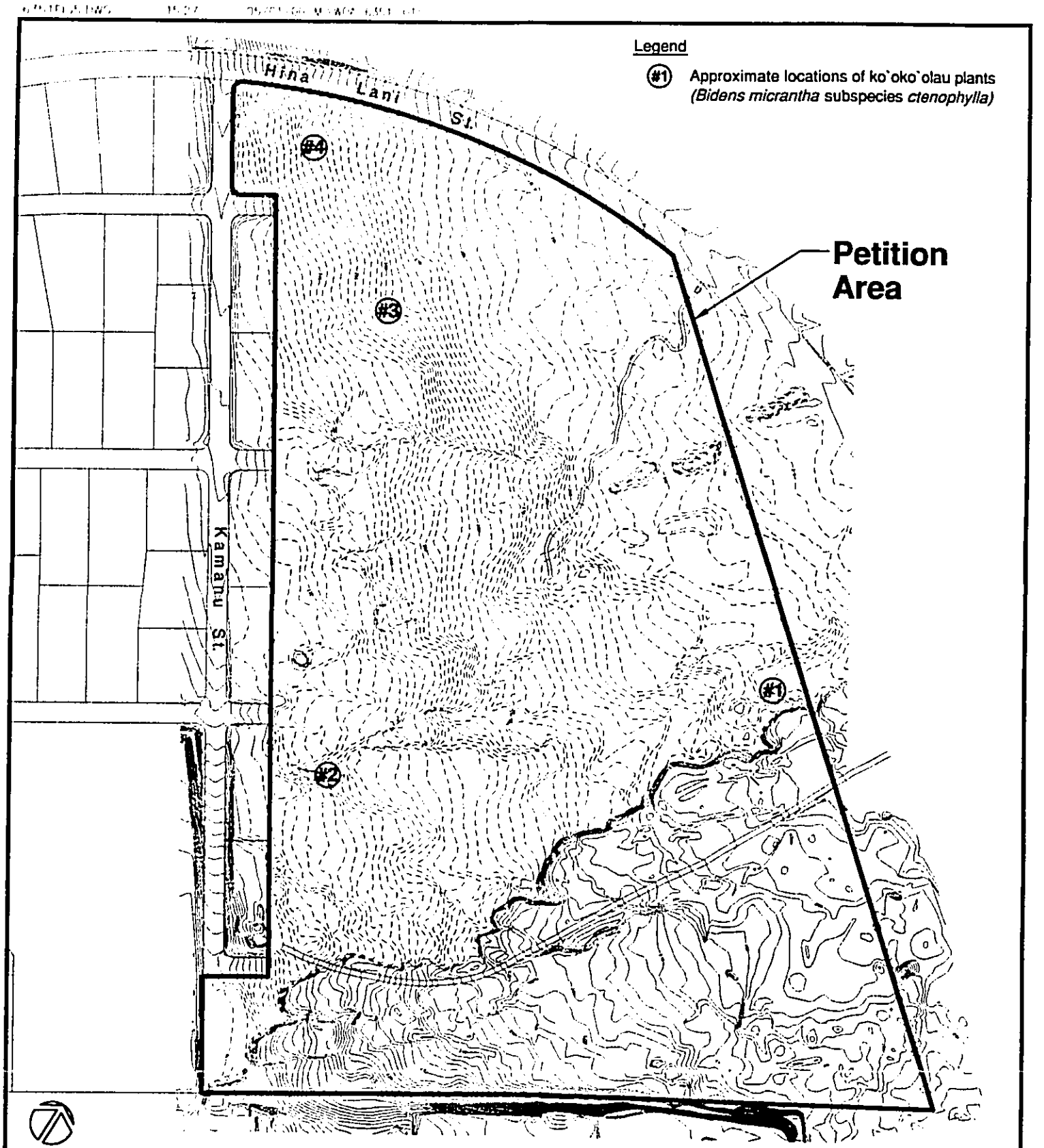
A candidate species is one which is being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service. Candidate species are not subject to the Federal and State Endangered Species Laws. It is anticipated that a candidate species will be listed as threatened or endangered sometime in the future.

The maiapilo or native caper plants (*Capparis sandwichiana*), of which there are at least two dozen within the Petition Area, is considered a species of concern by the U.S. Fish and Wildlife Service (1999). Species of concern are plants for which there is a need for more biological and/or taxonomic information regarding whether a species might require conservation actions in the future. The *Capparis* is not considered a high priority item as the plants are widespread throughout the Hawaiian Islands.

Impacts and Mitigation Measures

No significant impacts on flora within the Petition Area are anticipated from the construction and operation of the proposed project.

Mitigation measures will be undertaken for the *Bidens*, a plant which is a candidate endangered species. A buffer zone with a minimum width of 30 feet will be established in the immediate vicinity of the *Bidens* #1 plant along the Petition Area's eastern boundary.



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KALOKO INDUSTRIAL PARK, PHASES III & IV

LOCATIONS OF *BIDENS* SPECIES

FIGURE 3-3

Seeds and cuttings will be propagated from the other three Bidens located within the downslope (makai) portion of the Petition Area. One possibility is to contract the Amy B.H. Greenwell Ethnobotanical Garden for the propagation and establishment of the plants at its garden in Captain Cook, Kona as the garden specializes in native dry land species. Although the Bidens would be removed from the Petition Area, its genetic material would still be preserved.

The individual landowners/tenants of the proposed development will be encouraged to use native plants in the landscaping of their respective lots.

Cumulative Impacts and Mitigation Measures: No significant cumulative impacts on botanical resources are anticipated from the development of the proposed projects in the nearby region. The vegetation within the proposed project sites is predominantly of mixed shrubland vegetation types. The transformation of flora in the nearby region would likely result in an increased amount of introduced plant species commonly used for landscaping. The use of native plants found in the region for landscaping of the proposed developments would contribute toward mitigating the loss of native flora through site clearing activities. For the Urban Expansion State Lands, more intensive botanical surveys are recommended to be conducted; and, if areas with endangered or rare plants are found, it may be necessary and/or desirable to establish a nature study park (or parks) around these areas (*Urban Expansion State Lands FEIS, July 1993*).

According to a botanical survey of the Kaloko-Honokohau Business Park site, there are no threatened and endangered species or species of concern within the site. The site is predominantly vegetated with introduced or alien species such as koa haole, fountain grass, Christmas berry, and kiawe. (Char, April 2000). The native plants found on both the Petition Area and adjacent Business Park site can also be found in similar lowland, dry environments in the West Hawaii region and on most of the main Hawaiian Islands. Figure 3-4 depicts the botanical resources within the Petition Area and adjacent Business Park site.

Similar to the establishment of a buffer zone with a minimum width of 30 feet in the immediate vicinity of the *Bidens* #1 plant along the Petition Area's eastern boundary, the botanical survey for the adjacent Business Park recommends the establishment of a buffer zone at least 50 feet wide along the site's eastern (mauka) boundary and northeast corner.

Development of the two projects would likely result in an increased amount of native species used for landscaping purposes as compared to the current proliferation of introduced species within the sites.

3.10.2 Fauna

A faunal survey of the Petition Area was conducted by Rana Productions, Ltd. in March 2000 to determine the presence of any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on or within the immediate vicinity of the Petition Area, and to assess the probability of usage of the site by listed species based on the existing habitat. The faunal survey is included in Appendix D and is summarized below.

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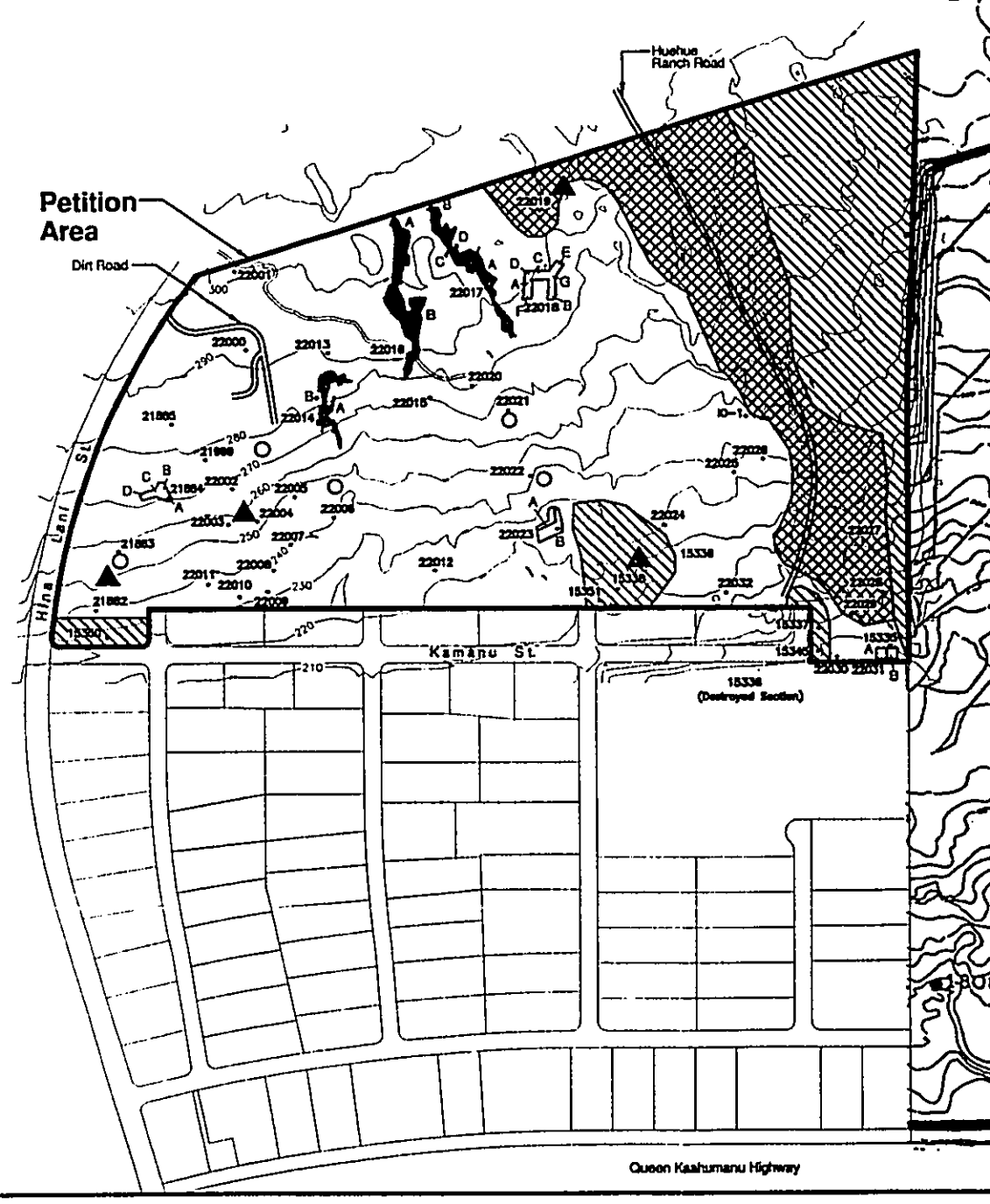
Legend

- A`a Flow
- Bulldozed Area
- ○ Non-Cultural Cave
- ▲ Approximate locations of ko`oko`olau plants *(Bidens micrantha* subspecies *ctenophylla)*

Archaeological Sites Kaloko-Honokohau Business Park	
Site No.	*Formal Type*
18105	Wall
18106	Platform
18107	Enclosure
18108	Bluff, modified
18109	Enclosure, remnant
18110	Enclosure, circular
18111	Complex (lava tube)
18112	Complex
18113	Platform
18114	Ahu
18116	Complex (lava tube)
18117	Lava tube
18118	Outcrop, modified
18119	Enclosure, rectangle
18120	Lava blister
18121	Complex
18122	Trail, kerbstone
18123	Sink, modified
18124	Lava tube
18125	Lava tube
18126	Enclosure, rectangle
18127	Complex
18128	Rock shelter
18130	Outcrop, modified
18131	Lava tube
18132	Lava tube
18133	Trail, stepping stone
18134	Lava tube
18139	Pavement
18142	Outcrop, modified
18186	Wall segment
18188	Lava tube
18189	Complex
18192	Enclosure, c-shaped
18193	Outcrop, modified
18194	Complex
18195	Terrace
18197	Lava tube
18356	Wall segments

Not to Scale



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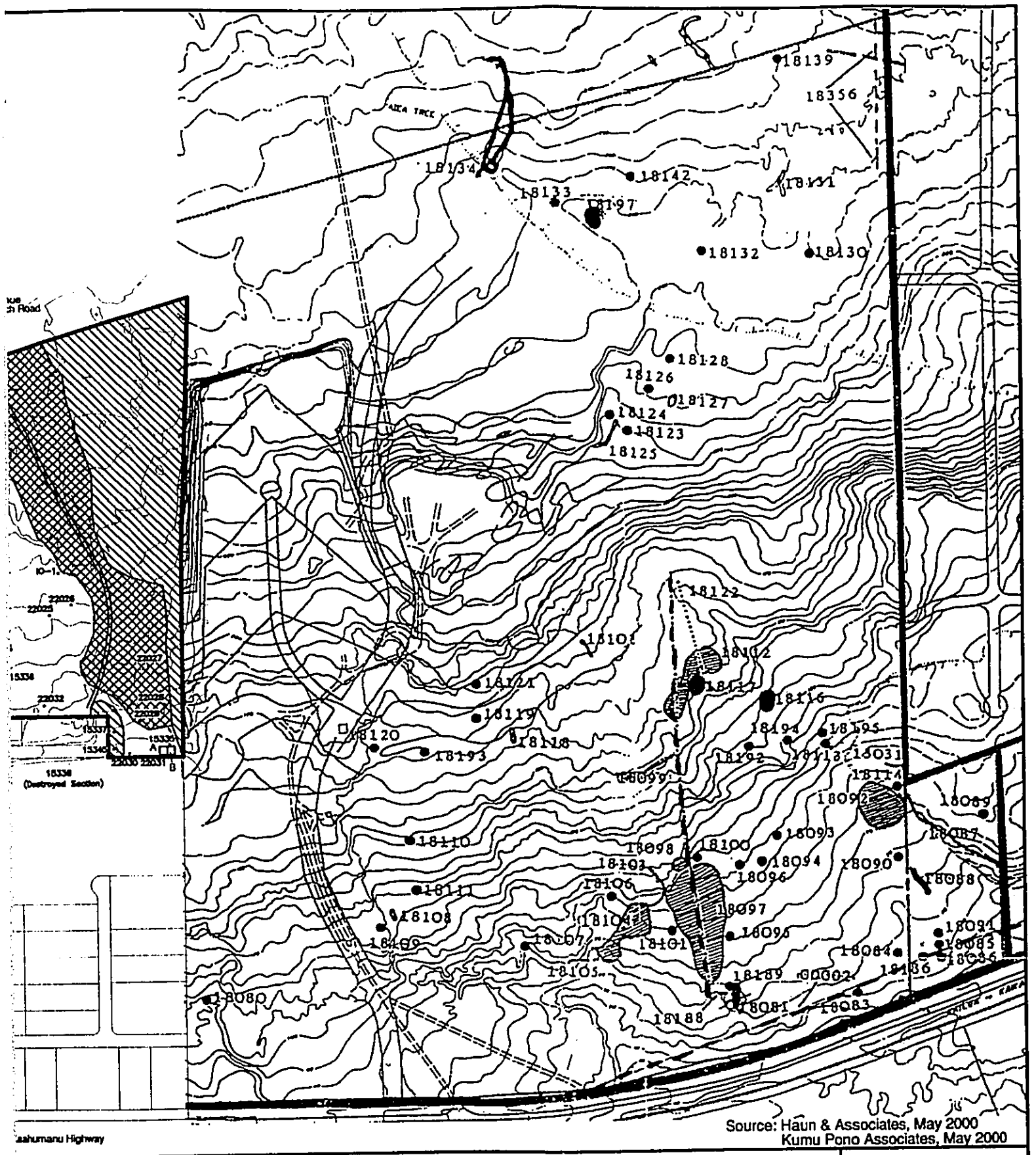
KALOKO LIGHT INDUSTRIAL SUBDIVISION PHASES III

Flora & Archaeological Resources of
Petition Area & Kaloko - Honokohau Business



SUBDIVISION PHASES III & IV

gical Resources of
lonokohau Business Park

FIGURE
3-4

No native, endangered or threatened avian or mammalian species were detected within the Petition Area during the survey.

A total of 16 avian species representing 10 families were detected during the survey, including: Grey Francolin (*Francolinus pondicerianus*), Black Francolin (*Francolinus francolinus*), Erckel's Francolin (*Francolinus erckelii*), Chicken (*Gallus gallus*), Spotted Dove (*Streptopeia chinensis*), Zebra Dove (*Geopelia striata*), Northern Mockingbird (*Mimus polyglottus*), Common Myna (*Acridotheres tristis*), Japanese White-eye (*Zosterops japonica*), Sky Lark (*Alauda.a. arvensis*), House Sparrow (*Passer domesticus*), Warbling Silverbill (*Lonchura malabarica*), Yellow-fronted Canary (*Serinus mazambicus*), House Finch (*Carpodacus m. mexicanus*), Yellow-billed Cardinal (*paroaria capitata*), and Northern Cardinal (*Cardinalis cardinalis*). All of the avian species detected are common alien species found throughout the leeward lowland areas on the Island of Hawaii.

Many of the migratory and extralimital avian species from Hawaii have been recorded from coastal areas in North Kona. The more common of these include the Pacific Golden Plover (*Pluvialis fulva*), Ruddy Turnstone (*Arenaria interpres*) and Wandering Tattler (*Heteroscelus incanus*). There is also the possibility that small numbers of the endangered endemic Hawaiian subspecies of the Dark-rumped Petrel (*Pterodroma phaeophygia sandwichensis*) overfly the Petition Area between May and October, although the site does not provide suitable nesting habitat for this species.

There are three native water bird species currently breeding within the Kaloko-Honokohau National Historical Park. These include the Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*) and Black-crowned Night Heron (*Nycticorax nycticorax hoactli*) (David, 1994). The Hawaiian Stilt and Hawaiian Coot are endemic species (native and unique to Hawaii) and are listed as endangered species under both the Federal and State Endangered Species Acts (DLNR 1986, Federal Register 1999). The Black-crowned Night Heron is an indigenous (native to Hawaii, but also found elsewhere) species. There is also seasonal usage of habitat within the National Park by a number of migratory shorebirds, including the indigenous Pacific Golden Plover (*Pluvialis fulva*).

The current usage of Aimakapa Pond by the aforementioned species has varied considerably over the past 12 years (see Table 3-2). Prior to the construction of the Cyanotech aquaculture facilities located adjacent to the Kona International Airport at Keahole and the Kealakehe Wastewater Treatment Plant located to the south of the Petition Area, the bulk of the resident water birds in the North Kona District were concentrated within the Kaloko-Honokohau National Historical Park. Since the construction of these two wetland features, the majority of water birds present in the District have moved to one or the other of these man-made facilities. Populations of the three non-migratory species have also increased considerably during this period (see Table 3-2).

The intertidal zone and Aimakapa Pond located within the Kaloko-Honokohau National Historical Park have been censused annually as part of the National Audobon Society's North Kona Christmas Bird Count circle since 1988. Following the opening of the Kealakehe Wastewater Treatment Plant, this facility has also been included within the Christmas Bird Count circle on an annual basis. (David, 2000).

Table 3-2 North Kona Christmas Bird Count 1988 to 1999		
Species	**Low Count**	**High Count**
Hawaiian Stilt	4	190
Hawaiian Coot	4	164
Black-crowned Night Heron	1	45
Pacific Golden Plover	11	179
Source: Data compiled from (David 1989, 1990, 1991, 1992, 1993, NAS 2000)		

The only mammalian species observed during the survey was the Indian mongoose (*Herpestes a. auropunctatus*). Skeletal remains of a feral pig (*Sus.s. scrofa*) and domestic cattle (*Bos taurus*) were encountered within the Petition Area, as well as scat of domestic dog (*Canis f. familiaris*), cat (*Felis catus*), donkey (*Equus a. asinus*), and feral goat (*Capra h. hircus*) in numerous areas of the site. Although no rodents were detected during the survey, it is likely that roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*), and Polynesian rats (*Rattus exulans hawaiiensis*) utilize the site.

Although the federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was not detected during the survey, it is likely that they overfly the Petition Area upon occasion, as they have been observed in numerous lowland areas in North Kona on a seasonal basis. The federally endangered Hawaiian hawk (*Buteo solitarus*) is also known to occur in the general vicinity and may occur intermittently on the Petition Area as they transit through the area.

Impacts and Mitigation Measures

No significant impacts on fauna within the Petition Area are anticipated from the construction and operation of the proposed project.

The faunal survey indicated a low diversity and density of avian species detected within the Petition Area which is attributable in part to the drought conditions which have plagued the region in recent years. The survey further indicated that the habitat found within the Petition Area does not provide the resources necessary for the sustenance or nesting of native avian species. In a wetter year, it is expected that additional avian alien species would utilize the existing habitat within the Petition Area. The incorporation of landscaping within the proposed development will likely attract many of the common alien avian species currently found in the North Kona area. The development of parking lots and other open areas within the proposed project are also likely to attract a number of migratory shorebirds annually between September and May.

Given the large fluctuations in the population of the Hawaiian Stilt, Hawaiian Coot, Black-crowned Night Heron, and Pacific Golden Plover, it is suggested that monitoring of these populations will not provide statistically valid data on water quality over any reasonable period of time (David, 2000).

The potential impact that the proposed development poses to the endangered Dark-rumped Petrels is the increased threat of the downing of birds disoriented by exterior lighting associated with the project. Nocturnal flying seabirds, especially fledging birds, are

especially at risk of disorientation caused by exterior lighting and consequent downing due to collisions with man-made structures. Exterior lighting within the proposed development will be shielded to reduce the potential for interactions between nocturnally flying Dark-rumped Petrels with external lights and man-made structures.

Cumulative Impacts and Mitigation Measures: No significant cumulative impacts on faunal resources are anticipated from the development of the proposed projects in the nearby region. No federally listed endangered or threatened avian or mammalian species were detected during the faunal surveys conducted of the respective project sites.

In the interest of reducing the potential for unwanted interactions between nocturnally flying Dark-rumped Petrels with external lights and man-made structures, the shielding of lights planned for the various developments would mitigate this potential occurrence.

Following construction, the incorporation of landscaping within the proposed developments will likely attract many of the common alien avian species currently found in the Kona area.

3.10.3 Archaeological/Historic Resources

An archaeological inventory survey was conducted by Haun & Associates of the Petition Area in April 2000. The survey included a 100 percent surface examination and limited subsurface testing. The archaeological inventory survey is included in Appendix E and is summarized below.

Archaeological investigations conducted within the Petition Area resulted in the identification of 45 sites with 81 component features. These include nine sites identified in prior surveys and 36 sites identified during the subject survey. A summary of the sites and features are included in Table 3-3 and their locations are depicted in Figure ~~3-4~~ 3-5. Development of the road along the western boundary of the Petition Area resulted in the removal of five of the previously identified sites (Sites 15337, 15338, 15345, 15350, and 15351). As such, there are 40 sites with 56 component features currently remaining within the Petition Area.

The sites include 35 single-feature sites and 10 complexes of features. The feature types include 22 modified outcrops, 12 terraces, 10 caves, nine mounds, seven pahoehoe excavations, six cairns, five walls, three trails, three enclosures, two concentrations of marine shell, one cupboard, and one series of grinding slicks. Functionally, the 81 features include the following: agriculture (42), temporary habitation (14), resource procurement (7), marker (6), garden boundary (4), livestock control (3), transportation (3), tool manufacture (1), and storage (1).

Five additional lava tube caves were also identified within the Petition Area during the current survey. Upon examination, these caves were determined to contain no cultural remains.

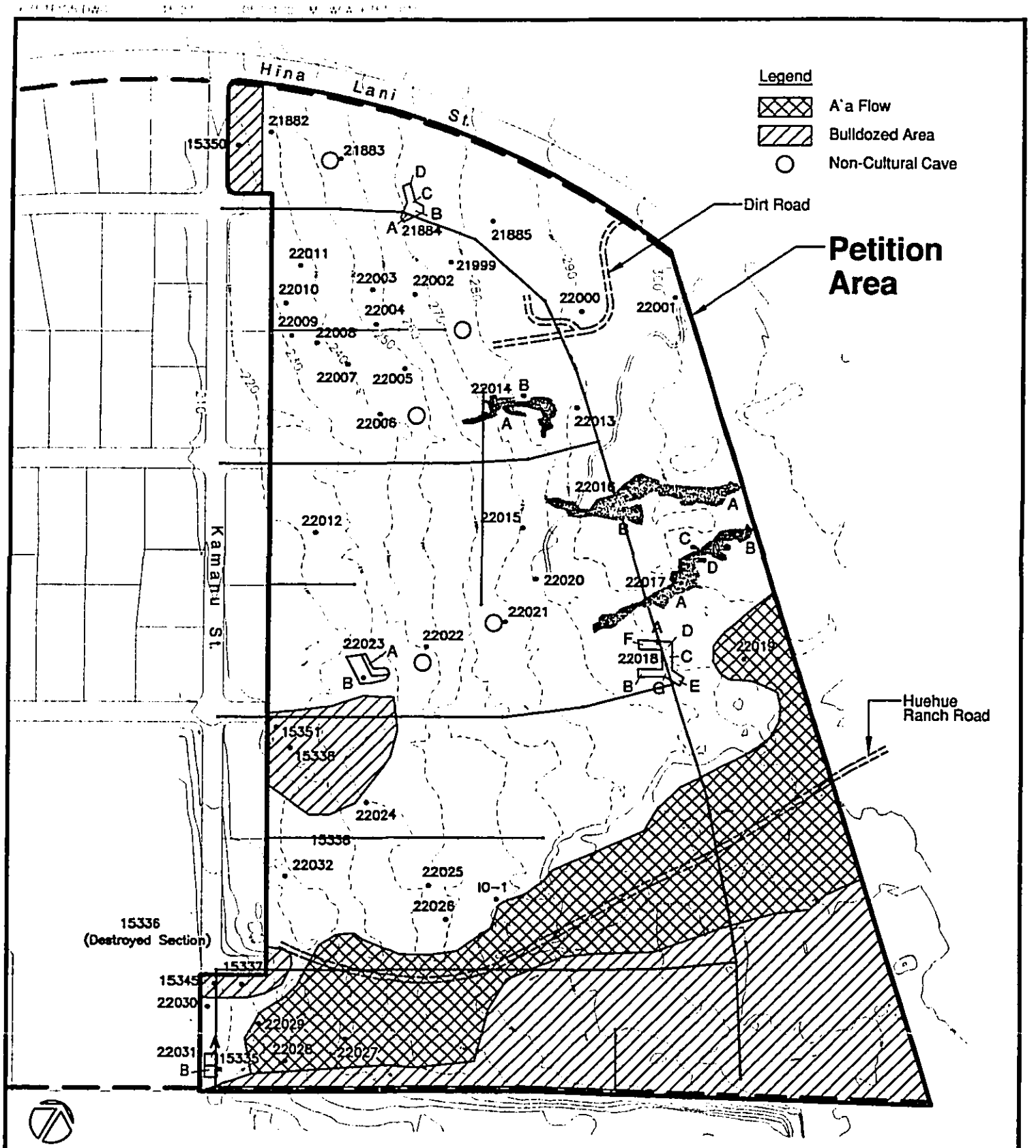
The sites and component features identified within the Petition Area conform to the traditional Hawaiian site/feature types expected in the Middle Zone (from the 15-foot to 800-to 900-foot elevation) (Cordy et al. 1991), one of four environmental zones characterizing the settlement patterns of the area. As expected, temporary habitation sites and trails were identified. The trails all appear to be "branch" trail segments. These trails were

distinguished from major mauka-makai and coastal transportation routes since the branch trails facilitated access to resource and subsistence areas in the immediate vicinity of the habitation sites.

Table 3-3
Summary of Identified Archaeological Sites

Site	Total Features	Formal Type												Function								
		Modified outcrop	Terrace	Cave	Mound	Pahoehoe excavation	Cairn	Wall	Trail	Enclosure	Marine shell concentration	Grinding slicks	Cupboard	Agriculture	Temporary habitation	Resource procurement	Marker	Garden boundary	Livestock control	Transportation	Tool manufacture	Storage
15335	1							1										1				
15336	1							1											1			
15337*	18	1	11		6									17	1							
15338*	1									1									1			
15345*	1		1											1								
15350*	2					1			1							1				1		
15351*	3			2				1							2				1			
21882	1	1												1								
21883	1	1												1								
21884	4	1				2	1							1		2	1					
21885	1	1												1								
21999	1			1											1							
22000	1					1										1						
22001	1	1												1								
22002	1	1												1								
22003	1	1												1								
22004	1						1										1					
22005	1	1												1								
22006	1					1										1						
22007	1	1												1								
22008	1	1												1								
22009	1	1												1								
22010	1										1				1							
22011	1	1												1								
22012	1						1										1					
22013	1	1												1								
22014	2			1						1					2							
22015	1				1									1								
22016	2			2											2							
22017	4	1		2		1								1	2	1						
22018	7	5		1	1									6	1							
22019	1								1											1		
22020	1						1										1					
22021	1	1												1								
22022	1					1										1						
22023	2			1						1					1			1				
22024	1	1												1								
22025	1						1										1					
22026	1											1									1	
22027	1						1										1					
22028	1								1											1		
22029	1							1										1				
22030	1												1									1
22031	2				1			1						1				1				
22032	1										1				1							
Total	81	22	12	10	9	7	6	5	3	3	2	1	1	42	14	7	6	4	3	3	1	1

* Site removed prior to current survey



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KALOKO INDUSTRIAL PARK, PHASES III & IV

ARCHAEOLOGICAL SITES LOCATION MAP

FIGURE 3-5

The temporary habitation sites contained very limited amounts of cultural material. Cultural deposits were uncommon and, where present, very shallow. These characteristics, and the limited evidence for structural modifications to the caves, indicate the temporary habitation use was of a very limited duration. Also as expected, historic remains consisted of ranch walls.

Previous radiocarbon age determinations from temporary habitation sites in the Middle Zone are relatively late, with most spanning the 1700s. The two radiocarbon dates from the subject survey confirm use in the 1400s to 1500s.

An important finding of the subject survey is the identification of numerous informal agricultural features (modified outcrops, terraces, mounds, excavated depressions, and several probable garden enclosures). Fifty-two percent of the features identified were interpreted to be agricultural in function (42 features at 21 sites). The agricultural features documented by the subject survey, as well as by surveys previously conducted of other areas in the project vicinity, support a modification of the Cordy et al. (1991) settlement model as it pertains to agricultural use of the Middle Zone. As the Cordy et al. (1991) model indicates that agricultural features were limited to the lower-most portion of the Middle Zone, the subsequent surveys have documented a second band of agricultural use extending between the 100- and 350-foot elevation.

Impacts and Mitigation Measures

No significant impacts on archaeological/historical resources within the Petition Area are anticipated from the construction and operation of the proposed project.

All of the sites identified within the Petition Area were evaluated for significance in accordance with criteria established pursuant to Chapter 275-6 (d), State Department of Land and Natural Resources (DLNR), Rules Governing Procedures for Historic Preservation Review. According to these rules, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of five established criteria.

Based on the criteria, all of the sites identified within the Petition Area are assessed as solely significant under Criterion "d": "*Have yielded, or is likely to yield, information important for research on prehistory or history.*" These sites have yielded information important for understanding late prehistoric to historic land use in the Petition Area. The mapping, written descriptions, photography, and test excavation at 32 of the 40 sites adequately documents them and no further work or preservation is recommended.

Eight sites (Sites 21999, 22010, 22014, 22016, 22017, 22018, 22023, and 22032) retain the potential to yield information important for understanding prehistoric and historic land use. If these sites are not preserved, then limited data recovery is recommended. Data recovery at these sites would entail surface collection and excavation where deposits are present. The data recovery work would be guided by a Data Recovery Plan prepared for review and approval by the State DLNR Historic Preservation Division.

The archaeological inventory survey for the Petition Area was submitted to the State DLNR Historic Preservation Division and is pending their review and concurrence.

Cumulative Impacts and Mitigation Measures: In general, the proposed projects in the nearby region would retain some of the more significant archaeological resources found within the respective sites. For the Liliuokalani Trust project, specific sites (primarily those containing human remains) would be preserved, subject to a mitigation plan. The creation of an Historic Reserve to protect the concentration of sites at the northern end of the Kuakini Wall near Palani Road would be an additional mitigation measure. (*Liliuokalani Trust Final EIS*, October 1990).

The University of Hawaii Center at West Hawaii proposes the establishment of five preserve areas to include various archaeological sites with interpretive venues to educate current and future residents and visitors of West Hawaii (*University of Hawaii Center at West Hawaii Final EIS*, May 2000).

The Urban Expansion of State Lands recommends completion of an archaeological inventory survey for the entire petition area prior to initiation of any future development. Some of the sites previously identified are burials or potential burials, which would be subject to a burial treatment plan in coordination with the State Department of Land and Natural Resources Historic Preservation Division and the Hawaii Island Burial Council. (*Urban Expansion State Lands Final EIS*, July 1993).

An archaeological inventory survey with limited subsurface testing was conducted of the Kaloko-Honokohau Business Park site. Approximately 64 sites were identified within the site, varying in context from traditional Hawaiian use to historic-era ranching. Figure 3-4 depicts the archaeological resources within the Petition Area and adjacent Business Park site. The traditional Hawaiian sites contain a variety of formal site and feature types, including: intensive dryland agricultural complexes; simple agricultural features and sites; temporary, recurrent and permanent habitation sites; a refuge cave; human burials; animal containment features; an ahupuaa wall and various boundary walls; petroglyphs; a network of trails; and ahu. Sites associated with historic cattle ranching were also identified within the site.

All sites were evaluated as having some level of archaeological significance. The survey recommended that 28 of the 65 sites in the property be subjected to a program of further data recovery. Eight (8) sites are recommended for preservation. For the remaining 29 sites, no further research is recommended as they are deemed no longer significant. (*Environmental Impact Statement Preparation Notice for the Kaloko-Honokohau Business Park*, March 2000).

3.10.4 Native Culture

A cultural impact assessment was conducted in July 2000 to assess the potential impacts of the proposed project on native Hawaiian cultural resources, practices and beliefs. The cultural impact assessment is included in Appendix F and is summarized below.

The cultural impact assessment, prepared from a native Hawaiian perspective, included examining cultural practices and beliefs within the ahupua'a, conducting documentary research, and consulting with individuals and/or organizations with knowledge of the area, cultural resources, practices, and beliefs. The assessment included a regional perspective encompassing the adjoining lands. Although the assessment focused on the ahupua'a of

Kaloko located on the northwestern slopes of Hualālai, information from the Kohanaiki ahupua'a and Honokōhau ahupua'a which adjoin the northern and southern boundaries of Kaloko, respectively, was also included.

Native Hawaiian concepts and values associated with 'āina and iwi have direct relevance to this cultural impact assessment. There exists a deep relationship between the kama'āina (native-born, one born in a place) and the land of their birth, one hānau or kulāiwi (native land, homeland). A number of reciprocal relationships are incorporated into the native Hawaiian perspective of land management and tenure. The 'āina is the provider of food, shelter and clothing; the people are the caretakers.

Mauka-Makai Connection: The ahupua'a as a land division extending from the mountains to the sea is the backdrop for the ko kula uka, ko kula kai concept. The extended family living in the uplands share the fruits of the earth with family members living in the coastal areas who shared the bounties of the sea. Offshore activities such as surfing and deep-sea fishing also relied on the knowledge of the mauka regions, more specifically the landscape or terrain of the land as reference points.

Ancestor Burials: The cultural beliefs and practices surrounding burials include the responsibility of descendants to care for the ancestors even in death. Iwi is defined as "bone, carcass; core".

Identified Cultural Resources, Practices and Beliefs: The following cultural resources, practices and beliefs identified by interviewees through the cultural impact assessment are associated with the larger region of Kaloko and Honokōhau. No resources, practices and beliefs specific to the Petition Area were identified.

The Kona coast was cited as important to the ali'i as evidenced by ali'i burials and residences. Kaloko is known as the burial place for the ali'i Kamehameha I, Kahekili, and Kahekili's family. The lands surrounding the Kaloko Industrial area are known to have caves that contain burials. Interviewees cited possibilities that burial caves are present on the Petition Area.

Gathering of plants including ko'oko'olau, 'uhaloa, pili (grass), noni, pua kala (Hawaiian poppy), māmaki, uhi, and 'ūlei was common in the general mauka region. The Kaloko and Honokōhau region traditionally supported a large population settlement as evidenced by the abundance of cultural resources. Kaloko provides examples of the important ocean-land connection, including the reciprocal ko kula uka (inland dweller, belonging to the uplands), ko kula kai (lowland dweller, belonging to the lowlands) 'ohana tradition.

Interviewees indicated there are no continuing cultural practices occurring today on the Petition Area. Mauka-makai trails have been paved over in some areas and blocked by development. Fishermen continue to use the traditional 'ōpelu ko'a (mackerel fishing grounds) as passed down for generations. At the Kaloko-Honokōhau National Historical Park, the makai wall and mākāhā at Kaloko fishpond are being repaired/built and will be incorporated into the National Park program as a productive fishpond.

A number of project-related concerns were identified by interviewees. It was felt that if cultural sites are identified on the Petition Area, they should be preserved; burials should not be disturbed. Concern was cited that surface runoff and wastewater disposal either through cesspools or septic tanks could affect the water quality in the anchialine ponds and Kaloko and ʻAimakapā fishponds. The visual impact of the intensification of buildings mauka of Queen Kaʻahumanu Highway will affect fishermen who use ʻōpelu koʻa to locate traditional fishing grounds. It was felt that the intensification of development on the Hualālai slopes will affect the mauka view plane from the Kaloko-Honokōhau National Historical Park.

Impacts and Mitigation Measures

Based on an assessment of the impacts of the proposed project on the resources, beliefs and practices identified, the Kaloko Industrial Park, Phases III and IV, will have a minimal negative cultural impact upon native Hawaiian cultural resources, beliefs, and practices.

Possible Burial Sites: No evidence of burials was identified in the archaeological inventory surveys encompassing the Petition Area (Haun, 2000 and Soehren, 1979) and no burial locations were revealed during the cultural impact assessment process. Other interviews conducted for developments on surrounding properties have identified burials on these properties, and informants have expressed that it is possible that burials are present on the Petition Area.

The proposed development has the potential to affect traditional burial sites should any be present on the Petition Area. Any burials found on the Petition Area should not be disturbed pending consultation with the State DLNR Historic Preservation Division (SHPD). The treatment of any remains should be in accordance with procedures to be approved by the Hawai'i Island Burial Council and SHPD.

Water Quality in Ponds at the Kaloko-Honokōhau National Historical Park: Wastewater and storm water discharged from surrounding businesses and industrial areas into cesspools and dry wells have the potential to affect ground-water resources and, ultimately the fishponds and anchialine ponds within the Park. Although water quality samples and surveys have not demonstrated that ground water has been affected, it was expressed that water quality has been affected by existing developments and that there is a need for regional planning on this issue.

Mitigation measures for storm water runoff and wastewater disposal are discussed in Sections 3.5, 3.17.2 and 3.17.3. The National Park Service should continue to monitor ground-water resources and conduct water quality testing for the fishponds and anchialine ponds within the Kaloko-Honokōhau National Historical Park. Samples should be specifically tested for contaminants that are typically associated with residential, business and industrial activities.

Changes to the Landscape and View Plane: Residential, business and industrial developments on the slopes of Hualālai may alter the terrain and obstruct or destroy landmarks used by fishermen in a traditional fishing method whereby ʻōpelu koʻa or fishing grounds are located by aligning known reference points.

Although none of these features or landmarks are within the Petition Area, the proposed development should be designed to mitigate the visual impacts to the existing terrain and landscape, as well as the obstruction of natural features or landmarks. This may include ensuring a low building profile, appropriate building materials, and suitable plantings and landscaping. Fishermen knowledgeable of traditional reference points used in locating fishing grounds, and National Park Service personnel, will be consulted to provide input ~~should be afforded the opportunity to consult~~ on the development of building and landscaping design guidelines for the proposed project.

If native plants on the Petition Area cannot be incorporated into the landscaping plan for the proposed development, local native Hawaiians, the Amy B.H. Greenwell Botanical Garden, other local ethnobotanical groups, and interested educational institutions will ~~should~~ be afforded the opportunity to gather seeds and cuttings or to rescue the plants.

Cumulative Impacts and Mitigation Measures: The assessment of cumulative impacts on native culture focuses on the ahupua'a of Kaloko, Honokōhau and Kohanaiki and in general on proposed developments just mauka of Queen Kaahumanu Highway. As a result of existing and proposed developments, the intensification of buildings will change the landscape of the ahupua'a of Kaloko, Honokōhau and Kohanaiki. When considered individually, each of the developments does not pose a significant cultural impact, especially when concentrated mauka of Queen Ka'ahumanu Highway. Eventually, however, the transformation of the Kona plain and the lava fields will result in the loss of this traditional landscape.

Developments on the slopes of Hualalai may alter the terrain and obstruct or destroy landmarks used by fishermen whereby 'ōpelu ko'a or fishing grounds are located by aligning known reference points. Existing developments on the slopes of Hualalai, and the potential intensification of built structures by proposed developments will continue to affect experiential activities at the Kaloko-Honokōhau National Historical Park. Developments should be designed to mitigate such visual impacts, with consideration to building profiles, appropriate building materials, and suitable landscaping.

Future developments in the nearby region also have the potential to affect traditional burial sites should any be present. The treatment of any remains should be in accordance with procedures approved by the Hawaii Island Burial Council and State Department of Land and Natural Resources Historic Preservation Division.

Wastewater and storm water which may be discharged from surrounding businesses and industrial activities into individual wastewater systems and drywells have the potential to affect ground-water resources and ultimately the fishponds and anchialine ponds in the Kaloko-Honokōhau National Historical Park. Storm water drainage and wastewater disposal systems should be designed to remove contaminants prior to entering the ground water system. The County's plan to extend sewer service north of its Kealakehe Wastewater Treatment Plant, allowing for eventual connection by future developments to municipal sewer lines, will reduce the long-term impact on ground-water resources. The implementation of a pollution prevention plan and recommended Best Management Practices for developments mauka of the Kaloko-Honokōhau National Historical Park will also serve to mitigate the effects of pollutants from storm water runoff.

Future developments in the nearby region also have the potential to affect traditional gathering practices of native plants including ko'oko'olau, 'ulaloa, noni, 'ala'ala wai nui, alahe'e, māmaki, 'ūlei, and 'ōhi'a. With the exception of ko'oko'olau, these plants are locally abundant.

3.11 Socio-Economic Characteristics

3.11.1 Population

The County of Hawaii, with a 1998 population of 143,135, is the second most populated County in the State of Hawaii. Long-range forecasts of the State's population growth indicate that growth rates for the Neighbor Islands will continue to outpace that of Oahu. State population forecasts are shown in Table 3-4. Hawaii County is expected to have the largest percentage increase over the next 20 years: 55,800 people or 37 percent.

Table 3-4
Population Forecasts for the State of Hawaii and Counties
2000-2020

	Resident Population						
	1995	2000	2005	2010	2015	2020	Percent Change
C&C of Honolulu	870,000	904,000	944,000	980,000	1,016,000	1,050,600	20.75
Hawaii County	137,200	149,600	160,600	173,900	189,100	205,400	49.71
Kauai County	56,000	60,900	66,600	72,000	77,300	82,800	47.86
Maui County	115,200	124,000	132,800	140,900	148,000	155,400	34.90
Total	1,179,200	1,240,500	1,306,005	1,368,810	1,432,415	1,496,220	26.88

Source: *Population and Economic Projection for the State of Hawaii to 2020 (Report of Results and Methodology)*, State of Hawaii, Department of Business, Economic Development & Tourism, Research and Economic Analysis Division, May 1997.

Table 3-5 describes the population change from 1970 to 1995 in each of nine districts identified on the Island of Hawaii. The Puna District experienced the largest increase in terms of the number of new residents. The populations of South Hilo, Kau and Hamakua grew more slowly, while the population of North Hilo experienced an 8.2 percent decrease during the 1980s. This decline is largely attributed to the closing of the sugar mills in the area.

Table 3-5
Population by District, Hawaii County
1970-1995

District	1970	1980	1990	1995	Percent Change			
					1970-80	1980-90	1990-95	1970-95
Puna	5,154	11,751	20,781	27,585	128.0	76.8	32.7	435.21
S. Hilo	33,915	42,278	44,639	45,790	24.7	5.6	2.6	35.01
N. Hilo	1,881	1,679	1,541	1,561	-10.7	-8.2	1.3	-17.01
Hamakua	4,648	5,128	5,545	5,757	10.3	8.1	3.8	23.86
N. Kohala	3,326	3,249	4,291	4,826	-2.3	32.1	12.5	45.10
S. Kohala	2,310	4,607	9,140	12,098	99.4	98.4	32.4	423.72
N. Kona	4,832	13,748	22,284	25,447	184.5	62.1	14.2	426.63
S. Kona	4,004	5,914	7,658	8,619	47.7	29.5	12.5	115.26
Kau	3,398	3,699	4,438	5,607	8.9	20.0	26.3	65.01

Source: The State of Hawaii Data Book, 1997, A Statistical Abstract, State of Hawaii, Department of Business, Economic Development & Tourism.
Note: *The* 1970 data is as presented in *The State of Hawaii Data Book, 1993-94, A Statistical Abstract,* State of Hawaii, Department of Business, Economic Development & Tourism.

The population of West Hawaii has grown more rapidly than that of East Hawaii in recent years, with approximately 63 percent of the island's population currently residing there. The North Kona District experienced a 426 percent growth from 1970 to 1995, the second largest population increase on the island.

3.11.1.1 North Kona Population and Housing

The resident population in North Kona includes a high proportion of newly arrived residents who moved into their homes within the five years prior to the 1990 census. Only 39 percent of North Kona residents had lived in the same house five years prior to the census. 27 percent had lived elsewhere on the island, 7 percent had lived on another island, 3 percent came from a foreign country, and the remaining 24 percent of the population came from a different state. Many of these new residents are older, more affluent, and in many cases, retired. Thus, the social characteristics of the Kona area have evolved as a consequence of the population influx.

Of the 9,900 North Kona division housing units in existence in 1990, only 7,898 units (79 percent) were occupied. Renters occupied 3,588, or 45 percent, of these units. Although the median rent for Hawaii County was $490, more than one third of the occupied rental units in North Kona were under contract rent rates from $500 to $749. Just over one fifth of the renter-occupied units throughout the entire County were in this price range.

Residential areas in the vicinity of the Petition Area are located to the north along Kaimi Nani Drive, and to the east along Mamalahoa Highway and in the Kealakehe Homestead area. The homes in these areas are located a minimum of approximately 2 miles from the Petition Area.

3.11.1.2 Economic Characteristics

In the 1990's, Hawaii County's job growth rate outpaced that of the rest of the State with the creation of approximately twice as many jobs. However, by 1994, job growth hovered

around zero percent, mirroring the stagnant trend that had manifested elsewhere in the State four years prior. The late 1990's saw an acceleration in job creation from 1996 through 1997, and Hawaii County's job growth was again well ahead of the other counties. This growth was generated by several trends: modest increases in visitor counts; continued hotel development and renovation; and new entries in retailing. The County's job growth experienced a noteworthy boost even as the Asian economic decline took its effect on the State. A large portion of the increase is attributed to hiring within service industries, including hotels, health services and hospitals, and a range of other business services. In 1998 and 1999, however, job growth hovered around zero percent, again reflecting the overall State decline.

3.11.1.3 Visitor Industry

Tourism is a mainstay of the State's economy. Tourism, which has been a major industry for decades, is also a primary driver of the retail trade. The majority of visitors to Hawaii County stay in West Hawaii. This trend is expected to continue. Hawaii County accommodated increases in both westbound (5 percent) and eastbound (17 percent) visitors in 1998 while the other three counties experienced little or no increase in westbound arrivals, and decreases of up to 25 percent in eastbound arrivals. Most of the projected increases in visitor arrivals for Hawaii County are expected to appear in West Hawaii. The growth of visitor traffic to West Hawaii led to the shift of overseas airlines from Hilo International Airport to Kona International Airport at Keahole, and the extension of the Kona runway in 1996 boosted arrivals.

3.11.1.4 Employment and Job Growth

Business and employment trends in the Kona area have shifted from agriculturally-based employment to a focus on the visitor industry. Slightly more than half of the employed persons in 1950 listed their primary occupation as being in agriculturally-related operations. Tourism-related activities in Kona were of moderate economic importance until the appearance of resorts and vacation homes in the 1960s. By 1970, agricultural occupations employed only a small fraction of the percent of employed persons, while service-related jobs, primarily in the visitor industry, grew to account for a considerable portion of the job market. The economic boost in the visitor industry translated to growth in wholesale and retail trade, as well as in the construction industry. Resort development in the Kona-Kohala region, dubbed "the Gold Coast", continued through the 1980s and early 1990s with elite getaway resorts such as the Hilton Waikoloa (formerly the Hyatt Regency Waikoloa) and Sheraton's Orchid at Maunalani.

Overall, the total number of jobs in the County displayed healthy gains in 1996 and 1997, and remained steady in 1998. In 1998, the list of the top 30 employers in Hawaii County was dominated by tourism-related businesses, 15 of which were hotels that employed 6,478 people. Two wholesale retail and manufacturing companies and one development/general contracting company were also included in the list, their employees totaling 497, and two agriculture-related companies employed 1,715 people. Table 3-6 shows the average annual job count by industry in Hawaii County from 1994 to 1998.

Table 3-6
Job Count by Industry, Hawaii County

Industry	1994	1995	1996	1997	1998
Total Jobs	50,250	49,550	50,700	51,900	52,050
Agriculture	2,950	2,450	2,550	2,450	2,500
Contract Construction	2,600	2,550	2,300	2,100	1,900
Finance, Insurance, Real Estate	2,450	2,400	2,600	2,600	2,750
Manufacturing	2,050	1,750	1,650	1,650	1,500
Services & Miscellaneous	14,950	15,050	16,250	17,400	16,950
Trade (wholesale & retail)	12,450	12,650	12,550	12,850	13,100
Transportation, Utilities, Communication	2,650	2,600	2,600	2,650	2,800
Government	10,200	10,100	10,150	10,250	10,550

Source: *Data Book, 1998*, County of Hawaii, Department of Research and Development.
Note: *Data rounded to the nearest 50; totals may not add due to rounding.*

3.11.1.5 Unemployment

Along with the job growth rate, the unemployment rate is another indicator of the labor market. Historically, data reflects that Hawaii County's unemployment rate is consistently one of the highest in the State. A slight decrease in Hawaii County's unemployment rate is observable from a high of 10.8 percent in 1994 to 9.9 percent in 1996. In 1997, unemployment was slightly higher at 10.2 percent, but 1998 brought a further decrease to 9.7 percent. First Hawaiian Bank's Economic Forecast, 1999-2000 Edition, also shows a continuing decrease to 9.2 percent over the first half of 1999. According to the Department of Labor and industrial Relations, the unemployment rate in February of 1999 was 8.6 percent, and that for February of 2000 was 6.4 percent. However, these statistics represent data that is not seasonably adjusted.

3.11.1.6 Income

The per capita income of Hawaii County households is below that of the other counties in the State. The 1990 per capita income for North Kona is $17,497, much higher than the $13,169 per capita income of Hawaii County overall. North Kona's Median Household income and Median Family income also outpaced the County's 1990 averages with $35,364 and $39,329 compared to $29,712 and $33,186, respectively.

Of the 5,791 families residing in North Kona in 1990, 6.8 percent, or 395 families were living below the poverty level. The proportion of impoverished families is lower than the 10.9 percent found across Hawaii County overall, but slightly higher than the State's proportion of 6.0 percent of families. The Pahoa district had the highest incidence of poverty, with 18.6 percent families living below federal income guidelines. The South Hilo and Kau districts closely reflected the County average with 11.4 and 9.9 percent, respectively; South Kona, North Kohala and South Kohala displayed proportions similar to that of North Kona, with 6.1,

7.5, and 7.8 percent of families of poverty status. The North Hilo and Hamakua districts had the lowest incidence of poverty in Hawaii County with 4.8 and 5.7 percent of families, but the total number of families in these districts is significantly lower than that of most other districts in the County.

Impacts and Mitigation Measures

The proposed project will result in short- and long-term beneficial socio-economic impacts.

In the short-term, the proposed project will confer positive economic benefits in the local area. Direct economic benefits will result from construction expenditures both through the purchase of materials from local suppliers and through the employment of local labor, thereby stimulating that sector of the economy. Indirect economic impacts may include benefits to local retail businesses resulting from construction activities. During the project's total build-out phase, an estimated 19,345 direct full-time equivalent and 9,673 indirect full-time equivalent jobs will be created (The Hallstrom Group, Inc., May 2000).

Upon full build-out, the proposed development is anticipated to provide an estimated 2,789 direct full-time equivalent jobs, with an additional approximately 1,399 indirect full-time equivalent jobs to be created (The Hallstrom Group, Inc., May 2000). It is anticipated that *most of the employees of the proposed development will be from within the region.* Therefore, the proposed project is not anticipated to induce increased population growth or associated development in the region.

Cumulative Impacts and Mitigation Measures: The urbanization and development of the proposed projects in the nearby region will create long-term direct and in-direct employment opportunities and generate increased property, sales and income taxes. To support the cumulative increase in population, the State and County would need to provide public and County services, respectively. Given the anticipated revenues that could potentially be generated by such projects, the cumulative impacts to public facilities and services should be positive.

Although the visitor industry is expected to continue as the primary economic activity for the area, the increased population would generate a demand for more diverse goods and services. With more employment in the region, out migration to Honolulu and other areas of the State by job-seeking individuals would potentially decrease.

The social impacts associated with development of the proposed projects in the nearby region will be determined by a number of factors, including: the rate of growth in the region; the ability of infrastructure construction to keep pace with growth; and demographic characteristics of new in-migrants. Accelerated growth rates could heighten social impacts as residents' perceptions of urban problems such as overcrowding, traffic congestion, and competition for recreational resources increase. In turn, these factors are related to the ability of State and County government to provide necessary public services and infrastructure to keep pace with population increases.

3.12 Air Quality

According to the State DOH, Clean Air Branch, the State of Hawaii did not exceed any federal ambient air quality standards in 1998, and is considered by the U.S. Environmental Protection Agency to be in compliance with all criteria set forth by the National Ambient Air Quality Standards (NAAQS). In 1998, there were seven occasions when the ozone pollutant concentration measured at Sand Island on the Island of Oahu exceeded the State Ambient Air Quality Standards (SAAQS), but remained below the federal standard.

The 1998 Annual Summary, Hawaii Air Quality Data does not provide air quality data for the Island of Hawaii. However, within recent years the Island has gained three special monitoring stations. The Kona station, located approximately 14 miles south in Kealakekua on the Konawaena High School campus, is closest to the Petition Area. The Kona station monitors two pollutants: particulate matter that is ten microns or less in aerodynamic diameter (PM_{10}) and sulfur dioxide (SO_2). Kilauea Volcano is a source of sulfur dioxide and other sulfur oxide gas emissions. Table 3-7 summarizes the available preliminary data.

Table 3-7
Monthly Summary of 24-Hour Average Particulate Matter (PM_{10}) ($\mu g/m^3$)
Preliminary Data, Kona Special Monitoring Station
1997-1999

	1997		1998		1999	
	Range	Average	Range	Average	Range	Average
JAN	ND	ND	11 – 23	14	16 – 27*	21.8*
FEB	ND	ND	12 – 19	14.6	12 – 21*	17.5*
MAR	ND	ND	13 – 20*	16.5*	15 – 27	21.8
APR	ND	ND	19 – 25*	20.5*	10 – 28	19.6
MAY	ND	ND	17 – 24	20.4	15 – 23	18.2
JUN	ND	ND	16 – 19	18.2	12 – 13*	12.5*
JUL	6 – 17	13	20 – 23	21	ND	ND
AUG	10 – 23	15.8	20 – 29	23.8	ND	ND
SEP	20*	20*	22*	22*	ND	ND
OCT	13 – 24	17	17 – 23*	20*	ND	ND
NOV	18 – 26	20.8	16 – 18*	17*	ND	ND
DEC	16 – 20	17.8	11 - 24	16.3	ND	ND

Source: State of Hawaii Department of Health, Clean Air Branch
Notes: 1. Range refers to the lowest and highest 24-hour $\mu g/m^3$ value recorded in the month.
2. Average refers to the arithmetic mean of all hours recorded in the month.
3. * Denotes months when less than 5 samples were taken.
4. ND denotes months for which no data was available.

Data from the Kona station is unpublished; the data collected thus far is considered preliminary and is subject to change. Therefore, there is no established baseline for ambient air quality in the Kona area. 24-hour averaged PM_{10} data collection began in July 1997 and continued through June 1999, with manual sampling performed every six days.

During this time, there was a total of 101 valid periods and 21 missed sampling periods from which data is unavailable.

The highest 24-hour PM_{10} concentration recorded at the Kona station from 1997 to 1999 was 29 micrograms per cubic meter ($\mu g/m^3$). The Hawaii State Standard level, as well as the Federal Primary Standard level and Federal Secondary Standard level of PM_{10} averaged over 24 hours is 150 $\mu g/m^3$. Thus, levels of PM_{10} in the Kona area are well within Federal and State air quality standards.

Data collection for SO_2 levels began in April 1997 and continued through December 1999. Over the 33 months of data collection, there were ten days of invalid data which was not incorporated into the average SO_2 concentration during those respective months. Table 3-8 summarizes the available preliminary data.

Table 3-8
Monthly Summary of 24-Hour Average Sulfur Dioxide (SO_2) ($\mu g/m^3$)
Preliminary Data, Kona Special Monitoring Station
1997-1999

	1997		1998		1999	
	Range	Average	Range	Average	Range	Average
JAN	ND	ND	2 – 39	14.3	1 – 12	5.3
FEB	ND	ND	2 – 17	5.8	3 – 18*	6.4*
MAR	ND	ND	2 – 24	9.0	3 – 17	7.6
APR	0 – 4	2.5	3 – 36	13.7	4 – 12	6.8
MAY	0 – 8	2.1	4 – 36	9.8	3 – 18*	6.9*
JUN	0 – 6	2.3	5 – 17	9.8	3 – 14	4.9
JUL	0 – 14	4.5	3 – 24	9.4	4 – 10	5.7
AUG	0 – 26	7.6	5 – 28	10.4	4 – 8	6.0
SEP	0 – 16	5.2	3 – 20	8.3	3 – 9	5.1
OCT	0 – 40	6.6	5 – 11	6.6	5 – 8	5.8
NOV	0 – 54	11.5	4 – 14	8.0	5 – 11	6.6
DEC	2 – 32	13.8	2 – 17*	7.0*	3 – 12	5.2

Source: State of Hawaii Department of Health, Clean Air Branch
Notes: Range refers to the lowest and highest 24-hour $\mu g/m^3$ value recorded in the month.
Average refers to the arithmetic mean of all hours recorded in the month.
* Denotes months which contained one or more days of invalid data.
ND denotes months for which no data was available.

The highest 24-hour SO_2 concentration recorded at the Kona station from 1997 to 1999 was 54 micrograms per cubic meter ($\mu g/m^3$). The Hawaii State Standard level, as well as the Federal Primary Standard level, of SO_2 averaged over 24 hours is 365 $\mu g/m^3$. Thus, levels of SO_2 in the Kona area are well within Federal and State air quality standards.

Within the immediate vicinity of the Petition Area, vehicular-related emissions in the form of carbon monoxide (CO) are generated from traffic traveling along the nearby roadways. It is

likely that elevated concentrations of vehicle emissions are confined to limited areas near the Queen Kaahumanu/Hina Lani Street intersection during periods of traffic back-up when dispersion conditions are poor.

Ambient air quality levels in the immediate Petition Area are also likely to be periodically affected by dust emissions generated from the adjacent quarry operations located south of the site.

Impacts and Mitigation Measures

During construction of the proposed project, two potential types of air pollution emissions will likely occur, resulting in air quality impacts: 1) airborne dust from vehicle movement and grading activities; and, 2) carbon monoxide and nitrogen oxide emissions from on-site construction equipment traveling to and from the project work site. The properties which are anticipated to be most affected by construction activity air quality impacts are those businesses located adjacent to the proposed project.

Potential air quality impacts during construction of the proposed development will be mitigated by complying with the State DOH Administrative Rules, Title 11, Chapter 60, Air Pollution. The construction contractor(s) is responsible for complying with the State DOH regulations which prohibit visible dust emissions at property boundaries. Compliance with State regulations will require adequate measures to control airborne dust by methods such as water spraying and sprinkling of loose or exposed soil or ground surface areas and dust-generating equipment during construction. As may be deemed appropriate, paving of areas early in the construction schedule will also help to control dust. Increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction workers can be alleviated by moving the equipment and personnel to the site during off-peak hours. Exhaust emissions from construction vehicles are anticipated to have negligible impact on air quality in the project vicinity as the emissions would be relatively small and readily dissipated.

In addition, the predominant direction of wind (land breezes) generated by thermal convection from solar heating of the land mass is inland, resulting in transport of dust inland, and not toward the ocean. As a result, it appears that there is little potential for significant input of sediment to the marine and pond environment resulting from the proposed project.

No significant air quality impacts are anticipated from the operation of the proposed project. The ambient air quality levels would be most affected by vehicular emissions in the form of CO generated by project-related traffic, especially at the intersections of Hina Lani Street with Queen Kaahumanu Highway and Kamanu Street, and to a lesser extent at the Hina Lani Street/Kanalani Street intersection. Planned traffic and roadway improvements in the immediate project vicinity as described in Section 3.17.4 would improve traffic flow and consequently help in reducing the CO concentration levels.

Through restrictive covenants, the individual businesses within the proposed development will be restricted from using their subject lots in a manner that creates excess air pollution, dust or emission of odorous or noxious matters as may be considered a nuisance to nearby lots.

Cumulative Impacts and Mitigation Measures: No significant long-term cumulative impacts on air quality are anticipated from the development of the proposed projects in the nearby region. In conjunction with the projected increase of vehicular traffic to be generated by the proposed projects, it is anticipated that ambient air quality levels would be most affected by increased vehicular emissions in the form of CO. Traffic and roadway improvements to be implemented in conjunction with development of the respective projects would improve traffic flow and help in reducing the CO concentration levels. Transportation management alternatives as a means to reduce traffic levels and, consequently, air quality impacts have been proposed for two of the proposed projects. Consideration is given to parking and loading provisions for shuttles and vans, as well as utilizing carpools and public transportation at the proposed University of Hawaii Center at West Hawaii (*University of Hawaii Center at West Hawaii Draft EIS*, May 2000). Liliuokalani Trust considers the use of staggered hours for school/businesses and carpooling (*Liliuokalani Trust Final EIS*, October 1990).

Another cumulative impact is the potential electrical demand on the Keahole Generating Station resulting from regional development, and subsequent air quality impacts. However, any expansion of the station will be subject to rigorous review by the State Department of Health and must meet Federal and State clean air requirements.

3.13 Noise

Ambient noise in the vicinity of the Petition Area is predominantly attributed to vehicular traffic along Queen Kaahumanu Highway, Hina Lani Street and the roadways traversing through the existing Kaloko Industrial Park. Another source of ambient noise is generated by the adjacent quarry operations located south of the Petition Area.

Aircraft operations associated with Kona International Airport at Keahole approximately 3 miles to the north include fixed and rotary wing aircraft which generally overfly the vacant lands between the Airport and Queen Kaahumanu Highway, west-northwest of the Petition Area. The Petition Area is located outside of the Airport's 55 DNL (Day-Night Average Sound Level) noise contour (State Department of Transportation, Airports Division, December 1997).

Impacts and Mitigation Measures

Construction noise will be unavoidable during the duration of the construction of the proposed development. Development of the Petition Area will involve grubbing and grading of the site and construction of infrastructure, buildings and associated facilities. Operation of construction equipment and vehicles will raise ambient noise levels in the project vicinity. However, due to the existing light industrial uses and undeveloped areas of the adjacent properties, construction noise will not adversely impact any noise sensitive properties. The properties which are anticipated to be most affected by construction activity noise impacts are those businesses located adjacent to the proposed project. Mitigation measures such as the use of properly muffled construction equipment and incorporation of State DOH construction noise limits pursuant to the provisions of the State DOH Administrative Rules, Title 11, Chapter 46, Community Noise Control (applicable only to Oahu) are applicable to the project.

No significant noise impacts are anticipated from the operation of the proposed project. Ambient noise levels in the vicinity of the Petition Area will increase slightly as a result of the associated increase in vehicular traffic generated by the proposed development. However, the increased noise levels are not anticipated to adversely affect any nearby noise sensitive uses since the surrounding areas are comprised of light industrial uses and undeveloped lands.

Through restrictive covenants, the individual businesses within the proposed development will be restricted from using their subject lots in a manner that creates excess sounds as may be considered a nuisance to nearby lots.

Cumulative Impacts and Mitigation Measures: No significant long-term cumulative impacts on noise are anticipated from the development of the proposed projects in the nearby region. Ambient noise levels in the vicinity will increase as a result of the associated increase in vehicular traffic generated by the proposed developments. The increased noise levels as a result of the proposed Kaloko Industrial Park, Phases III and IV, and adjacent Kaloko-Honokohau Business Park are not anticipated to adversely affect any nearby noise sensitive uses since the surrounding areas are comprised of light industrial uses and undeveloped lands.

For the Liliuokalani Trust project, existing and planned uses along Queen Kaahumanu Highway are primarily commercial and light industrial. Roadway traffic noise levels at the proposed residential areas of the project are not expected to exceed current FHA/HUD noise standards. (*Liliuokalani Trust Final EIS*, October 1990).

The University of Hawaii Center at West Hawaii considers parking and loading provisions for vans and shuttles to address potential increased vehicular noise (*University of Hawaii Center at West Hawaii Draft EIS*, May 2000).

For the Urban Expansion State Lands, the future developer would be responsible for implementing appropriate sound attenuation measures, as may be necessary, to reduce noise levels to acceptable standards (*Urban Expansion State Lands Final EIS*, July 1993).

3.14 Visual Resources

The primary public viewpoints of the Petition Area include: 1) mauka views from Queen Kaahumanu Highway, 2) makai views from upper Hina Lani Street in the vicinity of Mamalahoa Highway, 3) southerly views from Hina Lani Street, and 4) mauka views from the Kaloko-Honokohau National Historical Park.

From Queen Kaahumanu Highway, mauka views of the Petition Area are intermittent and limited primarily by topographical features and the existing Kaloko Industrial Park development. There are no significant mauka views from the Highway in the project vicinity. A 50-foot wide landscaped buffer strip located between the Industrial Park's western boundary and Queen Kaahumanu Highway provides visual relief from the development's buildings.

From upper Hina Lani Street in the vicinity of Mamalahoa Highway, makai views of the Petition Area, although evident, are relatively diminished by the expansiveness of the

panoramic visual landscape. The buildings of the existing Kaloko Industrial Park immediately makai of the Petition Area are discernible from this vantage point, although its low profiles do not detract from the expansive visual landscape which is in part dominated by the Pacific Ocean beyond.

As viewed from Hina Lani Street in the vicinity of the Petition Area, only the northern portion of the site is visible due to the declining nature of the topography beyond. Looking southwest from Hina Lani Street, views of the ocean are visible immediately beyond the Petition Area due to the declining topography.

As viewed mauka from the Kaloko-Honokohau National Historical Park in the vicinity of the coastline, the Petition Area is partially visible beyond the buildings of the existing Kaloko Industrial Park due to its elevated topography. In the overall context of the broader visual landscape, the western slopes of the Hualalai Volcano with its clusters of residential developments dominate the background view, while the buildings of the existing Kaloko Industrial Park are predominant in the foreground view due to the surrounding barren landscape.

Impacts and Mitigation Measures

There are no significant impacts affecting views or visual resources. Development of the Petition Area will alter the visual landscape from its natural, barren state to one of urban use. Due to the elevated topography of the Petition Area, buildings within the proposed development will be visible beyond the existing Kaloko Industrial Park development as viewed from makai areas. As the proposed project will be similar in visual character to that of the adjacent light industrial uses, the change in views from the various public vantage points, primarily the mauka-makai views, will be of an intensification of the existing uses.

To reduce the visual impacts of the proposed development, landscaping and architectural design criteria will be developed and implemented for the project. The criteria will be incorporated either as covenants within the individual property deed documents or within a Declaration of Restrictive Covenants for the proposed development.

Landscaping will be implemented within the proposed development, as deemed appropriate, to minimize or screen the visual impact of the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Appropriate plant material and variety will be established for the proposed development.

Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

Cumulative Impacts and Mitigation Measures: The proposed developments would contribute to an overall change in the region as the physical environment would be altered from largely open lava fields to a developed landscape of urban uses consisting of low-rise residences, retail/offices, light industrial, medical facilities, public facilities such as schools and civic centers, and a variety of recreational facilities and natural open space reserves.

Existing public views along the major roadways in the region, especially Queen Kaahumanu Highway, will be altered to more of an urban, built-up landscape. Adverse visual impacts can be mitigated by adopting prudent site planning criteria (low building profiles/building bulk standards, appropriate building and roof materials and color, and adequate setbacks) and landscape design standards to provide adequate buffers and screening.

The cumulative visual impact of the proposed Kaloko Industrial Park, Phases III and IV and Kaloko-Honokohau Business Park developments will be of a more intensified landscape since the Business Park fronts Queen Kaahumanu Highway and Phases III and IV of the Industrial Park are located mauka of the existing industrial park development. A buffer area is proposed between Queen Kaahumanu Highway and the Business Park development. Impacts of the visual character of both projects will be mitigated through appropriate architectural design and landscape criteria.

3.15 Solid Waste

Presently, solid waste from the region is disposed of at the County of Hawaii's Puu Anahulu landfill located approximately 18 miles north of the Petition Area in Waikoloa. In 1993, the initial 30-acre increment of the 300-acre landfill was opened with a projected capacity of six to 11 years. Additional 30-acre increments are expected to be required every five years thereafter. The former Kailua (Kealakehe) Landfill is presently used as a transfer station where refuse collected from residential areas is compacted for transport to the Puu Anahulu landfill.

Impacts and Mitigation Measures

No significant impacts to the municipal solid waste collection and disposal system are anticipated during construction and operation of the proposed development.

Refuse generated by the proposed project will be collected by private refuse collection companies and transported to the County's Puu Anahulu landfill for disposal. The solid waste to be generated by the proposed development can be accommodated at the Puu Anahulu landfill (County of Hawaii Department of Public Works, Solid Waste Division, April 2000). Assuming a population density of 40 capita per acre in areas of industrial use and a solid waste generation rate of 5 to 6 pounds/capita/day, the annual solid waste generation would be approximately 2,700 to 3,200 tons. The individual landowners and/or tenants will be responsible for arranging the collection and disposal of the industrial-type solid waste to be generated by the respective businesses.

The individual tenants will be encouraged to institute resource conservation measures to promote environmentally sensitive and energy efficient design, such as low-flush toilets, energy-efficient fixtures, and facilities for recycling. Such measures would be included in educational brochures or newsletters through the proposed development's association.

Cumulative Impacts and Mitigation Measures: Solid waste generated in the region 20 plus years hence would range from approximately 160.7 to 203.7 tons per day. The County's Puu Anahulu landfill is expected to have the capacity to accommodate solid waste generated by existing uses and proposed projects in the region. The promotion of instituting

recycling and resource conservation measures by the proposed developments should help in reducing solid waste to be generated in the future.

3.16 Public Services and Facilities

3.16.1 Police Protection

The Kealakehe Police Station, located on Queen Kaahumanu Highway less than 2 miles south of the Petition Area, provides service to the North and South Kona Districts. The station has a force of 56 uniformed officers, with eight patrol units assigned to each of the three watches within a 24-hour period. There is also a small substation in Captain Cook that serves as a staging area for officers from the Kona Station working in that area.

Impacts and Mitigation Measures

No significant impacts to police services are anticipated as a result of the proposed project. Although it is likely that the proposed project would require only the occasional police protection services, it would likely represent a minimal amount relative to the overall regional demand.

Cumulative Impacts and Mitigation Measures: The increase in population attributable to the proposed projects in the nearby region, primarily the Liliuokalani Trust and Urban Expansion State Lands, will increase demand on existing police services within the region. The Liliuokalani Trust would work with the County in determining the extent of expansion required and how to best meet future requirements (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands recommends coordination with the County of Hawaii Police Department to set aside land, if required, to accommodate additional stations or substations for police services (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.2 Fire Protection

Fire protection service for the project area is provided by the Kailua-Kona Fire Station located approximately 3.6 miles to the southeast near the intersection of Palani Avenue and Queen Kaahumanu Highway. The station serves areas within a 30-miles radius extending from Keauhou to the Kona Village Resort. Nine firefighters man 24-hour shifts every other day for a total of 3 shifts. The station is equipped with a ladder truck, a tanker, a rescue boat, and an Emergency Medical Service (EMS) ambulance.

Other fire stations in the region are located in Keauhou, South Kohala, and Waikoloa. There is also a volunteer-operated fire station located on the Belt Highway that provides back-up support to the Kailua-Kona Station.

Impacts and Mitigation Measures

No significant impacts to fire services are anticipated as a result of the proposed project. The proposed project would likely require the occasional fire protection services which would be minimal in relation to the overall regional demand. Furthermore, the project will be designed and built in compliance with the applicable County of Hawaii fire code requirements.

Cumulative Impacts and Mitigation Measures: The increase in population attributable to the proposed projects in the nearby region, primarily the Liliuokalani Trust and Urban Expansion State Lands, will increase demand on existing fire protection services within the region. The Liliuokalani Trust would work with the County in determining the extent of expansion required and how to best meet future requirements (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands recommends coordination with the County of Hawaii Fire Department to set aside land, if required, to accommodate additional stations for fire protection services (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.3 Health Care Services

The Petition Area is within the service area of the 75-bed Kona Community Hospital located in Kealakekua, approximately 11 miles to the south. Although the hospital provides for most surgical needs, specialty cases are transferred to Honolulu hospitals.

Another medical facility in the region is the North Hawaii Community Hospital in Waimea. The Hospital has 50 beds and provides a full spectrum of acute care services, including a 24-hour emergency room, medical/surgical care, obstetrical/gynecological care, cardiac care, and long-term care.

Impacts and Mitigation Measures

No significant impacts on medical services are anticipated as a result of the proposed project. The project is located within relatively close proximity to existing medical service facilities and will not contribute to any increased need for additional medical service facilities or personnel.

Cumulative Impacts and Mitigation Measures: The increase in resident population primarily as a result of the Urban Expansion State Lands will place additional demands on health care services in the region. The Urban Expansion State Lands recommends that the developer and/or landowner coordinate development activities with the State Department of Health to provide it with lead time to plan for expanded health care facilities in the region (*Urban Expansion State Lands Final EIS*, July 1993). The Liliuokalani Trust development proposes a new regional hospital containing up to 120 beds that would service the West Hawaii area (Liliuokalani Trust Final EIS, October 1990).

3.16.4 Schools

Schools servicing the project area include Kealakehe Elementary, Kealakehe Intermediate and Kealakehe High Schools located approximately 1.9 miles to the southeast. The elementary school's capacity is 1,064 students, and the 1999/2000 school year enrollment is 898 students, putting the school at approximately 84 percent capacity. Kealakehe Intermediate School, with facilities for 1,078 students, is at 86 percent capacity with 930 students. Kealakehe High School opened in 1997, and is currently at 76 percent capacity with a student body numbering 1,119 in grades 9th through 11th. The High School will begin 12th grade instruction during the 2000-2001 school year.

Impacts and Mitigation Measures

No significant impacts on schools are anticipated as a result of the proposed project. The proposed development will not generate a substantial demand for schools as the work force is anticipated to be primarily from the existing population.

Cumulative Impacts and Mitigation Measures: Proposed development in the region, especially those with residential uses, would place a demand on existing school facilities in the region. The Liliuokalani Trust would continue to work with the State Department of Education to assure that adequate public school services are provided (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands indicate the difficulty in predicting the level of additional school facilities that would be required at this time as the land uses for the site have not yet been determined. A recommendation is for the landowner and/or developer of the site to contribute to the development, funding and/or construction of school facilities on a pro-rata basis. (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.5 Recreational Facilities

The Old Kona Airport State Park, located on the site of the former airport, is the only full-service active recreational park in the region. There are five baseball fields, two soccer fields, two football fields, and four tennis courts. Gym facilities include a full-sized basketball court, a multipurpose room, and a small office.

Other State Parks located in Kona include Kealakekua Bay Historic Park, Kekaha Kai State Park, Keolonahihi State Historic Park, and Napoopoo Beach Park. The playfields at Kealakehe High School are also within the vicinity of the Petition Area.

County parks in the region include Disappearing (White) Sands Beach Park, Hookena Beach Park, Kahaluu Beach Park, Manini Point (Napoopoo), Milolii Beach Park, and Pahoehoe Beach Park. The Kona Community Aquatic Center, administered by the County of Hawaii, provides facilities for lap swimming, and also includes a water-play area for young children.

Tennis courts are available at Greenwell Park in Captain Cook, Higashihara Park in Keauhou, and at Kailua Playground. There are also numerous private, semi-private, and resort-owned golf courses in the area which are also open to the public.

The Honokohau Small Boat Harbor is located approximately 1.1 miles southwest of the Petition Area on Honokohau Bay. Approximately 450 berthing slips are provided for both recreational and commercial vessels. The Harbor is administered by the State Department of Transportation (DOT), Harbors Division.

The 1,160-acre Kaloko-Honokohau National Historical Park, located approximately 0.4 mile to the west of the Petition Area, makai of Queen Kaahumanu Highway, is administered by the National Park Service. The Park contains extensive natural and cultural resources, such as archaeological sites, wetlands and fishponds, and nearly all of the land is a designated national historical landmark.

Impacts and Mitigation Measures

No significant impacts on recreational facilities are anticipated as a result of the proposed project. The proposed development will not generate a substantial demand for recreational facilities as the work force is anticipated to be primarily from the existing population.

Cumulative Impacts and Mitigation Measures: An increase in population will likely place a demand on the existing recreational facilities in the region. The Urban Expansion State Lands recommends that the developer and/or landowner coordinate the provision of adequate recreational facilities with the County of Hawaii Department of Parks and Recreation (*Urban Expansion State Lands Final EIS*, July 1993). The Liliuokalani Trust proposes the establishment of a historic preserve and a new park which would add to the recreational opportunities of the area (*Liliuokalani Trust Final EIS*, October 1990).

3.17 Infrastructure and Utilities

3.17.1 Water System

Potable water use is provided by the County of Hawaii Department of Water Supply (DWS) from its North Kona Water System. The Kahaluu Well Field and Kahaluu Shaft, located about 9 miles south of the Petition Area, are the primary sources of supply for the system. Water is transported from the Kahaluu sources through two major pipelines: the upper service line extending along Mamalahoa Highway to Kalaoa (north of Kaloko), and the lower service line extending along Kuakini and Queen Kaahumanu Highways to Kona International Airport at Keahole. The Mamalahoa route includes 12- and 8-inch diameter pipelines. The Kuakini/Queen Kaahumanu route, which starts at the Kahaluu shaft, includes a 24-inch diameter pipeline that reduces to 20 inches 3.5 miles south of Kailua-Kona. The line reduces to 16 inches at Kailua-Kona, and finally to a 12-inch line between the Honokohau Small Boat Harbor and Kona International Airport at Keahole. A series of booster pumps and reservoirs provide support for transmission and storage.

In the vicinity of the Petition Area, the main supply line on Queen Kaahumanu Highway is a 12-inch line. On Hina Lani Street, there are two (2) 1.0 MG water storage tanks located at spillway elevations of 650 feet and 363 feet, as well as one (1) 1.0 MG control tank situated at 138 feet. These are connected by 16- or 20-inch water lines that extend along Hina Lani Street to provide interconnection between the upper and lower service areas. Within the Kaloko Industrial Park, there are various 8- and 12-inch water lines running beneath the existing roads.

Impacts and Mitigation Measures

The proposed project's average daily water demand is estimated to be 328,000 gallons per day (gpd). The project's maximum daily and peak hour flow demands are estimated at 492,000 gpd and 1,640,000 gpd (68,333 gallons per hour or 1,139 gallons per minute), respectively. Adequate water supply is available from the County system, and water commitments for the proposed development have been secured from the County Department of Water Supply. Proposed water system improvements include new 8-inch water lines along the roadway extensions of Olowalu, Kauhola and Maiau Streets, and a new 8-inch water line in the Lawehana Street extension interrupted by the Costco site.

Cumulative Impacts and Mitigation Measures: The County of Hawaii Department of Water Supply has prepared the *Hawaii County Water Use and Development Plan* (1991) which identifies the long-range water facility improvements that will be required to service the region.

According to the County of Hawaii's *Keahole to Kailua Development Plan*, estimated 2010 water demand for the proposed developments in the region is 14.8 mgd, with a maximum daily demand of 22.2 mgd. A series of wells are proposed to be drilled about 2.5 to 3.5 miles inland in the 1,500- to 1,800-foot water resource development zone. In addition to new sources, significant improvements to the existing County transmission system will be required to support the various projects planned in the region. Ancillary water storage and distribution system improvements are also proposed for the region.

Proposed water system improvements will be developed in coordination with the County Department of Water Supply for the proposed projects in the nearby region.

3.17.2 Wastewater System

There are no municipal sewer lines serving the Kaloko Industrial Park. Existing industrial users in the Kaloko Industrial Park employ cesspools for wastewater disposal. The State DOH no longer approves the use of cesspools for sewage disposal, and currently requires the installation of septic tanks and seepage pits/leaching fields or individual wastewater treatment systems.

The Kealakehe Wastewater Treatment Plant is located approximately 1.5 miles south of the Petition Area, makai of Queen Kaahumanu Highway and adjacent to the southern boundary of the Honokohau Small Boat Harbor. The facility has a treatment capacity of 2.8 million gallons per day (mgd), with average daily flows of 1.2 mgd. The facility includes land irrigation as the primary method of disposal for treated effluent, and incorporates the existing collection system of the Kailua-Kona Sewerage System and northward to Honokohau.

Based on preliminary discussions with the County of Hawaii Department of Public Works, the County is initiating plans and discussion for extending sewer service north to Kona International Airport at Keahole. Although there are no firm plans or schedule at this time, the County would require that Kaloko Industrial Park, Phases III and IV, install sewer lines for future connection with the municipal system.

Impacts and Mitigation Measures

As specified by Chapter 62, Hawaii Administrative Rules, the State DOH requires the use of individual wastewater systems in unsewered areas, including septic tanks and aerobic units with disposal systems. The individual property owners and/or tenants of the proposed development will be required to install septic tanks or aerobic units with appropriate disposal systems for their wastewater system in conformance with all State DOH requirements. Measures to educate the property owners/tenants on the proper use of septic tanks and aerobic units would be included in educational brochures or newsletters issued through the proposed development's association. Such measures would focus on the proper/improper

waste products that would be acceptable/unacceptable for disposal in such individual wastewater systems.

In light of the County's plans to extend sewer service to the north of its Kealakehe Wastewater Treatment Plant, the potential requirement for installation of a sanitary sewer system for the Petition Area will be incorporated in project plans. This would allow for the eventual connection of the light industrial subdivision to municipal sewer lines as improvements to the County's collection system develop.

The design average daily wastewater flow and design maximum daily wastewater flow for the proposed project are estimated at 326,000 gpd and 1,338,000 gpd, respectively. The system's peak flow is assumed to be equal to the maximum flow since the effects of dry-weather and inflow and infiltration during heavy rainfall periods are assumed to be negligible due to the relatively low water table in the area.

The County of Hawaii Department of Public Works recently prepared the *Kealakehe Wastewater Treatment Plant Effluent Reuse Master Plan* (Final Report, February 1999) to address water quality concerns in the area and provide irrigation water supply. The County is intending to proceed with the water reuse plan in the near term, with implementation of both the water reuse and sewer collection improvements.

Installation of sewer lines within the existing Kaloko Industrial Park, Phases I and II which will connect to the proposed municipal system will be undertaken through the Improvement District process. The County is currently coordinating with the State Department of Transportation, Highways Division's Queen Kaahumanu Highway widening project to reserve a 60-foot wide corridor for future pipeline installation in connection with the water reuse/sewer collection project.

Cumulative Impacts and Mitigation Measures: The County of Hawaii Department of Public Work's plan to extend sewer service north and ultimately to Kona International Airport at Keahole would allow for future developments in currently unsewered areas to eventually connect to the municipal sewer system. This will also eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

Like the Kaloko Industrial Park, Phases III and IV, the individual businesses within the Kaloko-Honokohau Business Park would be required to install individual wastewater systems until such time that the County's sewer system is extended to the project site. The Business Park will provide for sewer lines within the development which will allow for eventual connection to the County's sewer system.

The cumulative amount of wastewater generated in the region 20 plus years hence would range from 8.3 to 8.8 mgd. The Kealakehe Wastewater Treatment Plant can be expanded to accommodate up to 7.5 mgd, resulting in a potential shortfall of .8 to 1.3 mgd in the 20 plus year development timeframe. According to the County of Hawaii's *Keahole to Kailua Development Plan*, the plant could be expanded to 8 mgd average flow for a 40-year design period. If further increases beyond 8 mgd are required, the plant capacity can be further expanded by conversion of the treatment process from aerated lagoons. (*Kaloko Town Center Final EIS*, September 1996).

In regard to the County of Hawaii Department of Public Work's plan to proceed with its Kealakehe Wastewater Treatment Plant water reuse plan, the County recognizes that the treatment and transmission system should be planned, designed, and installed with the intent of providing for immediate reuse, yet allow for expansion as influent flows increase (*Kealakehe Wastewater Treatment Plant Effluent Reuse Master Plan*, February 1999).

3.17.3 Drainage System

There are no streams or natural drainageways in or near the Petition Area. The surrounding area consists of barren aa and pahoehoe lava fields which are highly permeable. The natural drainage pattern consists of rainfall percolating through the layers of very porous lava to the underground subsurface strata with very little or no ponding and runoff.

In the vicinity of the Petition Area, the only major drainage system is along Queen Kaahumanu Highway, where there is an existing culvert and drainage structure to convey runoff across the Highway from mauka areas. Within the existing Kaloko Industrial Park, drainage systems include storm drain inlets, percolation in dry wells, and some drain lines. The drainage system along Hina Lani Street consists of roadside swales and percolating dry wells that divert runoff to avoid overtopping the roadway and intercept flows from discharging onto the Petition Area.

Impacts and Mitigation Measures

Proposed drainage improvements will include asphaltic concrete roadside swales, drain inlets, and dry wells within the project's roadways. The location and design of these storm drain improvements will be in accordance with guidelines and criteria contained in the County of Hawaii Storm Drainage Standard. As required, a 10-foot wide drainage easement will be provided along the southern boundary of the subject property as a continuation of an existing easement to eventually convey flows from future development of areas east (mauka) of the site.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

Other appropriate BMPs for mitigation purposes could include filtration or infiltration measures, including flow-through based treatments by such means as filters, vegetated swales and other media filters or infiltrators. Flow-through-based water quality control measures require that storm flow be passed through a filtration media or be infiltrated. Storm water is filtered or infiltrated through soil or suitable media capable of filtering pollutants prior to discharge or release into underground or surface water bodies.

Vegetated swales consisting of suitable native plants, grass or ground cover could be installed to provide flow-through treatment in conjunction with dry wells as part of the development of light industrial and commercial facilities.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

Drainage improvements within the individual lots would be installed and maintained by the owners and operators of the industrial-commercial lots.

Cumulative Impacts and Mitigation Measures: Drainage system improvements will be developed for the respective proposed projects in the nearby region. For the Kaloko Industrial Park, Phases III and IV, and Kaloko-Honokohau Business Park projects, appropriate Best Management Practices would be implemented by the respective businesses to mitigate the impacts of storm water runoff discharging pollutants into the ground-water system. To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, separate pollution prevention plans as described under Impacts and Mitigation Measures above will be prepared for use by the individual lot owners and tenants/operators of the two developments.

3.17.4 Roadway System and Traffic

Major roadways providing access to the Petition Area include Queen Kaahumanu Highway, Hina Lani Street, and Mamalahoa Highway (Hawaii Belt Road). Primary access to the Kaloko Industrial Park is from Queen Kaahumanu Highway at its intersection with Hina Lani Street.

Queen Kaahumanu Highway is a two-way, two-lane arterial State highway extending from Kawaihae to Kailua-Kona in a north-south direction. It is the primary highway providing access along the North Kona and South Kohala coasts. A left-turn median storage lane and right-turn acceleration lane are provided at its unsignalized intersection with Hina Lani Street.

Hina Lani Street is a two-way, two-lane County collector road on the north border of the Kaloko Industrial Park, and provides a mauka-makai connection between Queen Kaahumanu Highway and Mamalahoa Highway. Hina Lani Street intersects Queen Kaahumanu Highway at a stop-controlled T-intersection.

Approximately 375 feet mauka of Queen Kaahumanu Highway, Hina Lani Street intersects with Kanalani Street, a two-way, two-lane County roadway providing north-south access through the existing Kaloko Industrial Park. Approximately 0.4 mile mauka of Queen Kaahumanu Highway, Hina Lani Street intersects with Kamanu Street, a two-way, two-lane County roadway traversing in a north-south direction through the existing Kaloko Industrial Park.

Mamalahoa Highway, located about 3.0 miles mauka of Queen Kaahumanu Highway, is a two-way, two-lane State arterial highway that is a continuation of a "belt" road that encircles the Island of Hawaii. Mamalahoa Highway provides the primary route between Waimea and Kailua-Kona.

A traffic impact assessment was conducted in July 2000 to identify potential traffic impacts resulting from the proposed project and provide improvements to mitigate such impacts, as may be required. The traffic impact assessment is included in Appendix G and is summarized below.

The traffic impact assessment analyzed traffic conditions at the following three intersections in the vicinity of the Petition Area during the weekday AM and PM peak traffic hours:

- Queen Kaahumanu Highway and Hina Lani Street
- Hina Lani Street and Kanalani Street
- Hina Lani Street and Kamanu Street

The Transportation Research Board's evaluation concept of Level of Service (LOS), a quantitative and qualitative assessment of traffic operations, was used to describe facility operations. Levels of Service are defined by LOS "A" through "F", indicating a range of traffic conditions from ideal or free-flowing conditions to unacceptable operating conditions, respectively.

The overall traffic conditions at the study intersections during the AM and PM peak traffic hours are summarized in Table 3-9. The AM and PM peak traffic hours generally occur between 7:00 AM and 8:00 AM and 3:30 PM and 4:30 PM, respectively.

Table 3-9
Existing Traffic Conditions

Intersection	Movement	AM LOS	PM LOS
Queen Kaahumanu Hwy./Hina Lani St.	Southbound (LT)	B	B
	Westbound (LT)	F	F
Hina Lani Street/Kanalani Street	Northbound (LT & RT)	B	B
	Westbound (LT & TH)	A	A
Hina Lani Street/Kamanu Street	Northbound (LT)	A	B
	Northbound (RT)		
	Westbound (LT)	A	A
	Westbound (TH)		

At the intersection of Queen Kaahumanu Highway and Hina Lani Street, the southbound left-turn traffic movement at the Highway operates at satisfactory LOS "B" conditions during the AM and PM peak traffic hours. On Hina Lani Street, the westbound left-turn movement operates poorly at LOS "F" conditions during both the AM and PM peak traffic hours.

At the intersection of Hina Lani Street and Kamanu Street, the westbound left-turn and through traffic movement along Hina Lani Street operates at the free-flow condition of LOS "A" during both the AM and PM peak hours. Along the northbound approach of Kamanu Street, the left-turn and right-turn traffic movement operates at LOS "A" and LOS "B" during the AM and PM peak hours, respectively.

Impacts and Mitigation Measures

No significant impacts on traffic are anticipated during construction and operation of the proposed project.

Short-Term Impacts and Mitigation Measures:

During construction of the proposed project, short-term traffic impacts will occur from construction vehicles such as earthmovers and heavy trucks transporting equipment and building materials. These construction vehicles could impede traffic flow since they are relatively slow and difficult to maneuver. This increased traffic should not be significant, but may cause inconveniences to motorists in the vicinity.

To avoid potential traffic congestion, the movement or transport of large, slow-moving, heavy construction vehicles or equipment will be restricted during the AM and PM peak traffic hours. Flaggers or off-duty police officers will be employed to direct traffic during significant phases of construction to minimize traffic congestion.

Long-Term Impacts and Mitigation Measures:

The cumulative impacts of the proposed project with other developments and general projected growth in the region have been accounted for in this traffic impact assessment. The assessment forecasts traffic volumes and conditions without the project as a baseline from which to identify the incremental effects of the project. Traffic volumes were forecast for year 2010, the anticipated full build-out date for the proposed project.

The travel forecast is based upon the average annual traffic growth rate as described in the Hawaii Long Range Land Transportation Plan (HLRLTP). Based upon Statewide population, employment, and visitor forecasts for the Year 2020, the HLRLTP estimates that the average daily traffic on Queen Kaahumanu Highway would increase at an average rate of 3.5 percent per year. Using 2000 as the Base Year, a growth factor of 1.035 was applied to the existing traffic demands per year to achieve the projected Year 2010 traffic demands.

Trip Generation/Trip Distribution: Access to the proposed project would be via Kamanu Street. The directional distribution of all site-generated vehicular trips at the intersection of Kamanu Street with Hina Lani Street was based upon the directional distribution of traffic along Hina Lani Street. At the intersection of Hina Lani Street and Kanalani Street, the site-generated traffic was assumed to be through traffic. The directional distribution of traffic at the intersection of Queen Kaahumanu Highway was assumed to remain the same as existing.

Other Considerations: The proposed adjacent 337-acre Kaloko-Honokohau Business Park, to consist of commercial-industrial mixed uses, will be developed in three phases, the first of which is to be completed by Year 2010. Based on the traffic impact analysis conducted for the Business Park, Phase I of the development is expected to generate 942 and 1,734 trips during the AM and PM peak traffic hours, respectively. These trips were assigned to the street network in the study area and would influence the traffic operations in the vicinity of the Kaloko Industrial Park, Phases III and IV. In addition to the Business Park, there are two other planned improvements to be implemented by the State DOT Highways Division that

would affect traffic operations in the project vicinity. One is the planned installation of a traffic signal system at the intersection of Queen Kaahumanu Highway and Hina Lani Street to increase the carrying capacity of the facility and improve motorist safety (expected by 2001). The other is the planned widening of Queen Kaahumanu Highway from two lanes to four lanes. For the purpose of this traffic impact assessment, these modifications are assumed to have been completed by Year 2010.

Year 2010 Traffic Conditions Without Project: Results of the analysis for LOS during the AM and PM peak traffic hours without the project are summarized in Table 3-10. Traffic operations at the intersection of Queen Kaahumanu Highway and Hina Lani Street are expected to improve significantly for the year 2010 conditions due to the installation of the planned traffic signal system at the intersection and widening of the Highway to four lanes. The left-turn traffic movement on the westbound approach of this intersection is expected to improve from LOS "F" to LOS "B" and LOS "C" during the AM and PM peak hours, respectively. The levels of service at the other two study intersections are not expected to change since the traffic operations along Hina Lani Street should be similar to existing conditions.

Table 3-10
Year 2010 Conditions With and Without Project

Intersection	Movement	AM LOS		PM LOS	
		w/ out project	with project	w/ out project	with project
Queen Kaahumanu Hwy./ Hina Lani St.	Southbound (LT)	B	B	B	C
	Westbound (LT)	B	C	C	C
Hina Lani St./Kanalani St.	Northbound (LT & RT)	B	C	B	C
	Westbound (LT & TH)	A	B	A	A
Hina Lani St./Kamanu St.	Northbound (LT)	A	D	B	B
	Northbound (RT)		A		C
	Westbound (LT)	A	C	A	A
	Westbound (TH)		–		–

Year 2010 Traffic Conditions With Project: The year 2010 cumulative AM and PM peak hour traffic conditions with the proposed project are summarized in Table 3-10. For the purpose of this traffic impact assessment, the intersection of Hina Lani Street with Kamanu Street is assumed to have been restriped to accommodate the increased traffic along the minor street.

During the AM and PM peak traffic hours, traffic operations at the study intersections are expected to be slightly worse than in year 2010 without project conditions. At the intersection of Queen Kaahumanu Highway and Hina Lani Street, the southbound left-turn movement is anticipated to decline from LOS "B" to LOS "C" conditions during the PM peak hour due to the increased traffic on Hina Lani Street. Similarly, the westbound left-turn movement is expected to decline from LOS "B" to LOS "C" conditions during the AM peak hour.

The increase in traffic on Hina Lani Street is also expected to result in a decrease in the LOS for the critical movements at the intersection of Hina Lani Street and Kanalani Street. The LOS for the northbound movement of this intersection is expected to decline from LOS

"B" to LOS "C" during the AM and PM peak traffic hours. The intersection's westbound movement is expected to experience a change from LOS "A" to LOS "B" during the AM peak hour.

Traffic operations at the Hina Lani Street and Kamanu Street intersection are also expected to change in LOS due to the increase in traffic accessing the proposed project. The addition of site-generated traffic from the proposed project to Kamanu Street could affect traffic operations of the critical movements at this intersection. However, the addition of a left-turn refuge lane on Hina Lani Street and the provisions for exclusive left-turn and right-turn lanes on Kamanu Street should mitigate the impact of additional traffic at the intersection. The critical movements at this intersection are expected to operate at acceptable Levels of Service under year 2010 with project conditions.

The following measures are recommended for the proposed project:

1. Maintain adequate sight distances for motorists to safely enter and exit all project driveways and roadways.

2. Restripe Hina Lani Street at the intersection with Kamanu Street to create a left-turn refuge lane for vehicles turning left onto Hina Lani Street. There is sufficient pavement width to accommodate three lanes along this segment of Hina Lani Street. Since the left-turn refuge lane will provide a median on the westbound approach of Hina Lani Street, a left-turn lane could be provided to accommodate vehicles turning left onto Kamanu Street.

3. Restripe Kamanu Street at the intersection with Hina Lani Street to provide exclusive left-turn and right-turn lanes for the approach. There is sufficient pavement width on Kamanu Street to accommodate three lanes at this intersection.

Incorporating the above improvements, the development of the proposed project is expected to have minimal impact on traffic operations in the project vicinity. Despite the projected increase in traffic at the study intersections, the intersections are expected to operate at acceptable levels of service due to the planned improvements at the intersections of Hina Lani Street and Queen Kaahumanu Highway and Hina Lani Street and Kamanu Street.

The impact of industrial vehicles on traffic operations and safety will be addressed in the design of the project roadways. Roadway intersections will be designed to provide adequate turning radii to avoid or minimize vehicle encroachments to oncoming traffic lanes. Adequate sight distances will also be maintained for all project roadways.

3.17.5 Electrical and Communications Systems

Electrical System: Electrical service in the County of Hawaii is provided by the Hawaii Electric Light Company (HELCO). In the vicinity of the Petition Area, electrical power is provided by HELCO's Keahole generating plant, which has a current generating capacity of 86 megawatts. Power to the area is supplied via a 69kV transmission line along Queen Kaahumanu Highway. Existing installations in the area are generally underground facilities except for a few overhead facilities.

Communications System: Telephone service to the area is provided by Verizon Hawaii, Inc. (formerly GTE Hawaiian Telephone Company) from their Kailua-Kona electronic switching facilities. The area is served by trunk cables supported on HELCO's 69 kV poles mauka of Queen Kaahumanu Highway.

Cablevision System: Sun Cablevision is franchised to provide cable television service for the West Hawaii region. Cable television service is provided from their main plant located in Kailua-Kona. Currently, service lines extend north only up to Honokohau Harbor.

Impacts and Mitigation Measures

Electrical System: Electrical power supply and service for the proposed project will be provided via HELCO's existing facilities in the adjacent Kaloko Industrial Park and the 69 kV transmission line along Queen Kaahumanu Highway. The projected power consumption for the proposed development, based on 4,000 KWH/month/lot, is estimated at 328,000 KWH per month. Actual power requirements for the project will depend on the ultimate use of each individual lot.

Preliminary consultation with HELCO indicates that a new substation may be required to service the proposed development. The project therefore may be required to set aside an area dedicated for a substation. The project is proposed to be serviced by overhead power lines. Further requirements for a potential substation, including its location and acreage, and associated electrical improvements will be determined in consultation with HELCO during the project's design phase.

Communications System: According to preliminary consultation with Verizon Hawaii Inc. (formerly GTE Hawaiian Telephone Company), telephone service for the proposed development can be provided utilizing HELCO power poles and a combination of fiber and copper cable and electronic equipment ~~direct burial cables~~. Fiber optic cables are available at the existing Kaloko Industrial Park and could be extended to the proposed project. The developer will be required to set aside an area dedicated for Verizon Hawaii Inc.'s electronic equipment. Further coordination will be conducted with Verizon Hawaii Inc. regarding requirements for telephone service, including an easement location for electronic equipment, during the project's design phase.

Cablevision System: Cable service could be extended from the Kaloko Industrial Park entrance via a fiber-optic loop on Queen Kaahumanu Highway.

Cumulative Impacts and Mitigation Measures: Electrical, telephone and cable services are provided by privately-owned utility companies who plan for and provide services as the demand arises. As demand increases with development in the region, the respective utility companies would develop facilities to meet that demand. Specific requirements for associated electrical, telephone and cable services for the proposed projects in the nearby region would be respectively determined in consultation with the respective utility companies.

4. CONFORMANCE TO PLANS, POLICIES, AND CONTROLS

This section discusses the conformance and consistency of the subject Petition for the Kaloko Industrial Park, Phases III and IV, to the applicable State of Hawaii and County of Hawaii plans, policies and controls.

4.1 Hawaii State Plan

The Hawaii State Plan, embodied in Chapter 226, Hawaii Revised Statutes (HRS), serves as a guide for goals, objectives, policies, and priorities for the State. The State Plan provides a basis for determining priorities, allocating limited resources, and improving coordination of State and County plans, policies, programs, projects, and regulatory activities. The proposed project supports and is consistent with the following State Plan objectives and policies:

SEC. 226-6 Objectives and policies for the economy – in general.

(a) (1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people.

(b) (6) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.

The proposed development will create numerous short- and long-term employment opportunities. During construction of the project's total build-out phase, an estimated 19,345 full-time equivalent direct and 9,673 full-time equivalent indirect jobs will be created. Upon full build-out, the proposed development is anticipated to provide an estimated 2,789 full-time equivalent direct jobs, with an additional approximately 1,399 full-time equivalent indirect jobs to be created.

SEC. 226-11 Objectives and policies for the physical environment – land-based, shoreline, and marine resources.

(b) (6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.

(b) (8) Pursue compatible relationships among activities, facilities, and natural resources.

A buffer zone will be established in the immediate vicinity of the candidate endangered species ko'oko'olau (*Bidens micrantha* subspecies *ctenophylla*) plant located along the Petition Area's eastern boundary. Seeds and cuttings will be propagated from the other three *Bidens* plants located within the Petition Area to preserve its genetic material.

The shielding of exterior lighting within the proposed development will reduce the potential for interactions between the endangered endemic, nocturnally flying Dark-rumped petrels with external lights and man-made structures.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

SEC 226-12 Objectives and policies for the physical environment – scenic, natural beauty, and historic resources.

(b) (3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

(b) (4) Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

The cultural resources of the Petition Area were evaluated through documentary research and oral histories and recommendations have been made for protecting these resources in the cultural impact assessment (see Section 3.10.4 and Appendix F).

SEC. 226-13 Objectives and policies for the physical environment – land, air and water quality.

(b) (3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.

(b) (7) Encourage urban developments in close proximity to existing services and facilities.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

In the *State Land Use District Boundary Review, Hawaii* (Office of State Planning, 1992), the Petition Area has been identified as an area recommended for urban development. Located approximately 3 miles south of the Kona International Airport at Keahole, 3.4 miles north of Kailua-Kona town, and adjacent to the existing Kaloko Industrial Park, Phases I and II, the Petition Area is in close proximity to existing services and facilities.

4.1.1 Hawaii State Plan Priority Guidelines

The establishment of priority guidelines is to address areas of statewide concern. The proposed Kaloko Industrial Park, Phases III and IV development supports or conforms to the following priority guidelines:

SEC. 226-104 Population growth and land resources priority guidelines.

(b) (1) Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures and away from areas where other important benefits are present, such as protection of important agricultural land or preservation of lifestyles.

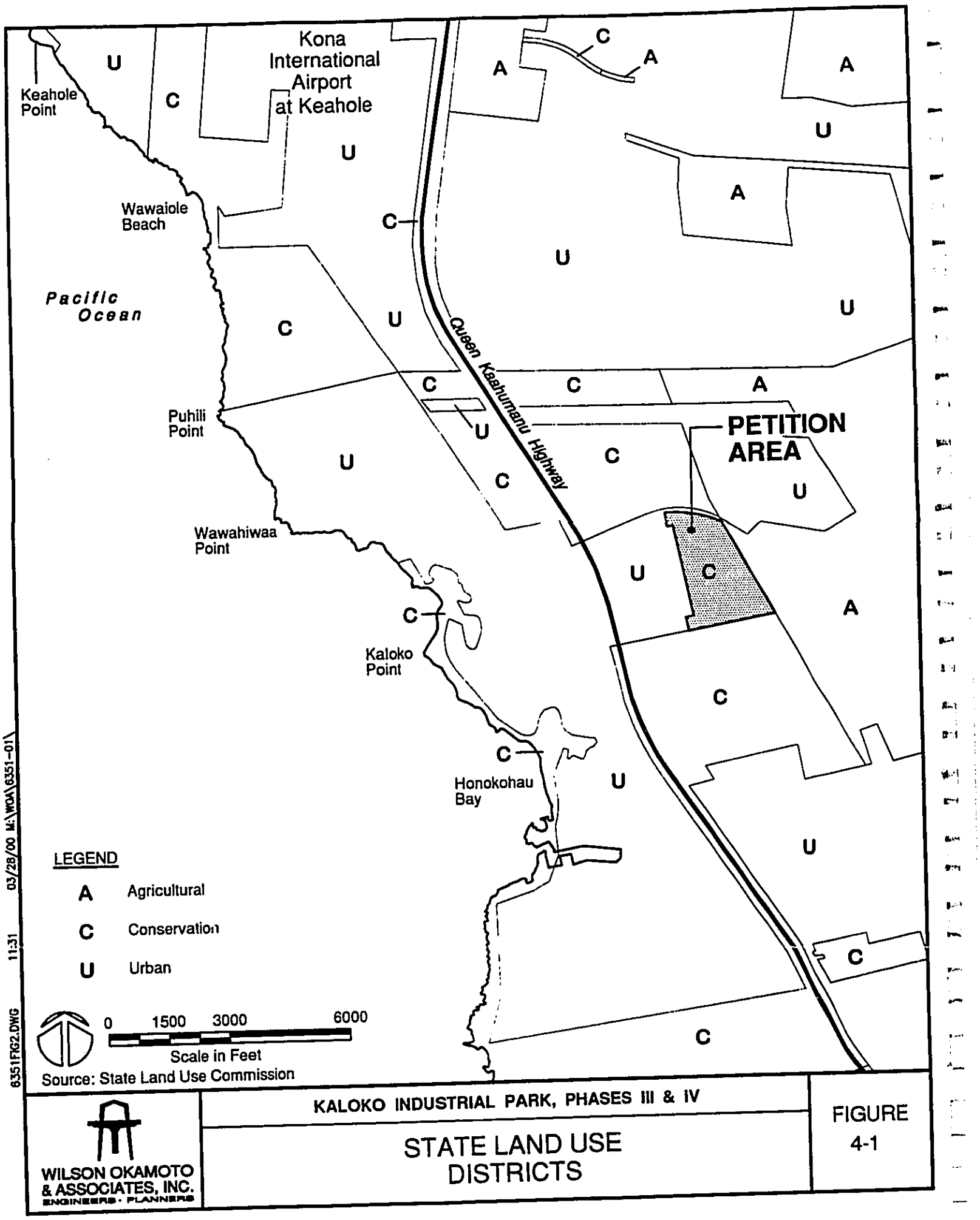
(b) (9) Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.

The Petition Area is located in close proximity to urban areas where adequate public facilities are available, including the adjacent Kaloko Industrial Park, Phases I and II, Kona International Airport at Keahole approximately 3 miles to the north, and Kailua-Kona town approximately 3.4 miles to the south. The Petition Area has been identified as an area recommended for urban development according to the State Office of Planning's Five-Year Boundary Review (1992) which is made within the context of other existing State and County land use policies for the site and the region as a whole.

4.2 State Land Use District

The State Land Use Law, Chapter 205, HRS, is intended to preserve, protect and encourage the development of lands in the State for uses which are best suited to the public health and welfare for Hawaii's people. All lands in the State are classified into four land use districts by the State Land Use Commission: Urban, Agricultural, Conservation, and Rural. The Petition Area is designated within the State Conservation District (see Figure 4-1).

In May 1981, Phases I and II of the Kaloko Industrial Park (130.1 acres) were reclassified from the Conservation District to the Urban District by the State Land Use Commission (Docket A80-482).



KALOKO INDUSTRIAL PARK, PHASES III & IV

STATE LAND USE DISTRICTS

FIGURE 4-1

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In May 1981, Phases III and IV of the Kaloko Industrial Park were also approved for Urban reclassification under the "incremental districting" provisions of the Land Use Commission rules, provided there was substantial completion of on-site and off-site improvements for the first two phases within five (5) years of the approval (Docket A80-482). Since these improvements could not be completed within this timeframe, the property has remained in the Conservation District.

An approximately 8.5-acre roadway parcel was also reclassified from the Conservation District to the Urban District in May 1986 by the Land Use Commission (Docket A80-482) following a motion to redistrict the mauka-makai roadway portion of the Second Increment in Docket A80-482.

A new State Land Use District Boundary Amendment Petition to reclassify the approximately 102.3-acre site for Phases III and IV of the Kaloko Industrial Park from the Conservation District to the Urban District is being requested of the State Land Use Commission.

4.2.1 Conformance to the Urban District Standards

The State Land Use Commission, in accordance with Chapter 15-15, Hawaii Administrative Rules (HAR), must specifically consider the extent to which the proposed reclassification conforms to the applicable district standards. The standards for determining the boundaries for the Urban District include eight areas which are listed and discussed below:

(1) It shall include lands characterized by "city-like" concentrations of people, structures, streets, urban level of services and other related land uses.

The Petition Area is located adjacent to the existing Kaloko Industrial Park, Phases I and II and is approximately 3 miles south of the Kona International Airport at Keahole and 3.4 miles north of Kailua-Kona town, the major commercial and business hub of the region. Urban-designated lands in closer proximity to the Petition Area include approximately 2,640 acres of State-owned land located about 0.8 mile to the north which has been designated for residential, commercial, civic, light industrial, parks, golf course, and university uses. The recently developed Kohanaiki Business Park consisting of 38 acres is approximately 0.5 mile to the north. Adjacent and south of the Petition Area is a quarry operation, followed by the 54-acre Honokohau-Mauka Business Park (0.5 mile to the south).

(2) It shall take into consideration the following specific factors:

(A) Proximity to centers of trading and employment except where the development would generate new centers of trading and employment.

(B) Availability of basic services such as schools, parks, wastewater systems, solid waste disposal, drainage, water, transportation systems, public utilities, and police and fire protection.

(C) Sufficient reserve areas for foreseeable urban growth.

The Petition Area is located adjacent to the existing Kaloko Industrial Park, Phases I and II and lies between and in relatively close proximity to Kailua-Kona town and the Kona International Airport at Keahole, areas of trading and employment. During construction of the project's total build-out phase, an estimated 19,345 full-time equivalent direct and 9,673 full-time equivalent indirect jobs will be created. Upon full build-out, the proposed development is anticipated to provide an estimated 2,789 full-time equivalent direct jobs, with an additional approximately 1,399 full-time equivalent indirect jobs to be created.

The Petition Area is in close proximity to public transportation systems, utilities and services. Queen Kaahumanu Highway is located approximately 0.4 mile mauka of the site, while Mamalahoa Highway is located approximately 3 miles mauka. The County's Puu Anahulu landfill is approximately 18 miles to the north. Police and fire protection services for the Petition Area are available at facilities located approximately 2 miles to the south and 3.5 miles to the southeast, respectively. The nearest schools are located approximately 1.9 miles southeast of the site and a variety of parks are available in the project vicinity. Infrastructure and utilities will largely be an extension of the existing Kaloko Industrial Park.

The Petition Area is a logical extension of urbanization in the region since it lies adjacent to the existing Kaloko Industrial Park and is in close proximity to Kailua-Kona town. The Petition Area was previously approved for urban reclassification under the incremental districting provisions of the Land Use Commission in 1981. The Petition Area has been identified as an area recommended for urban development according to the State Office of Planning's Five-Year Boundary Review (1992) which is made within the context of other existing State and County land use policies for the site and the region as a whole.

(3) *It shall include lands with satisfactory topography, drainage, and reasonably free from the danger of any flood, tsunami, unstable soil condition, and other adverse environmental effects.*

The Petition Area has slopes generally ranging from 5 to 8 percent. The site is located within Zone X, areas determined to be outside the 500-year flood plain according to the FEMA FIRM, and is not subject to coastal hazards such as tsunami inundation. Proposed on-site infrastructure improvements will result in improved drainage and storm runoff conditions.

(4) *Land contiguous with existing urban areas shall be given more consideration than non-contiguous land, and particularly when indicated for future urban use on state or county general plans.*

The Petition Area is contiguous with existing urban areas, including the existing Kaloko Industrial Park, Phases I and II to the west and land designated for a golf course to the northeast, across of Hina Lani Street. The State Office of Planning has recommended as part of its Five-Year Boundary

Review (1992) that the Petition Area and surrounding lands be reclassified to the Urban District. This recommendation is made within the context of other existing State and County land use policies for the Petition Area and the region as a whole. The State Office of Planning's *West Hawaii Regional Plan* directs future urbanization to the Kailua-Kona to Keahole Subregional Planning Area. Within the County's current and proposed revised General Plan Land Use Pattern Allocation Guide Map (LUPAG), the Petition Area is designated as Industrial. The County's *Keahole to Kailua Development Plan* designates the Petition Area for Limited Industrial and Urban Expansion.

(5) *It shall include lands in appropriate locations for new urban concentrations and shall give consideration to areas of urban growth as shown on the state and county general plans.*

The Petition Area is consistent with the designation of new urban concentrations and urban growth areas as shown on State and County land use plans. The 1992 State Office of Planning's Five-Year Boundary Review recommends that the region extending from Keahole to Kailua, which includes the Petition Area, be reclassified to the Urban District. The proposed reclassification of the Petition Area is also consistent with the intent of the State Office of Planning's *West Hawaii Regional Plan* in identifying areas that are appropriate for future urban expansion. Furthermore, the County's current and proposed revised General Plan's LUPAG and *Keahole to Kailua Development Plan* designate the Petition Area as Industrial, and for Limited Industrial and Urban Expansion, respectively.

(6) *It may include lands which do not conform to the standards in paragraphs (1) to (5):*

(A) *When surrounded by or adjacent to existing urban development; and*

(B) *Only when those lands represent a minor portion of this district.*

The Petition Area conforms to the referenced paragraphs (1) to (5).

(7) *It shall not include lands, the urbanization of which will contribute toward scattered spot urban development, necessitating unreasonable investment in public infrastructure or support services.*

The Petition Area is contiguous with existing Urban areas, including the existing Kaloko Industrial Park, Phases I and II to the west and land designated for a golf course to the northeast, across of Hina Lani Street. Therefore, the Petition Area is a logical extension of urbanization in the vicinity and will not contribute toward scattered spot urban development. The proposed development will include all required on- and off-site infrastructure improvements to minimize the burden on public systems which may be affected by the project. The proposed project is not anticipated to have any significant impacts on public services in the area.

(8) It may include lands with a general slope of twenty per cent or more if the commission finds that those lands are desirable and suitable for urban purposes and that the design and construction controls, as adopted by any federal, state, or county agency, are adequate to protect the public health, welfare and safety, and the public's interests in the aesthetic quality of the landscape.

The Petition Area occupies an area of relatively uniform slope, ranging from 5 to 8 percent, and would therefore be suitable for urban development.

4.3 Five-Year State Land Use District Boundary Review

In 1992, a State Land Use District Boundary Review was undertaken for the Island of Hawaii by the Office of State Planning (now Office of Planning). Section 205-18, HRS, of the State Land Use Law, requires the State Office of Planning (OP) to undertake a review of the classification and districting of all land in the State every five years. The review provides the Land Use Commission the opportunity to review urbanization proposals from a broad, comprehensive and long-range viewpoint rather than incrementally on a case-by-case basis. It also provides an opportunity to identify conservation or agricultural resources which are not in the appropriate land use district and should be reclassified.

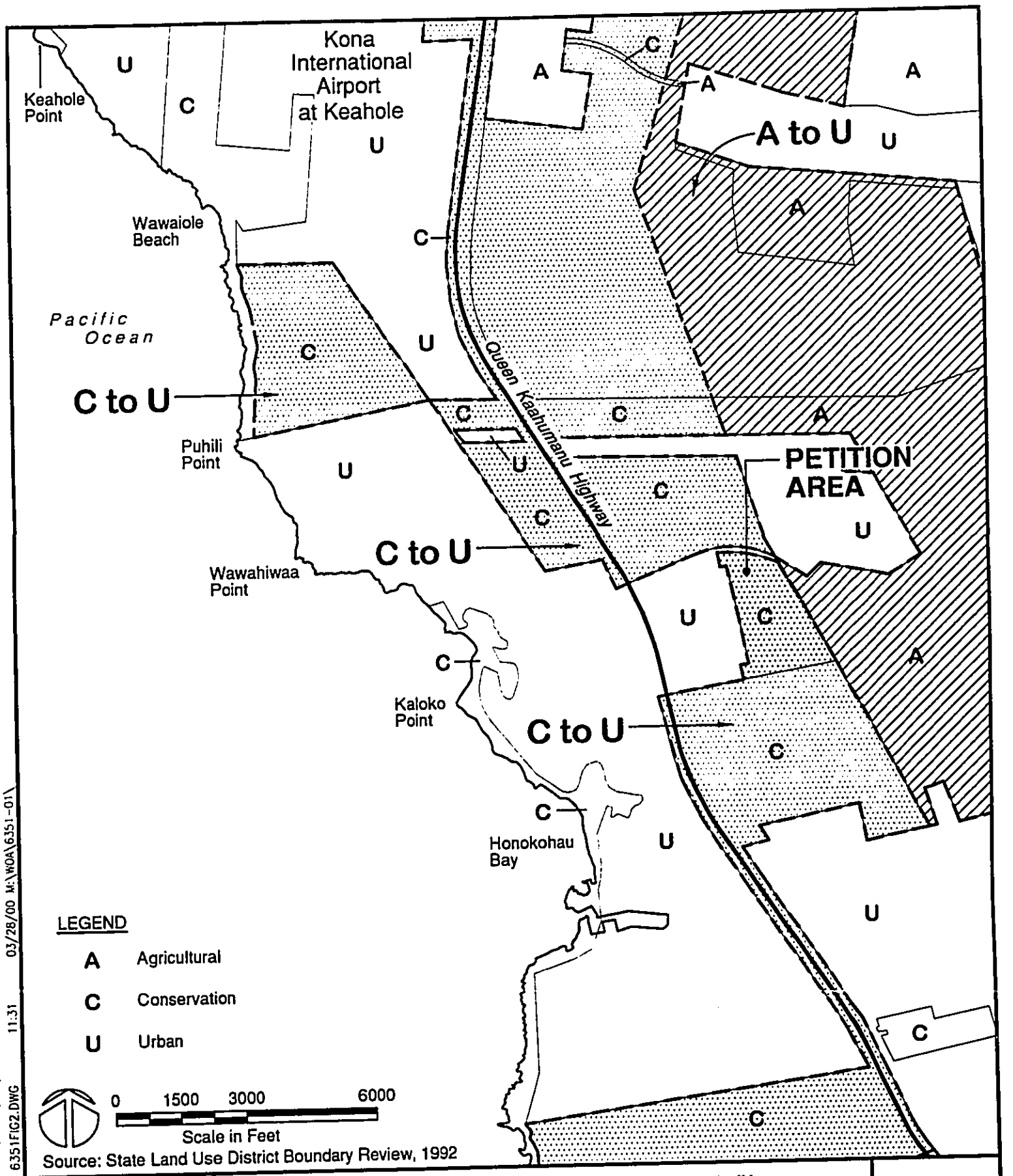
According to the 1992 State Land Use District Boundary Review, there were 30 recommendations to reclassify lands from the Agricultural or Urban Districts to the Conservation District (17 in the West Hawaii region alone) and three recommendations for reclassification of lands from the Agricultural and Conservation Districts to the Urban District. Included among the recommended reclassification of lands from the Conservation and Agricultural Districts to the Urban District is the region extending from Keahole to Kailua (9,563.5 acres total), which includes the Petition Area (see Figure 4-2). According to the Boundary Review, the recommended reclassification meets the standards and criteria for the Urban District contained in Section 205-2, HRS, Section 205-17, HRS, and Sections 15-15-18 (2, 3, 4, 5, 6, and 7) of Chapter 15-15, HAR, and is consistent with the State Office of Planning's *West Hawaii Regional Plan*, the County's *Keahole to Kailua Development Plan*, and the County's Development Plan.

4.4 Hawaii Coastal Zone Management Program

Hawaii's Coastal Zone Management (CZM) Program, established pursuant to Chapter 205A, HRS, as amended, is administered by the State Office of Planning (OP) and provides for the beneficial use, protection and development of the State's coastal zone. The objectives and policies of the Hawaii CZM Program encompass broad concerns such as impact on recreational resources, historic and archaeological resources, coastal scenic resources and open space, coastal ecosystems, coastal hazards, and the management of development. The proposed project conforms with the following applicable CZM objectives and policies:

1. Recreational Resources

Objective: Provide coastal recreational opportunities accessible to the public.



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KALOKO INDUSTRIAL PARK, PHASES III & IV

STATE LAND USE DISTRICT BOUNDARY REVIEW

FIGURE 4-2

Policies:

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

> *(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters.*

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

2. *Historic Resources*

Objective: Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

(A) Identify and analyze significant archaeological resources.

(B) Maximize information retention through preservation of remains and artifacts or salvage operations.

(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Based on the criteria established pursuant to Chapter 275-6 (d), State DLNR, Rules Governing Procedures for Historic Preservation Review, all of the archaeological sites identified within the Petition Area are assessed as solely significant under Criterion "d": "*Have yielded, or is likely to yield, information important for research on prehistory or history.*" These sites have yielded information important for understanding late prehistoric to historic land use in the Petition Area. The mapping, written descriptions, photography, and test excavation at 32 of the 40 sites adequately documents them and no further work or preservation is recommended. Eight sites retain the potential to yield information important for understanding prehistoric and historic land use. If these sites are not preserved, then limited data recovery is recommended. Data recovery at these sites, which would entail surface collection and excavation where deposits are present, would be guided by a Data

Recovery Plan prepared for review and approval by the DLNR Historic Preservation Division.

3. *Scenic and Open Space Resources*

Objective: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. Additionally, the landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

4. *Coastal Ecosystems*

Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

(C) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs.

(D) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures

mandated by applicable Federal, State and local regulations related to the project; and recommended Best Management Practices and controls appropriate for the project.

6. Coastal Hazards

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Policies:

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards.

(D) Prevent coastal flooding from inland projects.

The Petition Area is located within Zone X, areas determined to be outside the 500-year flood plain according to the FEMA FIRM, and is not subject to coastal hazards such as tsunami inundation. Proposed on-site infrastructure improvements will result in improved drainage and storm runoff conditions. To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommended Best Management Practices and controls appropriate for the project.

4.5 West Hawaii Regional Plan

The *West Hawaii Regional Plan*, prepared by the Office of State Planning (now Office of Planning) in November 1989, was formulated in response to the following:

- to coordinate State activities in the region in order to respond more effectively to emerging needs and critical problems;
- to address areas of State concern;
- to coordinate the Capital Improvements Program within a regional planning framework; and
- to provide guidance in State land use decision-making processes.

The *West Hawaii Regional Plan* is also intended to complement the County of Hawaii's General Plan and Community Development Plans.

The planning area of the West Hawaii Regional Plan encompasses the judicial districts of North Kohala, South Kohala and North Kona. In 1989, this area was anticipated to undergo

major changes in the landscape and lifestyle as a result of increased development of resorts along the coastline and residential communities in the mauka areas.

In response to anticipated changes, the plan noted that existing communities such as Kailua-Kona would be the first to expand into a mix of uses in order to support resort development, housing development, industrial development, agricultural development, and a host of ancillary services. To protect agricultural activities, culturally-rich heritage areas, and special environmental resource areas, the Regional Plan identified Subregional Planning Areas that could be planned and developed to accommodate urban growth without encroaching upon natural and cultural resources that are important to the continued vitality of the area. The Petition Area is located within the designated Subregional Planning Area of Kailua-Kona to Keahole (see Figure 4-3). The Petition Area's reclassification is thus consistent with the intent of the *West Hawaii Regional Plan* in identifying areas that are appropriate for future urban expansion.

4.6 County of Hawaii General Plan

The County of Hawaii General Plan was adopted by the Hawaii County Council in November 1989. The Plan contains goals, policies and standards to guide the development of the County in 13 areas: economic, energy, environmental quality, flood control and drainage, historic sites, natural beauty, natural resources and shoreline, housing, public facilities, public utilities, recreation, transportation, and land use.

Goals, Policies and Standards:

The proposed project is consistent with the following relevant goals, policies and standards of the General Plan:

A. *Economic* (County of Hawaii General Plan)

Goals:

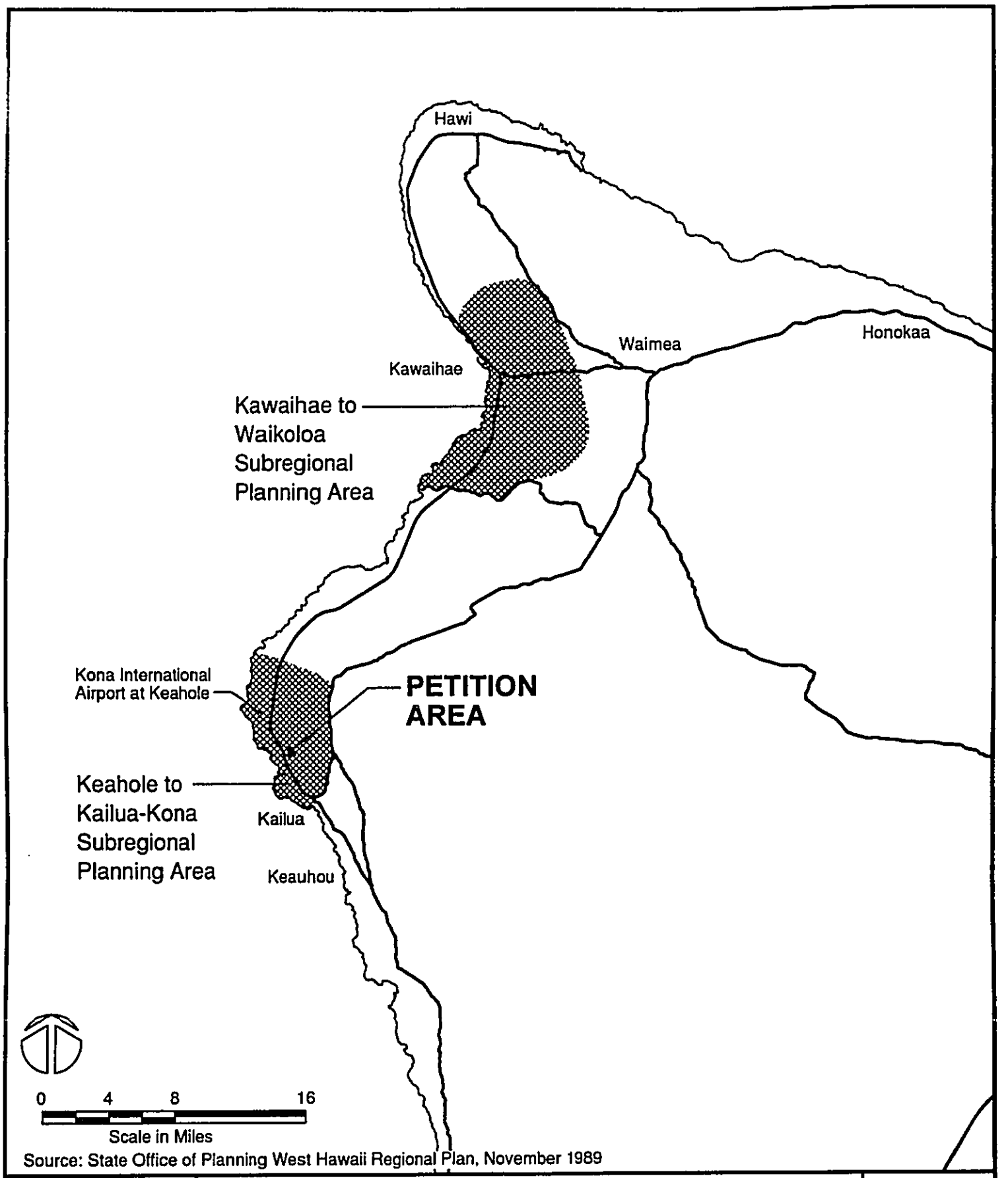
- *Provide residents with opportunities to improve their quality of life.*
- *The County shall provide an economic environment which allows new, expanded, or improved economic opportunities that are compatible with the County's natural and social environment.*

Policies:

- *The County shall strive for full employment.*
- *The County shall identify and encourage primary industries that are consistent with the social, physical, and economic goals of the residents of the County.*

Standards:

- *New industries which provide favorable benefit-cost relationships to the people of the County should be encouraged. Benefit-cost relationships as used here include more than fiscal considerations.*



Source: State Office of Planning West Hawaii Regional Plan, November 1989

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KALOKO INDUSTRIAL PARK, PHASES III & IV

WEST HAWAII REGIONAL PLAN

FIGURE 4-3

The proposed project will be a significant source of employment for the region during the construction and operation phases. During construction of the project's total build-out phase, an estimated 19,345 full-time equivalent direct and 9,673 full-time equivalent indirect jobs will be created. Upon full build-out, the proposed development is anticipated to provide an estimated 2,789 full-time equivalent direct jobs, with an additional approximately 1,399 full-time equivalent indirect jobs to be created.

Direct economic benefits will result from construction expenditures both through the purchase of material from local suppliers and through the employment of local labor. Indirectly, these wages, profits, and expenditures will have a multiplier effect through increased capital flowing through the region. These substantial direct and indirect economic impacts are a result of capital investment and entrepreneurship necessary to convert undeveloped lands into a competitive industrial park. Furthermore, the Hawaii Island economy would be stimulated by the capital investments and business operations of the proposed development.

D. *Flood Control and Drainage* (County of Hawaii General Plan)

Goals:

- *Control pollution.*
- *Reduce surface water and sediment runoff.*

Policies:

- *All development-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works.*

Standards:

- *"Storm Drainage Standards," County of Hawaii, October, 1970, and as revised.*
- *Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawaii County Code.*

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommended Best Management Practices and controls appropriate for the project.

E. *Historic Sites* (County of Hawaii General Plan)

Goals:

- *Protect and enhance the sites, buildings and objects of significant historic and cultural importance to Hawaii.*

Policies:

- *The County of Hawaii shall require both public and private developers of land to provide a historical survey prior to the clearing or development of land when there are indications that the land under consideration has historical significance.*

Standards:
The evaluation of the importance of specific historic sites is necessary for future action. The following standards establish a framework for evaluating sites.

- *Unique example of a particular style or period.*
- *Sites of traditional and cultural significance.*

Pursuant to the archaeological inventory survey conducted of the Petition Area, all of the archaeological sites identified within the site have yielded information important for understanding late prehistoric to historic land use in the Petition Area. Eight sites retain the potential to yield information important for understanding prehistoric and historic land use. If these sites are not preserved, then limited data recovery is recommended. Data recovery at these sites, which would entail surface collection and excavation where deposits are present, would be guided by a Data Recovery Plan prepared for review and approval by the DLNR Historic Preservation Division.

The cultural resources of the Petition Area were evaluated through documentary research and oral histories and recommendations have been made for protecting these resources in the cultural impact assessment (see Section 3.10.4 and Appendix F).

G. *Natural Resources and Shoreline* (County of Hawaii General Plan)

Goals:

- *Provide opportunities for the public to fulfill recreational, economic, and educational needs without despoiling or endangering natural resources.*
- *Protect rare or endangered species and habitats native to Hawaii.*
- *Ensure that alterations to existing land forms and vegetation, except crops, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of earthquake.*

Policies:

- *The County of Hawaii should require users of natural resources to conduct their activities in a manner that avoids or minimizes adverse effects on the environment.*

Standards:
The following shall be considered for the protection and conservation of natural resources.

- *The Coastal Zone and Special Management Area as defined by statute and in accordance with the adopted objectives and guidelines.*

A buffer zone will be established in the immediate vicinity of the ko'oko'olau (*Bidens micrantha* subspecies *ctenophylla*), a candidate endangered plant species, located along

the Petition Area's eastern boundary. Seeds and cuttings will be propagated from the other three *Bidens* plants located within the Petition Area to preserve its genetic material.

The shielding of exterior lighting within the proposed development will reduce the potential for interactions between the endangered endemic, nocturnally flying Dark-rumped petrels with external lights and manmade structures.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommended Best Management Practices and controls appropriate for the project.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

The Petition Area is not located in a flood hazard area. The structures in the proposed development will be designed and built to resist forces to seismic Zone 4 standards in accordance with the Hawaii County Building Code.

The Petition Area is located outside the boundaries of the County of Hawaii's Special Management Area. A discussion of the proposed project's conformance with the applicable Coastal Zone Management objectives and policies is included in Section 4.4.

M. *Land Use* (County of Hawaii General Plan)

Goals:

- *Designate and allocate land uses in appropriate proportions and mix and in keeping with the social, cultural, and physical environments of the County.*

Policies:

- *Zone urban- and rural-types of uses in areas with ease of access to community services and employment centers and with adequate public utilities and facilities.*
- *Allocate appropriate requested zoning in accordance with the existing or projected needs of neighborhood, community, region and County.*

Standards:

- *The designated land uses will be delineated on the General Plan Land Use Pattern Allocation Guide Map. The broad-brush boundaries indicated are graphic expressions of the General Plan policies, particularly those relating to land uses. They are long-range guides to general location and will be subject to: a) existing zoning; b) State Land Use District; and c) zone guide map and interpretation. Similarly, the acreages allocated represent alternatives for the various levels of economic activity and supporting functions, such as resort, residential, commercial and industrial activities.*
- *Zoning requests shall be reviewed with respect to General Plan designation, district goals, regional plans, State Land Use District, compatibility with adjacent zoned lands, availability of public services and utilities, access, and public need.*

The Petition Area is consistent with the designation of new urban concentrations and urban growth areas as shown on State and County land use plans. The State Office of Planning has recommended as part of its Five-Year Boundary Review (1992) that the Petition Area and surrounding lands be reclassified to the Urban District. This recommendation is made within the context of other existing State and County land use policies for the Petition Area and the region as a whole. The State Office of Planning's *West Hawaii Regional Plan* directs future urbanization to the Kailua-Kona to Keahole Subregional Planning Area. In the County's current and proposed revised General Plan, the LUPAG designates the Petition Area as Industrial. The County's *Keahole to Kailua Development Plan* designates the Petition Area for Limited Industrial and Urban Expansion. The Petition Area is also in proximity to existing urban areas, including the adjacent Kaloko Industrial Park, Phases I and II, Kona International Airport at Keahole to the north, and Kailua-Kona town to the south.

(3) *Industrial* (County of Hawaii General Plan)

Goals:

- *Designate and allocate industrial areas in appropriate proportions and in keeping with the social, cultural, and physical environments of the County.*

Policies:

- *The County shall support the creation of industrial parks in appropriate locations as an alternative to strip development.*
- *Through its zoning powers, the County shall locate industrial areas convenient to transportation facilities, and provide a variety of industrial zoned districts and lot sizes, depending on the needs of the industries and the communities.*
- *The County shall attempt to improve the aesthetic quality of industrial sites and protect amenities of adjacent areas by requiring landscaping, open spaces, buffer zones, and design guidelines.*
- *Industrial development shall be located in areas adequately served by transportation, utilities, and other amenities. Redeveloping or newly developing areas shall be developed in concert with programmed public and privately funded infrastructure to meet the expected needs.*

Standards:

- *Industrial development shall maintain or improve the quality of the present environment.*
- *Industrial activities may be located close to raw materials or key resources.*
- *Topography of industrial land shall be reasonably level.*
- *Industrial development shall be conveniently located to its labor resource.*

The Petition Area is located adjacent to the existing Kaloko Industrial Park and is centrally sited within the emerging Kailua-Kona to Keahole industrial/commercial corridor. Convenient vehicular access to the site is provided by Queen Kaahumanu Highway, the main arterial along the North Kona coast, and Hina Lani and Kamanu Streets. Infrastructure and utilities will largely be an extension of the existing Kaloko Industrial Park. The Petition Area occupies an area of relatively uniform slope, ranging from 5 to 8 percent.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

The Petition Area's close proximity to Kailua-Kona town and the various residential developments located upslope and mauka is favorable from a labor resource standpoint.

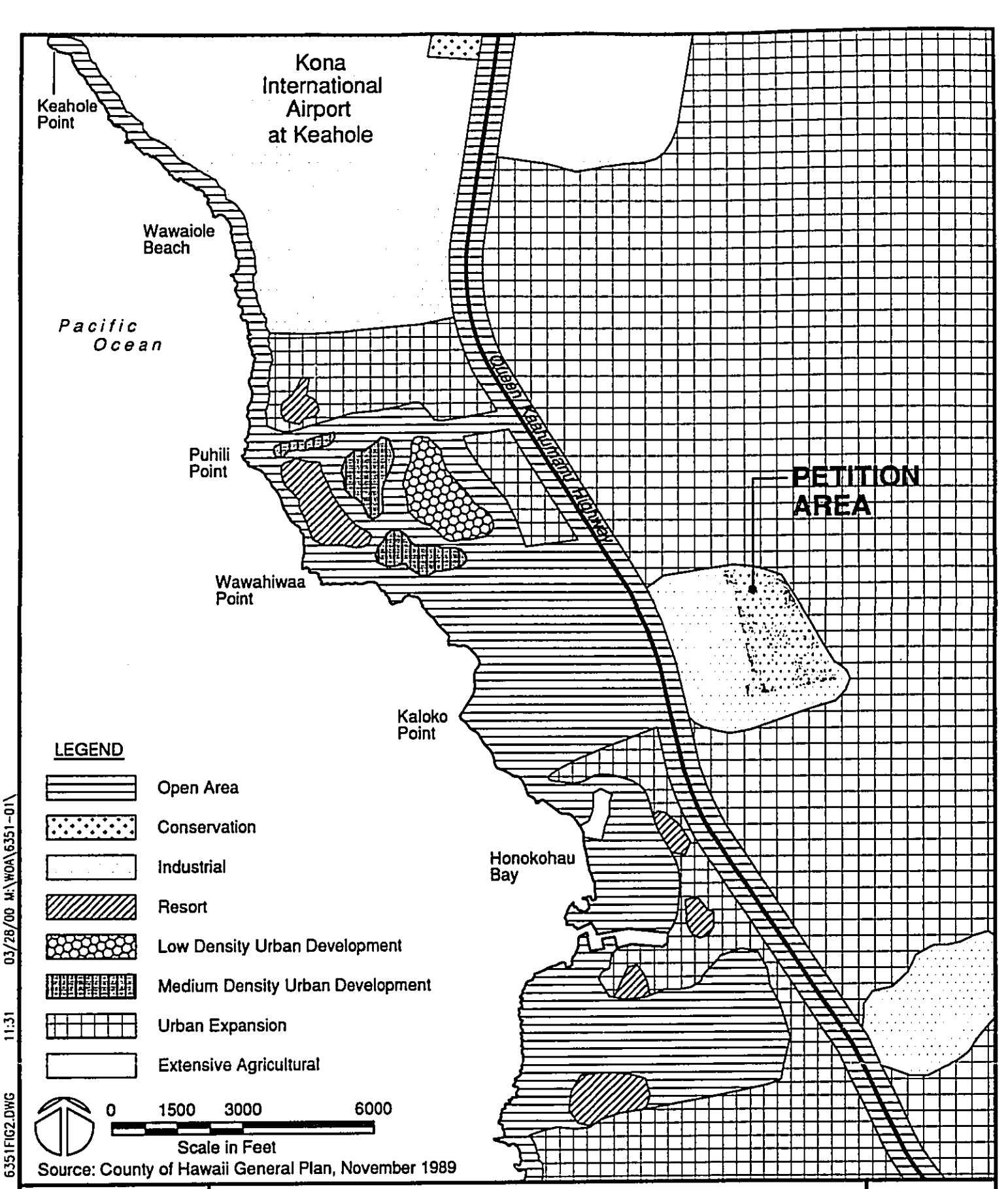
4.6.1 General Plan Land Use Pattern Allocation Guide Map

The General Plan Land Use Pattern Allocation Guide Map (LUPAG) delineates broad-brush boundaries that are graphic expressions of the General Plan policies, particularly those relating to land uses. The land use pattern is a broad, flexible design intended to guide the direction and quality of future developments in a coordinated and rational manner. These maps delineate a number of land use categories for each area.

The LUPAG Map designates the Petition Area as Industrial (see Figure 4-4). Industrial areas include uses such as manufacturing and processing, wholesaling, large storage and transportation facilities, and light industrial uses. The proposed project is consistent with the LUPAG Industrial designation.

4.6.2 County of Hawaii General Plan Revision Program

The existing County of Hawaii General Plan is currently undergoing revision by the County of Hawaii Planning Department in accordance with the Plan which sets forth that a comprehensive review should commence every ten years. Last amended in November 1989, a preliminary review of the General Plan was initiated by the County Planning Department in January 1998.



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COUNTY GENERAL PLAN LAND USE PATTERN ALLOCATION GUIDE

FIGURE 4-4

A preliminary draft of the *County of Hawaii General Plan Revision Program* was prepared by the County Planning Department in September 2000. The preliminary draft revisions to the General Plan include the following: a profile update for each of the elements; amendments to the goals, policies, standards, and courses of action; revision to the General Plan amendment procedures; revision to the land use designations; amendments to the Land Use Pattern Allocation Guide (LUPAG) Map; and, revisions to the Facilities Map. Following a series of public workshops, the draft revised General Plan will be processed through the County Planning Commission and, subsequent to public hearings, then to the County Council for ordinance adoption.

The proposed project is consistent with the following relevant amended goals, policies, standards, and courses of action of the preliminary draft *County of Hawaii General Plan Revision Program*:

Economic Element

Goals

- *Provide residents with opportunities to improve their quality of life **through economic development which shall be compatible with the County's natural and social environments**.*

Policies

- *The County shall support all levels of educational, **employment and training** opportunities and institutions for its residents.*

The proposed project will be a significant source of employment for the region during the construction and operation phases. During construction of the project's total build-out phase, an estimated 19,345 full-time equivalent direct and 9,673 full-time equivalent indirect jobs will be created. Upon full build-out, the proposed development is anticipated to provide an estimated 2,789 full-time equivalent direct jobs, with an additional approximately 1,399 full-time equivalent indirect jobs to be created.

Direct economic benefits will result from construction expenditures both through the purchase of material from local suppliers and through the employment of local labor. Indirectly, these wages, profits, and expenditures will have a multiplier effect through increased capital flowing through the region. These substantial direct and indirect economic impacts are a result of capital investment and entrepreneurship necessary to convert undeveloped lands into a competitive industrial park. Furthermore, the Hawaii Island economy would be stimulated by the capital investments and business operations of the proposed development.

The proposed project will be compatible with the natural and social environments of the area. To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective

building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

As most of the employees of the proposed development are expected to be from within the region, the project is not anticipated to induce increased population growth or associated development in the area.

Environmental Quality Element

Goals
- ***Control pollution.***

Policies
- *Encourage the concept of recycling agricultural, **industrial**, and municipal waste material.*

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

The individual landowners and/or tenants will be responsible for arranging the collection and disposal of the industrial-type solid waste to be generated by the respective businesses. The individual tenants will be encouraged to institute resource conservation measures to promote environmentally sensitive and energy efficient design, such as low-flush toilets, energy-efficient fixtures, and facilities for recycling. Such measure would be included in educational brochures or newsletters through the proposed development's association.

Flood Control and Drainage Element

Goals
- *[Control pollution.]*

Policies
- *[All development] **Development**-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works.*

Proposed drainage improvements will include asphaltic concrete roadside swales, drain inlets, and dry wells within the project's roadways. The location and design of these storm drain improvements will be in accordance with guidelines and criteria contained in the County of Hawaii Storm Drainage Standard.

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

Historic Sites Element

Goals

- *Protect, **restore**, and enhance the sites, buildings, and objects of significant historical and cultural importance to Hawaii.*

Pursuant to the archaeological inventory survey conducted of the Petition Area, all of the archaeological sites identified within the site have yielded information important for understanding late prehistoric to historic land use in the Petition Area. Eight sites retain the potential to yield information important for understanding prehistoric and historic land use. If these sites are not preserved, then limited data recovery is recommended. Data recovery at these sites, which would entail surface collection and excavation where deposits are present, would be guided by a Data Recovery Plan prepared for review and approval by the DLNR Historic Preservation Division.

The cultural resources of the Petition Area were evaluated through documentary research and oral histories and recommendations have been made for protecting these resources in the cultural impact assessment (see Section 3.10.4 and Appendix F).

Natural Resources and Shoreline Element

Goals

- *Provide opportunities for [the public to fulfill] recreational, economic, and educational needs without despoiling or endangering natural resources.*
- *Protect and effectively manage Hawaii's open space, watersheds, **shorelines**, and natural areas.*
- *Ensure that alterations to existing land forms, [and] vegetation, [except crops,] and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of earthquake.*

To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) could be used, including on-site polluting mitigating measures to control erosion and transport of fines, silt, sediments, and other pollutants which could adversely impact ground water or surface State waters.

To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

The Petition Area is not located in a flood hazard area. The structures in the proposed development will be designed and built to resist forces to seismic Zone 4 standards in accordance with the Hawaii County Building Code.

Public Utilities Element

Goals

- *Ensure that **properly regulated**, adequate, efficient and dependable public **and private** utility services [will be] **are** available to users.*

Utilities: Sewer

Policies

- *The County shall **continue to** seek State and Federal funds to assist in financing the construction of proposed sewer systems **and to improve existing systems**.*

Standards

- ***Applicable standards and regulations of the State Department of Health, Chapter 62, HRS, "Wastewater Systems".***
- ***All wastewater disposal systems shall conform to the applicable provisions of Chapter 11-62, Hawaii Administrative Rules for the Department of Health to ensure proper treatment and disposal of wastewater and to prevent further contamination of waterways and underground water sources.***

North Kona

- ***Expand the existing sewer collection system.***
- ***Construct a reclaimed water distribution system to service the area between Kailua and Keahole.***

Utility services to the proposed project will largely be an extension of the adjacent existing Kaloko Industrial Park.

Until such time that the municipal sewer system is extended to the Kaloko Industrial Park, the individual property owners and/or tenants of the proposed development will be required to install septic tanks or aerobic units with appropriate disposal systems for their wastewater system in conformance with all State Department of Health requirements as specified by Chapter 62, Hawaii Administrative Rules. Measures to educate the property owners/tenants on the proper use of septic tanks and aerobic units would be included in educational brochures or newsletters issued through the proposed development's association. Such measures would focus on the proper/improper waste products that would be acceptable/unacceptable for disposal in such individual wastewater systems.

The County of Hawaii Department of Public Works is currently initiating plans to extend sewer service north of its Kealakehe Wastewater Treatment Plant. In light of this, the installation of a sanitary sewer system for the Petition Area will be incorporated in the project plans. This would allow for eventual connection of the light industrial subdivision to municipal sewer lines as improvements to the County's collection system develop. In accordance with the *Kealakehe Wastewater Treatment Plant Effluent Reuse Master Plan* (Final Report, February 1999) prepared by the County Department of Public Works, the County is intending to proceed with the water reuse plan in the near term, with implementation of both the water reuse and sewer collection improvements.

Land Use (Introduction) Element

Policies

- *Zone urban- [and rural-] types of uses in areas with ease of access to community services and employment centers and with adequate public utilities and facilities.*

The Petition Area is in proximity to existing urban areas, including the adjacent Kaloko Industrial Park, Phases I and II, Kona International Airport at Keahole to the north, and Kailua-Kona town to the south.

Land Use (Industrial) Element

Policies

- *Industrial development shall be located in areas adequately served by transportation, utilities, and other [amenities] **essential infrastructure**. [Redeveloping or newly developing areas shall be developed in concert with programmed public and privately funded infrastructure to meet the expected needs.]*

Convenient vehicular access to the Petition Area is provided by Queen Kaahumanu Highway, the main arterial along the North Kona coast, and Hina Lani and Kamanu Streets. Infrastructure and utilities will largely be an extension of the adjacent existing Kaloko Industrial Park.

Land Use Pattern Allocation Guide (LUPAG) Map: The LUPAG Map of the *County of Hawaii General Plan Revision Program* retains the Industrial designation of the Petition Area of which the proposed project is consistent with.

4.7 Keahole to Kailua Development Plan

The *Keahole to Kailua Development Plan*, prepared by the County of Hawaii Planning Department, was adopted by resolution by the Hawaii County Council in April 1991. The Development Plan is intended to serve as an implementing tool for the County General Plan and be a flexible guide for the future growth and development of the area.

The *Keahole to Kailua Development Plan* encompasses an area of approximately 17,000 acres in the North Kona District extending from the Kau ahupuaa to the north, Mamalahoa Highway to the east, Palani Road and Kailua Village to the south, and the shoreline to the west. The overall goal established for the Development Plan is as follows:

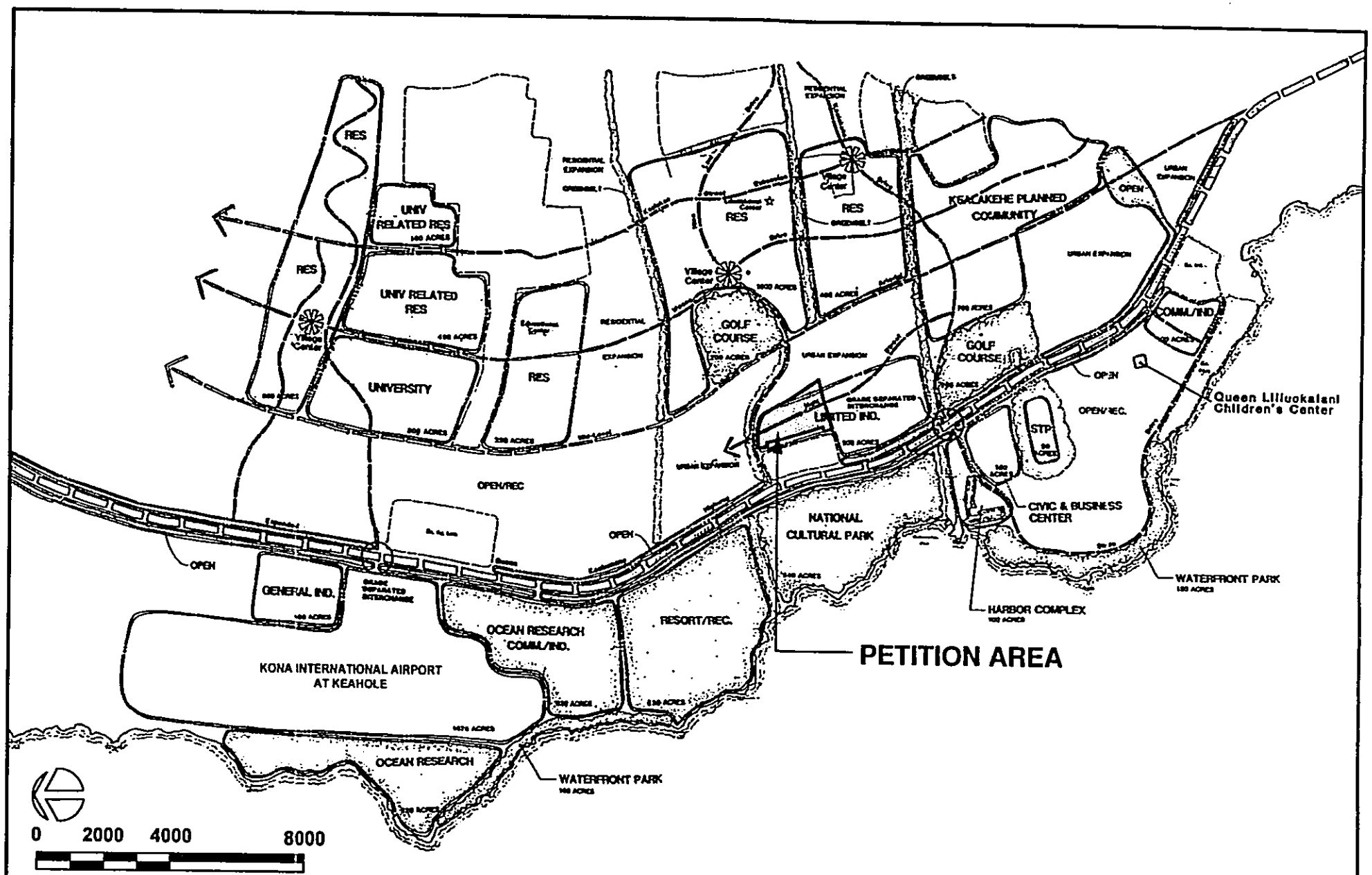
> *"To develop a mixed residential, commercial, resort, industrial and recreational community, with approximately 8,000 or more residential units, in a functional, attractive, and financially viable manner. The community will include appropriate shoreline uses, public facilities, and infrastructure and will be built out over the next 20 years."*

Within the Development Plan's project area, the Petition Area is designated on the Land Use Plan for "Limited Industrial", with a strip along the eastern portion designated for "Urban Expansion" (see Figure 4-5). "Urban Expansion" denotes the land's general suitability for urban development, although no specific urban uses have been recommended in the Plan. As the Development Plan does not recommend expansion of the existing leasehold industrial park adjacent to Kailua Village, it depicts instead the expansion of the existing Kaloko Industrial Park.

The Development Plan also assumes that some of the wider regional demand for industrial space will have to be satisfied within this planning area. Therefore, the proposed project is consistent with the Development Plan designations for the Petition Area.

The *Keahole to Kailua Development Plan* also includes a network of major arterial and collector roads that will form the overall framework for the future development of the area. The Development Plan proposes a collector roadway identified as "Main Street" with an 80-foot wide right-of-way running parallel to Queen Kaahumanu Highway from Kealakehe Drive to Hina Lani Street through the Limited Industrial area, including the Petition Area. The Development Plan, however, acknowledges the potential shifting and changing of roadway alignments as actual development occurs in the future.

The intent of this parallel roadway is to facilitate traffic circulation between the Limited Industrial area and the Urban Expansion areas to the north, keeping local traffic off of Queen Kaahumanu Highway. In regard to the proposed development, Kamanu Street, a primary collector road which traverses in a north-south direction from Hina Lani Street parallel to Queen Kaahumanu Highway, will be extended approximately 350 feet to the south boundary of the property.



Source: County of Hawaii Keahole to Kailua Development Plan, April 1991

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KEAHOLE TO KAILUA DEVELOPMENT PLAN
LAND USE MAP

FIGURE
4-5

County of Hawaii Zoning

The Hawaii County Zoning Code, as contained in Chapter 25 of the Hawaii County Code, regulates the use of lands within the State Urban, Agricultural and Rural Districts. The Petition Area is zoned Open District according to the Hawaii County Zoning Code (see Figure 4-6).

A zone change will be requested to reclassify the Petition Area from Open District to ML, Limited Industrial District (approximately ~~66.5~~ acres) and MCX, Industrial-Commercial Mixed District (approximately ~~35.8~~ 36 acres) (see Figure 2-1).

The ML, Limited Industrial District *"applies to areas for business and industrial uses which are generally in support of but not necessarily compatible with those permissible activities in other commercial districts."* The purpose of the MCX, Industrial-Commercial Mixed District *"is to allow mixing of some industrial uses with commercial uses. The intent of this district is to provide for areas of diversified businesses and employment opportunities by permitting a broad range of uses, without exposing nonindustrial uses to unsafe and unhealthy environments. This district is intended to promote and maintain a viable mix of light industrial and commercial uses."*

Examples of permitted uses in the ML and MCX Districts are identified in Section 2.1. The height limit in both of these zoning districts is 45 feet. The rezoning application is processed by the County of Hawaii Planning Department, undergoes Planning Commission review and recommendation, with approval rendered by the Hawaii County Council.

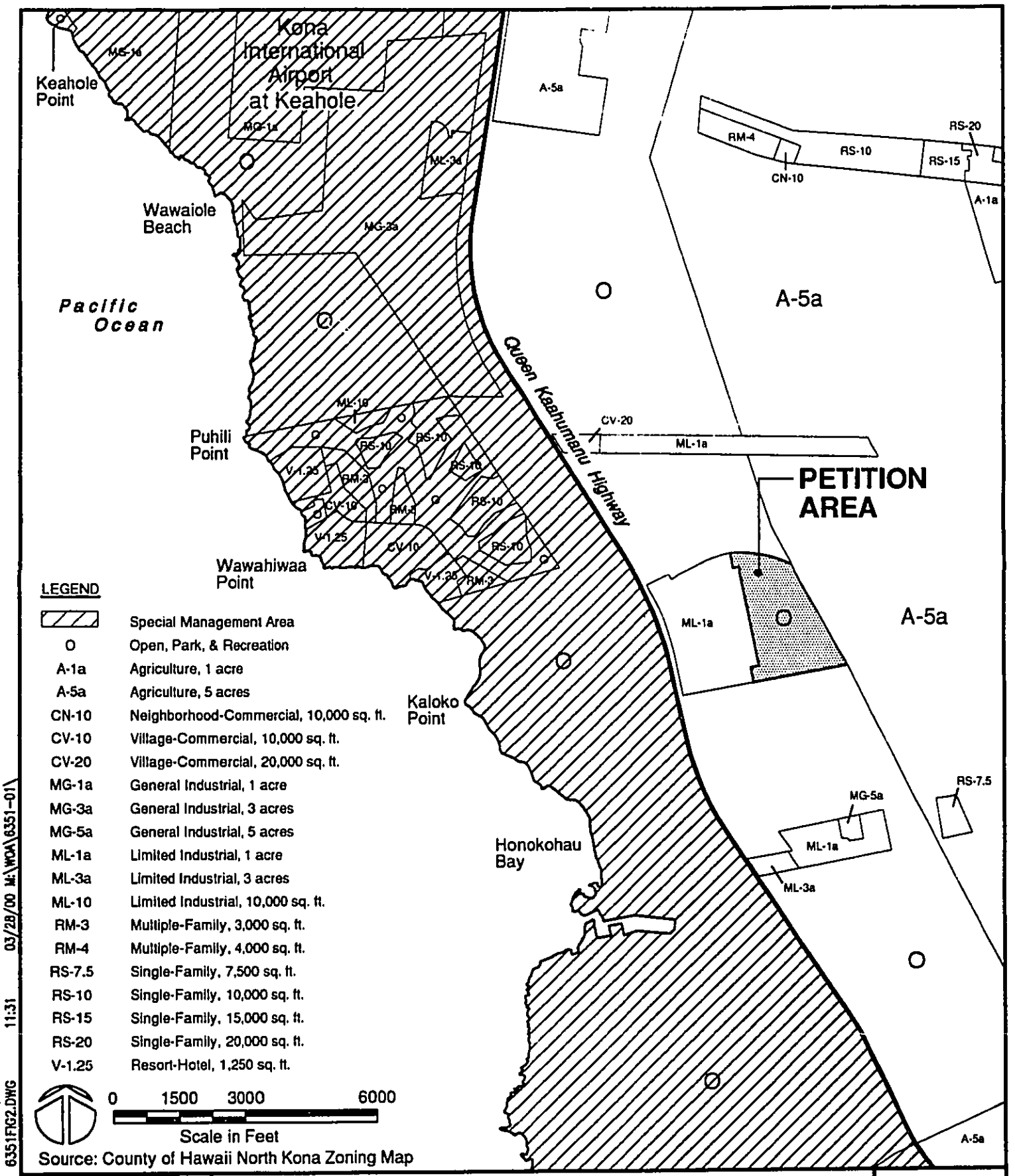
4.9 County of Hawaii Special Management Area

The Coastal Zone Management Act contains the general objectives and policies upon which all counties within the State have structured specific legislation, which created Special Management Areas (SMA). Any development located within the SMA is subject to requirements of the ~~SAM~~ SMA laws which are administered by the Planning Commission (SMA Use Permit) and Planning Director (SMA Minor Permit).

The Petition Area located outside the boundaries of the County of Hawaii's SMA and is therefore not subject to the SMA Use Permit.

4.10 Permits and Approvals

A list of permits and approvals which may be required prior to construction and operation of the proposed project, including the respective anticipated filing dates, is included in Table 4-1.



Source: County of Hawaii North Kona Zoning Map

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COUNTY ZONING AND SPECIAL MANAGEMENT AREA (SMA)

FIGURE 4-6

Table 4-1
List of Permits and Approvals

Permit/Approval	Anticipated Filing Date
State of Hawaii	
Land Use Commission • State Land Use District Boundary Amendment • Environmental Impact Statement	• May 2000 • November 2000 (Final EIS)
Department of Health • National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Associated with Construction Activity • Noise Permits • Air Quality Permits	• Summer 2001 • Fall 2001 • Fall 2001
Department of Land and Natural Resources Historic Preservation Division • Chapter 6E, HRS Historic Preservation	• May 2000 (submitted Archaeological Inventory Survey report to DLNR Historic Preservation Division)
County of Hawaii	
Hawaii County Council • Zone Change	• November 2000
Planning Department • Subdivision Approval	• Summer 2001
Department of Public Works • Grading, Grubbing and Stockpiling Permits	• Fall 2001
Other	
Utility Companies • Utility Service Requirements • Permit Regarding Work on Utility Lines	• Fall 2001 • Fall 2001

5. ALTERNATIVES TO THE PROPOSED ACTION

5.1 No Action Alternative

Under the No Action alternative, the Petition Area would remain in its current state. This alternative would not be consistent with State and County governmental policies of establishing new employment opportunities and would not create the overall positive economic impacts to the area. Furthermore, the property would not be put to a higher economic use which would contribute to a larger tax base for the County of Hawaii.

The No Action alternative would likely maintain the site as unimproved State Conservation District land. The Petition Area falls within the larger region extending from Keahole to Kailua which for the most part is recommended for Urban District reclassification under the State Office of Planning's Five-Year Boundary Review (1992). Furthermore, the County's current and proposed revised General Plan and the *Keahole to Kailua Development Plan* designate the property for Industrial, and Limited Industrial and Urban Expansion, respectively, and the No Action alternative would not be consistent with these broader County goals. Also, the proposed development as a logical extension of the existing Kaloko Industrial Park, Phases I and II, would be precluded.

The No Action alternative would also preclude all other short- and long-term beneficial and adverse physical, environmental and socio-economic impacts described in this EIS.

6. RELATIONSHIP BETWEEN LOCAL AND SHORT-TERM USES OF HUMANITY'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

6.1 Short-Term Uses

The proposed project will involve short-term uses of the environment during the construction phase. These uses will have both beneficial and adverse impacts. Construction activities associated with the proposed project will create temporary adverse impacts, including increased noise, airborne dust, and traffic inconveniences.

In the short-term, the project will also confer some positive benefits in the local area. Direct economic benefits will result from construction expenditures both through the purchase of materials from local suppliers and through the employment of local labor, thereby stimulating that sector of the economy. Indirect economic impacts may include benefits to local retail businesses resulting from construction activities.

6.2 *Long-Term Productivity*

Long-term productivity of the site should be enhanced by the proposed project. The development involves a long-term commitment of land for the proposed use. Once in a higher intensity use, it is unlikely that the land would revert to a lower intensity use in the foreseeable future.

In the long-term, the project will result in the increased availability of industrial/commercial space for businesses. Within the community, the businesses in the project vicinity can expect increased patronage from the additional work force.

Development of the Petition Area would increase its economic productivity in terms of generating employment, tax revenues and more economic activity which should result in benefits which extend throughout the regional economy.

7. IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS OF RESOURCES

In the short-term, construction of the proposed development will require an irreversible and irretrievable commitment of a number of resources, including land, capital, construction materials, manpower, energy, and water. Financial, material and manpower resources will also be irretrievably committed to the planning and design of the improvements.

Since the land committed to this project is presently not urbanized, the proposed action represents a long-term commitment of new land resources. In the long-term, project development will commit the land to a higher intensity use, which is unlikely to revert to a lower intensity use in the foreseeable future. Potential use of the land would not be curtailed as the proposed use is considered appropriate in terms of State and County of Hawaii land use plans.

Effective operation of the project when it is completed will also require irretrievable and irreversible commitments of labor, materials and resources (consumption of potable water, gas and petroleum-generated electricity).

Short- and long-term environmental and socio-economic impacts are expected to be created by development of the site. Construction will, in the short-term, generate unavoidable airborne dust, noise and traffic for nearby businesses.

In the long-term, a change in the visual landscape is unavoidable, since a parcel in its natural, barren state will be replaced by light industrial development. The project will also contribute to an increase in vehicular traffic; however, this would be offset by the provision of traffic improvements to accommodate project-related traffic. Mitigative measures for both short-term and long-term impacts have been explored and are summarized in Chapter 3 and presented in full in appendices referenced in this report.

8. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Adverse impacts can be defined as short-term and long-term negative effects relative to the construction and implementation of a proposed project. Short-term impacts are usually construction-related which will occur during the course of construction and cease upon completion of the project. Long-term impacts generally result from the implementation or operational phase of the proposed project.

8.1 Short-Term Effects

Unavoidable short-term impacts include those related to noise, air quality and traffic inconveniences.

Noise: Construction noise will be unavoidable during the duration of the construction of the proposed development. Short-term increases in noise levels will result from construction activities, vehicles and equipment. The use of muffled equipment as well as adherence to State Department of Health regulations on noise mitigation will minimize construction and traffic-related noise.

Air Quality: Construction-related air quality impacts will result from site preparation and earth moving activities, and the movement of construction vehicles on unpaved areas of the site. The construction contractor is responsible for complying with State Department of Health fugitive dust regulations which prohibit visible dust emissions at property boundaries.

Traffic: Construction-related vehicles could impede traffic flow in the project vicinity. To avoid potential traffic congestion, the movement or transport of large, slow-moving heavy construction vehicles or equipment will be restricted during the morning and afternoon peak traffic periods. The use of flaggers or off-duty police officers will be employed to direct traffic during significant phases of construction to minimize traffic congestion.

8.2 Long-Term Effects

Unavoidable long-term impacts resulting from the proposed development include visual resources and traffic.

Visual Resources: Although there are no significant impacts affecting views or visual resources, development of the Petition Area will alter the visual landscape from its natural, barren state to one of urban use. Due to the elevated topography of the Petition Area, buildings within the proposed development will be visible beyond the existing Kaloko Industrial Park development as viewed from makai areas. As the proposed project will be similar in visual character to that of the adjacent light industrial uses, the change in views from the various public vantage points, primarily the mauka-makai views, will be of an intensification of the existing uses.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be

required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

Traffic: Traffic generated by the proposed project together with a conservative assumption of growth in non-project related traffic will cumulatively impact future traffic conditions on roadways in the vicinity of the Petition Area. However, by incorporating the following measures to mitigate the project-generated traffic, the development of the proposed project is expected to have minimal impact on traffic operations in the project vicinity:

1. Maintain adequate sight distances for motorists to safely enter and exit all project driveways and roadways.

2. Restripe Hina Lani Street at the intersection with Kamanu Street to create a left-turn refuge lane for vehicles turning left onto Hina Lani Street. Since the left-turn refuge lane will provide a median on the westbound approach of Hina Lani Street, a left-turn lane could be provided to accommodate vehicles turning left onto Kamanu Street.

3. Restripe Kamanu Street at the intersection with Hina Lani Street to provide exclusive left-turn and right-turn lanes for the approach.

9. SUMMARY OF UNRESOLVED ISSUES

Unresolved issues are often associated with uncertainties in the early planning stages of proposed actions. There are only a few unresolved issues in the proposed development of the Kaloko Industrial Park, Phases III and IV.

Entitlements: This ~~Draft~~ Final EIS was prepared in support of a State Land Use District Boundary Amendment Petition to reclassify the subject lands from the Conservation to the Urban District. A subsequent zone change from the County of Hawaii is also required. These entitlements are being pursued and are unresolved at this time.

Municipal Sewer System: Extension of the County of Hawaii's wastewater system service north of the Kealakehe WWTP is in the preliminary planning stages. The planned extension of the system will enable the Kaloko Industrial Park developments to connect with the municipal sewer system to convey wastewater to the Kealakehe WWTP and terminate on-site wastewater discharges. The timetable and alignment of this sewer system extension are as yet unresolved. Phases III and IV of the Kaloko Industrial Park will employ on-site treatment systems until such time that the municipal system becomes available.

Queen Kaahumanu Highway Widening: The widening of the Queen Kaahumanu Highway from two to four lanes by the State Department of Transportation Highways Division is expected to be undertaken by the year 2010, but a more precise timetable has not yet been determined.

Coordination with National Park Interests: The proposed developments in the area, in particular, Kaloko Industrial Park, Phases III and IV, and the adjacent Kaloko-Honokohau Business Park, have sparked heightened interest from those concerned with the protection and preservation of the Kaloko-Honokohau National Historical Park. Coordination meetings and discussions are planned with interested and affected groups, including in particular the National Park Service and the Na Kokua Kaloko-Honokohau, Inc., an advisory committee to the National Park.

A pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots to control the potential transport of pollutants which could adversely impact the ground-water system. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project.

10. REFERENCES

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Oki, Delwyn S., Gordon W. Tribble, William R. Souza, and Edward L. Bolke, in cooperation with the National Park Service. *Ground-Water Resources in Kaloko-Honokohau National Historical Park, Island of Hawaii, and Numerical Simulation of the Effects of Ground-Water Withdrawals.* U.S. Geological Survey, Water Resources Investigations Report 99-4070. 1999.

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11. PREPARERS OF THE EIS

11.1 EIS Consultant

Wilson Okamoto & Associates, Inc.	
Rodney Funakoshi, AICP	Project Manager
Frances Yamada	Senior Planner
Tiffany Mathias	Planner
Denis Shiu, P.E.	Senior Civil Engineer
Jason Antonio	Graphics
Glynn Mayeshiro	Design Layout

11.2 EIS Technical Studies and Support

Char & Associates	
Winona P. Char	Botanical
Haun & Associates	
Alan E. Haun, Ph.D.	Archaeological
David Henry, B.S.	
Marine Research Consultants	
Steven Dollar, Ph.D.	Marine and Pond Environments
Tom Nance Water Resource Engineering	
Tom Nance	Ground Water Resources
Rana Productions, Ltd.	
Reginald E. David	Faunal
Wilson Okamoto & Associates, Inc.	
Pete Pascua, P.E.	Traffic
Ulalia Woodside	Cultural

12. CONSULTATION

12.1 Pre-Assessment Consultation

The following agencies were consulted during the pre-assessment phase of the EIS Preparation Notice. A total of 11 written comment letters and two no comment verbal responses were received. Of those who replied, some had no comments (✓) while others provided substantive comments (✓✓). Copies of written comments and responses are provided.

Federal

✓✓ U.S. Army Corps of Engineers
✓ U.S. Fish and Wildlife Service
✓✓ U.S. Department of Agriculture Natural Resources Conservation Service
✓✓ U.S. Department of the Interior Kaloko-Honokohau National Historical Park

State of Hawaii

✓✓ Department of Business Economic Development & Tourism (DBED&T) Land Use Commission
✓✓ DBED&T Office of Planning
✓ DBED&T Housing and Community Development Corporation of Hawaii
Department of Land and Natural Resources (DLNR) Land Division
DLNR Historic Preservation Division
✓ Department of Health Environmental Planning Office
✓ Department of Education
✓✓ Department of Transportation
✓✓ Office of Hawaiian Affairs
Department of Agriculture
✓ Department of Defense
✓ Department of Hawaiian Home Lands
University of Hawaii at Manoa (UHM) Environmental Center
UHM Water Resources Research Center

County of Hawaii

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

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

REPLY TO ATTENTION OF

April 11, 2000

Civil Works Technical Branch

APR 17 2000

Mr. Rodney Funakoshi, Project Manager
Wilson Okamoto and Associates
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Thank you for the opportunity to review and comment on the Environmental Assessment, Pre-Assessment Consultation, for the Kaloko Industrial Park Project, North Kona, Hawaii (TMK 7-3-51: 60). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, a DA permit will not be required for the project.

b. According to the Flood Insurance Rate Map and Street Index, there are no panels printed for the project area; therefore, the area is designated as Zone X (unshaded - areas outside of the 500-year floodplain).

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

P.O. Box 50004
Honolulu, HI
96850

USDA

Our People...Our Islands...In Harmony

April 28, 2000

RECEIVED
MAY 2 2000
WILSON OKAMOTO & ASSOC. INC

Mr. Rodney Funakoshi
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Rodney:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation – Kaloko Industrial Park, Phases III and IV, Kaloko, North Kona, Hawaii

We have reviewed the above mentioned document and have the following comments to offer:

One of the primary concerns regarding this project would be related to surface water and waste byproduct disposal. Since this is an industrial site, there will be solvents, paints, fuels, and a wide array of chemical/industrial materials in use. In addition, the creation of impervious surfaces will cause increased runoff on the project site. The most common method of dealing with the additional runoff is to construct dry wells or vertical drains that take the water down into a subsurface matrix. There are brackish and fresh water portions of the Ghyben-Herzberg lens that are tidally influenced along the coastal zone. Any intrusion of chemical/industrial waste either incidentally or intentionally reaching this tidally influenced subsurface water regime through the dry well system has the potential to impact the USFWS Kaloko Wildlife Refuge ponds and associated biota.

The dynamics involved and potential impacts from the placement of this project directly mauka of the reserve and its associated high quality coastal areas need to be understood if any of these types of substances will or could be introduced to the water table. Also, one of the few large coral reef communities in West Hawaii is located in the coastal reach of the park and the pond is a habitat for endangered Hawaiian birds.

Thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands

AN EQUAL OPPORTUNITY EMPLOYER

6351-01
May 16, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH: (808)946-2277
FAX: (808)946-2253

Mr. Kenneth M. Kaneshiro, State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Kaneshiro:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Assessment (EA)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51:60

Thank you for your letter of April 28, 2000, regarding the pre-assessment consultation for the subject project.

The Draft EA will include a discussion of the affected coastal resources and potential impacts to surface and ground water which may result from the construction and operation of the proposed project, including any proposed mitigation measures for averting or minimizing potential adverse effects.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

United States Department of the Interior

NATIONAL PARK SERVICE
KALOKO-HONOKOHAU NATIONAL HISTORICAL PARK
73-4786 Kanalani St., #14
Kailua-Kona, Hawaii 96740

L76 (KAHO)

April 7, 2000

RECEIVED
APR 11 2000
WILSON OKAMOTO & ASSOC. INC

Mr. Rodney Funakoshi, Project Manager
Wilson Okamoto & Associates
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Thank you for the chance to comment on the Environmental Assessment Pre-Assessment Consultation for Kaloko Industrial Park, Phases III and IV development project. The National Park Service is charged with preserving cultural and natural resources found within nearby Kaloko-Honokohau National Historical Park. Developments on mauka lands have the potential to affect park resources.

On page 2 under Project Description you state: "The site would be mass graded with all necessary infrastructure provided, including water, sewer, drainage, electrical, and communications systems." Our primary concerns are with your proposed sewer and storm water drainage systems. Studies completed by the US Geological Survey in Kaloko-Honokohau NHP (Ground Water Resources in Kaloko-Honokohau National Historical Park, Island of Hawaii, and Numerical Simulation of the Effects of Ground-Water Withdrawals, U.S. Geological Survey Water-Resources Investigation Report 99-4070) indicate that water resources in the park are vulnerable to groundwater contamination upgradient of the park. These resources include fishponds, anchialine ponds, and marine waters. The current systems in place for Phases I and II are inadequate for removing contaminants from waste water or storm water prior to it's entry into the groundwater system and national park biological resources are being adversely affected. The park contains significant water resources with unique ecosystems. Waters in the park are home to a number of threatened or endangered species and species of concern. These include the endemic Hawaiian stilt and coot. Contamination of these ecosystems by water entering the park is a threat to these federally protected species. Sewer and storm water drainage systems need to be addressed in detail in the Environmental Assessment (EA).

The above mentioned Kaloko-Honokohau NHP groundwater study as well as one for the entire Kona area (Geohydrology and Numerical Simulation of the Ground-Water Flow System of Kona, Island of Hawaii; U.S. Geological Survey Water-Resources Investigations Report 99-4073) addresses the potential for decreases in ground water levels due to increased water withdrawal. Decreasing ground water levels could change salinity levels in the fishponds and anchialine ponds, adversely affecting the species that inhabit these areas. How Phase III and IV developments would alter ground water levels also needs to be addressed in the EA.

The 82 additional units will undoubtedly increase traffic into the Kaloko Industrial Park complex and increase traffic on Queen Kaahumanu Highway. We would like to see information in the EA on the estimated increase in traffic and measures planned to alleviate traffic congestion.

Finally, changes in the landscape can adversely affect the viewscape of a cultural park. We do recognize that development will occur mauka of Kaloko-Honokohau National Historical Park, and that visual elements of the park have been and will continue to be affected by this development. Appropriate plantings would reduce these impacts. The park has developed a Vegetation Management Plan that addresses landscaping. We would be glad to act as a resource in helping you choose appropriate plants for this project.

Again, we appreciate the opportunity to comment on this project at such an early date. We look forward to further communications that might benefit all residents of the Kona area.

Mahalo,

Geraldine Bell for
Superintendent

6351-01
May 16, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946 2277
FAX (808)946 2253

Ms. Geraldine Bell, Superintendent
United State Department of the Interior
National Park Service
Kaloko-Honokohau National Historical Park
73-4786 Kanalani Street, #14
Kailua-Kona, Hawaii 96826

Dear Ms. Bell:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Assessment (EA)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of April 7, 2000 (Ref.: L76 (KAHO)), regarding the pre-assessment consultation for the subject project. We offer the following responses to your comments:

1. The Draft EA will include a discussion of the potential impacts that the proposed project's sewer and storm water drainage systems may have on surface and ground water within the Kaloko-Honokohau National Historical Park and surrounding project vicinity. Potential mitigation measures for averting or minimizing potential adverse effects will also be discussed.

2. Development of the proposed project will not alter ground-water levels.

3. A traffic study is being prepared for the Draft EA which will address the potential impact of the proposed project on the affected roadways in the vicinity, including Queen Kaahumanu Highway, and identify any mitigation measures which may be required.

4. The Draft EA will include a discussion of the potential visual impacts of the proposed development from mauka-makai public vantage points, and identify any mitigation measures which may be required. We appreciate your offer as a resource in selecting appropriate plants for the project.

Your interest and participation in the consultation phase of the environmental review process is greatly appreciated.

Sincerely,

Rodney Funakoshi, Project Manager

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

April 3, 2000

RECEIVED
APR 0 4 2000
WILSON OKAMOTO & ASSOC., INC.

Mr. Rodney Funakoshi
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawai'i 96826

Dear Mr. Funakoshi:

Subject: Draft of the Pre-Assessment Consultation letter
Project: Kaloko Industrial Park, Phases III and IV
TMK: 7 – 03 – 051: 060

This is to acknowledge receipt of the subject letter from your transmittal dated March 20, 2000.

Based upon our review of the subject letter, we have the following comments:

1. We suggest that the mailing list for the review of the draft environmental assessment include community groups and organizations in the area that may be affected or may have an interest in the proposed project.

2. Regarding statements on page 2., #3. Project Description, a development timetable should also be included as to the best estimate of the site master plan. The project description should also include descriptions of surrounding land uses and its relationship to current or proposed revisions to the Keahole to Kailua Development Plan.

3. We would like to point out that adjacent land south of the proposed project area and along Queen Kaahumanu Highway is the subject of a new petition, LUC Docket No. A00-730/Lanihau Partners L.P., involving approximately 337 acres requested to be reclassified from the State Land Use Conservation District to the Urban District. The petition proposes to establish a subdivision for commercial and light industrial uses including an existing quarrying operation.

4. Regarding the descriptions of studies of anticipated impacts on page 3., #5. Anticipated Impacts, we suggest additional studies and/or assessments on the following areas:
   - Natural, environmental, and anthropogenic impacts from the industrial park that may affect the Kaloko-Honokohau National Historic Park;
   - Impacts on air quality generated from the subdivision's activities;
   - Assessment of market demand regarding need for the uses described on page 2. of the Project Summary;
   - Socio-economic impacts of the project on the surrounding area and residential developments;
   - Impacts of surface runoff on surrounding areas, and any underlying groundwater resources;
   - Impacts on existing potable water sources; and
   - Impacts from the proposed wastewater disposal system. Since the approval of the LUC Docket No. A80-482, there have been changes in federal and state regulations relating to protection of public drinking water systems, such as source water assessment and protection initiatives and the prohibition of cesspools.

5. We recommend that all maps and figures that are provided in the draft environmental assessment are clear and easy to understand and based on current and accurate information, as we had expressed in our letter dated March 21, 2000.

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

Sincerely,

ESTHER UEDA
Executive Officer

EU:aa

6351-01
May 16, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808)946-2277
FAX: (808)946-2253

Ms. Esther Ueda, Executive Officer
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Dear Ms. Ueda:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Assessment (EA)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of April 3, 2000, regarding the pre-assessment consultation for the subject project. We offer the following in response to your comments:

1. Community groups and organizations that may be affected by the proposed project will be included as consulted parties for the subject Draft EA.

2. The Draft EA will include: 1) a development timetable for the proposed project, 2) a description of the surrounding land uses, and 3) a discussion of the relationship of the proposed project to the Keahole to Kailua Development Plan.

3. We acknowledge the recent filing of the petition (LUC Docket No. A00-730/Lanihau Partners L.P.) with the State Land Use Commission to reclassify approximately 337 acres of land located adjacent and south of the proposed project from the State Conservation District to the Urban District.

4. The Draft EA will include discussion of the following:
   - an assessment of the potential natural, environmental and anthropogenic impacts of the proposed project that may affect the Kaloko-Honokohau National Historical Park;
   - an assessment of the potential air quality impacts which may be generated by the proposed project;
   - an assessment of the market demand for the proposed project;

   - an assessment of the potential socio-economic impacts of the proposed project on the surrounding area and residential developments;
   - an assessment of potential impacts to surface water and ground-water resources, including potable water sources as a result of the proposed project; and
   - an assessment of potential impacts resulting from the wastewater disposal system for the proposed project.

5. All maps and figures to be included in the subject Draft EA will be based on current and accurate information and in a clearly understandable format.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

BENJAMIN J. CAYETANO
GOVERNOR
SELJI F. NAYA, Ph.D.
DIRECTOR
PHILIP J. BOSSERT
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824

RECEIVED
APR 24 2000
WILSON OKAMOTO & ASSOC., INC.

Ref. No. P-8579

April 19, 2000

Mr. Rodney Funakoshi, Project Manager
Wilson Okamoto & Associates, Inc.
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation
Kaloko Industrial Park Phases III and IV
Kaloko, North Kona, Hawaii
Tax Map Key 7-3-51: 60

We have reviewed the project summary for the development of Phases III and IV of Kaloko Industrial Park by TSA International, Ltd. The applicant is proposing an industrial subdivision of 82 one-acre lots on lands within the State Conservation (94.8 acres) and Agricultural (7.5 acres) Districts. The Land Use Commission previously reclassified approximately 130.1 acres for Phases I and II of the Kaloko Industrial Park (Docket No. A80-482). The land for Phases III and IV were approved for incremental districting provided Phases I and II were substantially completed. Phases III and IV would require a Land Use District reclassification to the Urban District.

We note that the County of Hawaii General Plan Land Use Pattern Allocation Guide (LUPAG) Map designates the land as Industrial. The Keahole to Kailua Development Plan designates it for Limited Industrial. The zoning for this area is Open District.

The Project Summary indicates that the Draft Environmental Assessment will include an archaeological inventory survey, botanical survey, faunal survey, cultural impact assessment, and traffic study. We recommend that the impacts of the proposed and existing industrial uses be evaluated for impacts on the Kaloko-Honokohau National Historic park that is located makai of the project area across Queen Kaahumanu Highway. We note that there are significant aquatic resources (fishponds) in the park area, which may be impacted by pollutants from industrial activities which may enter the groundwater. We also recommend that the consultant for the cultural impact assessment be selected after consultation with the Office of Hawaiian Affairs.

We also note that the Land Use Commission has received a new Petition (Docket No. A00-730) by Lanihau Partners L.P. immediately to the south for a mix of light industrial, commercial uses and quarry on approximately 336.9 acres. The cumulative impacts from both of these projects should be thoroughly assessed regarding infrastructure such as roads, water, sewer, drainage and power, as well as cultural and natural resources associated with the Kaloko-Honokohau National Historic Park which is immediately downslope across Queen Kaahumanu Highway.

If you have any comments or questions, please contact Lorene Maki of my staff at 587-2888. Thank you for the opportunity to comment.

Sincerely,

David W. Blane
Director
Office of Planning

cc: Ms. Esther Ueda, LUC

6351-01
May 16, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. David W. Blane, Director
State of Hawaii
Department of Business, Economic Development & Tourism
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Blane:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Assessment (EA)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of April 19, 2000 (Ref. No. P-8579), regarding the pre-assessment consultation for the subject project. We offer the following in response to your comments:

1. The Draft EA will include discussion of the potential impacts to the native Hawaiian culture, surface waters and groundwater resources which may result from the construction and operation of the proposed project as it may affect the Kaloko-Honokohau National Historical Park. Potential mitigation measures for averting or minimizing potential adverse effects, as appropriate, will also be discussed. The Office of Hawaiian Affairs has been consulted in the preparation of a Cultural Impact Assessment for the project site and vicinity.

2. We are generally aware of the proposed development of the adjacent 336.9 acres by Lanihau Partners L.P. and will address cumulative impacts as appropriate. The traffic impact assessment being prepared for the proposed Kaloko Industrial Park, Phases III and IV includes a growth factor to account for an increase in background traffic to year 2010, the anticipated full build-out date of the subject project.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

BENJAMIN J. CAYETANO
GOVERNOR

SHARYN L. MIYASHIRO
ACTING EXECUTIVE DIRECTOR

ROBERT J. HALL
ACTING EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM
HOUSING AND COMMUNITY DEVELOPMENT CORPORATION OF HAWAII
677 QUEEN STREET, SUITE 300
Honolulu, Hawaii 96813
FAX: (808) 587-0500

IN REPLY REFER TO:
00:PEO-877

April 14, 2000

Mr. Rodney Funakoshi
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

RE: Environmental Assessment Pre-Assessment Consultation for Kaloko Industrial Park, Phases III and IV

We have reviewed the project summary for the subject project and have no comments to offer at this time.

Thank you for the opportunity to comment.

Sincerely,

Sharyn Miyashiro

Sharyn L. Miyashiro
Acting Executive Director

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:
ENVIRONMENTAL PLANNING OFFICE
HAWAII STATE DEPARTMENT OF HEALTH
919 ALA MOANA BLVD., 3RD FLOOR
HONOLULU, HI 96814-4912

FACSIMILE TRANSMITTAL

DATE: 4/13/00 NO. OF PAGES (w/ cover sheet): 2

TO: Rodney Funakoshi
OFFICE: Wilson Okimoto & Assoc.
FAX: 946-2253 PHONE:

FROM: Art Bauckham
OFFICE: EPO-DOH
PHONE: (808) 586-4337 FAX: (808) 586-4370

MESSAGE: Pre-Assessment Consultation on Kaloko Industrial Park (See pg. 2)

We do not have any comments to offer at this time, but please send me a copy of the Draft EA. Mahalo.

Art Bauckham

NOTE: If this transmittal was illegible or incomplete, please call the sender.

MAR 30 2000

RECEIVED
OFFICE OF THE DIRECTOR
DEPT OF HEALTH

'00 MAR 28 A9:15

6351-01
March 22, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX. (808)946-2253

Dr. Bruce Anderson, Director
State of Hawaii
Department of Health
Environmental Planning Office
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Anderson:

Subject: Environmental Assessment (EA) Pre-Assessment Consultation
Kaloko Industrial Park, Phases III and IV
Kaloko, North Kona, Hawaii
Tax Map Key: 7-3-51: 60

On behalf of TSA International, Ltd., Wilson Okamoto & Associates, Inc. is currently preparing an Environmental Assessment for the Kaloko Industrial Park, Phases III and IV located at Kaloko, North Kona, Hawaii. Enclosed for your information is a summary of the proposed project.

As part of the pre-assessment consultation process, we are soliciting any comments you may have on the proposed project. Please submit your comments to:

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826
Attention: Rodney Funakoshi

We would appreciate your written comments by April 14, 2000. Should you have any questions, please call me at 946-2277. Thank you for your consideration in this matter.

Sincerely,

Rodney Funakoshi

Rodney Funakoshi, Project Manager

Enclosures

5043

BENJAMIN J. CAYETANO
GOVERNOR

PAUL G. LaMAHIEU, Ph.D.
SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

April 12, 2000

Mr. Rodney Funakoshi, Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Subject: Kaloko Industrial Park
Phases III and IV – EA Pre-Assessment Consultation

The Department of Education has no comment on the proposed project.

Thank you for the opportunity to respond.

Very truly yours,

Paul G. LaMahieu, Ph.D.
Superintendent of Education

PLeM:hy

cc: Paula Yoshioka, DAS

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

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

RECEIVED
APR 11 2000
WILSON OKAMOTO & ASSOC., INC.

IN REPLY REFER TO:
STP 8.9486

April 7, 2000

Mr. Rodney Funakoshi
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Subject: Kaloko Industrial Park, Phase III and IV
Draft Environmental Assessment (DEA)
TMK: 7-3-51: 60

Thank you for your transmittal requesting our review of the subject assessment.

The applicant should prepare a traffic study which addresses the cumulative impact the full build out of the industrial park will have on Queen Kaahumanu Highway and identify required mitigation measures.

We appreciate the opportunity to provide comments.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

6351-01
May 16, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH: (808) 946 2277
FAX: (808) 946 2253

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Assessment (EA)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of April 7, 2000 (Ref: STP 8.9486), regarding the pre-assessment consultation for the subject project. A traffic study is being prepared for the Draft EA which will address the cumulative impact of the full build-out of the proposed project on the affected roadways in the vicinity, including Queen Kaahumanu Highway, and identify any mitigation measures which may be required.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

PHONE (808) 594-1868

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

RECEIVED
APR 15 2000
WILSON OKAMOTO & ASSOC., INC.

April 10, 2000

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawai'i 96826
Attention: Rodney Funakoshi

Re: Environmental Assessment (EA) Pre-Assessment Consultation
Kaloko Industrial Park, Phases III and IV
Kaloko, North Kona, Hawai'i, TMK: 7-3-51:60

Dear Mr. Funakoshi:

Thank you for the opportunity to offer information on the proposes industrial park at Kaloko, North Kona, Hawai'i Island. The Kaloko area is an archaeologically sensitive area. In addition, it is an area in which access and gathering rights are very likely to exist. Therefore, we urge the project proponents to complete conduct studies in both archaeology and cultural resources.

We suggest that you contact the OHA representative in Kona, Ms. Ruby McDonald (808 329-7368) who can direct you to individuals in the community who will have the information necessary for these studies. In addition, we suggest that you contact the Kona Hawaiian Civic Club and work with them in the same manner. Their address is Kona Hawaiian Civic Club, P.O. Box 4098, Kailua-Kona, Hawai'i 96745.

We would like to review these studies and the draft EA when they are completed. If you have any questions please contact Lynn J. Lee, Policy Analyst at 594-1936.

Sincerely

Colin Kippen, Jr.
Deputy Administrator

cc: Board of Trustees
Ruby McDonald, OHA-West Hawaii

6351-01
May 16, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Colin Kippen, Jr., Deputy Administrator
State of Hawaii
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Kippen:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Assessment (EA)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of April 10, 2000, regarding the pre-assessment consultation for the subject project. An Archaeological Inventory Survey and Cultural Impact Assessment for the proposed project are being prepared for the Draft EA. As suggested, Ms. Ruby McDonald and the Kona Hawaiian Civic Club have been consulted in the preparation of the Cultural Impact Assessment.

As requested, a copy of the Draft EA will be provided to you upon its distribution for public review.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

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

RECEIVED
APR 10 2000
WILSON OKAMOTO & ASSOC., INC.

April 7, 2000

Rodney Funakoshi, Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Funakoshi:

Subject: Kaloko Industrial Park, Phases III & IV, Pre-Assessment Consultation, TMK 7-3-51:60, Kaloko, North Kona, Hawaii, Dated March, 2000

Thank you for the opportunity to review the subject application. The Department of Hawaiian Home Lands has no comment to offer.

If you have any questions, please call Daniel Ornellas of our Planning Office at 586-3836.

Aloha,

for Raynard C. Soon, Chairman
Hawaiian Homes Commission

12.2 EIS Preparation Notice Consultation

The following agencies, organizations and elected officials were consulted and comments solicited for the EIS Preparation Notice. As of August 10, 2000, a total of 17 comment letters were received. Of those who replied, some had no comments (✓) while others provided substantive comments (✓✓). Copies of written comments and responses are provided.

Federal

✓✓ U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Geological Survey
✓✓ U.S. Department of Agriculture Natural Resources Conservation Service
✓✓ U.S. Department of the Interior Kaloko-Honokohau National Historical Park

State of Hawaii

Department of Agriculture
✓ Department of Accounting and General Services
Department of Business Economic Development & Tourism (DBED&T)
DBED&T Energy Resources and Technology Division
✓✓ DBED&T Land Use Commission
✓✓ DBED&T Office of Planning
✓ DBED&T Housing and Community Development Corporation of Hawaii
Department of Defense
✓ Department of Education
Department of Hawaiian Home Lands
✓✓ Department of Health (DOH) Environmental Planning Office
✓✓ DOH Office of Environmental Quality Control
Department of Land and Natural Resources (DLNR)
✓✓ DLNR Historic Preservation Division
DLNR Office of Hawaiian Affairs
Department of Transportation
University of Hawaii at Manoa (UHM) Environmental Center
UHM Water Resources Research Center

County of Hawaii

Civil Defense Agency
Department of Parks and Recreation
Department of Public Works
✓✓ Department of Water Supply
✓✓ Planning Department
✓ Police Department
✓✓ Fire Department

Elected Officials

Senator Andrew Levin
Representative Jim Rath
Councilmember Curtis Tyler

Public Utility Agencies

✓✓ GTE Hawaiian Telephone Company
Hawaii Electric Light Company
Sun Cablevision

Organizations

Hawaii Leeward Planning Conference
Kona Hawaiian Civic Club
Kona Outdoor Circle
Kona-Kohala Chamber of Commerce
✓✓ Na Kokua Kaloko-Honokohau
Moku Loa Grcup, Sierra Club, Hawaii Chapter
✓✓ Sierra Club, Hawaii Chapter

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

REPLY TO ATTENTION OF

July 21, 2000

Civil Works Technical Branch

Ms. Esther Ueda
State of Hawaii
Department of Business
Economic Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804-2359

LAND USE COMMISSION
STATE OF HAWAII
2000 JUL 25 A 9:34

Dear Ms. Ueda:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice (EISPN) for the Kaloko Industrial Park - Phases III and IV - North Kona, Island of Hawaii (TMK 7-3-51: 60). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, a DA permit will not be required for the project.

b. The flood hazard information provided on page 3-9 of the EISPN is correct.

Should you require additional information, please contact Ms. Jessie Dobinchick of my Civil Works Technical Branch staff at (808) 438-8876.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

Copy Furnished:

Mr. Rodney Funakoshi
Wilson Okamoto and Associates
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

P.O. Box 50004
Honolulu, HI
96850

USDA

Our People...Our Islands...In Harmony

August 10, 2000

RECEIVED
AUG 14 2000
WILSON OKAMOTO & ASSOC., INC.

Mr. Rodney Funakoshi, Project Manager
Wilson Okamoto & Associates, Inc.
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Subject: Environmental Impact Statement Preparation Notice (EISPN) – Kaloko Industrial Park, Phases III and IV, Kaloko, North Kona, Island of Hawaii

We have reviewed the above mentioned document and have the following comment to offer:

Adopting more definite requirements for surface runoff disposal should mitigate groundwater and coastal wetland impacts. It was noted that on page 3-23..."may be recommended that individual owners develop... that employ filtration...."

If you have any questions or require further assistance, please contact Mr. Stephen Skipper, District Conservationist for the Kealakekua Field Office, at (808) 322-2484.

Thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

6351-01
August 15, 2000

Mr. Kenneth M. Kaneshiro, State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Kaneshiro:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 10, 2000, regarding the subject EIS Preparation Notice.

In conjunction with the Draft EIS, an assessment has been conducted to determine the potential ground-water effects on the pond and marine environments within the Kaloko-Honokohau National Historical Park and nearshore waters as a result of the proposed project. The assessment also identifies associated mitigative measures which may be needed to minimize any potential impacts to the pond and marine environment. The Draft EIS also includes a discussion of measures to be implemented to mitigate or eliminate any potential contaminants from the proposed project to ground water that could eventually reach the pond and marine environments.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Esther Ueda, Land Use Commission (with letter)

United States Department of the Interior

NATIONAL PARK SERVICE
KALOKO-HONOKOHAU NATIONAL HISTORICAL PARK
73-4786 Kanalani St., #14
Kailua-Kona, Hawaii 96740

August 7, 2000

RECEIVED
AUG 08 2000
WILSON OKAMOTO & ASSOC., INC.

State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Dear Land Use Commission:

Kaloko-Honokohau is responding to the Environmental Impact Statement Preparation Notice for Kaloko Industrial Park, Phases III and IV. The park is located directly makai of this project and this development may adversely affect resources in the park. The purpose of the park is the perpetuation of native Hawaiian culture therefore the park is also concerned with maintaining Hawaiian plants and animals. These natural resources include two endangered water birds, threatened Green Sea turtles and a number of plant species of concern. Other park species may soon be added to the endangered species list.

On of the park's major concerns is that of changes to water quality. Our primary concerns are with your proposed sewer and storm water drainage systems. Studies completed by the US Geological Survey in Kaloko-Honokohau NHP (Ground Water Resources in Kaloko-Honokohau National Historical Park, Island of Hawaii, and Numerical Simulation of the Effects of Ground-Water Withdrawals, U.S. Geological Survey Water-Resources Investigation Report 99-4070) indicate that water resources in the park are vulnerable to groundwater contamination upgradient of the park. These resources include fishponds, anchialine ponds, and marine waters. The current systems in place for Phases I and II are inadequate for removing contaminants from wastewater or storm water prior to it's entry into the groundwater system and national park biological resources are being adversely affected. A simple walk around the current complex shows a number of locations where contaminates are being carried into the groundwater system from storm water runoff. Along with problems of storm water runoff the park is concerned that the proposed sewer and leach field method of wastewater disposal is not adequate for removing ground water contaminates. The park contains significant water resources with unique ecosystems. Waters in the park are home to a number of threatened or endangered species and species of concern. These include the endemic Hawaiian stilt and coot. Contamination of these ecosystems by water entering the park is a threat to these federally protected species. Sewer and storm water drainage systems need to be addressed in detail in the Environmental Impact Statement (EIS). The EIS should also address future monitoring to assure that no impacts are occurring, and measures for remediating impacts if they do occur.

Water quality affects the cultural components of many sites in the park. Appropriate cultural use of the fishponds requires that they remain unpolluted. Ultimately the park plans to manage the fishponds in a traditional Hawaiian style and in order to do so the fish must remain edible. A number of sacred Hawaiian sites are also can be affected by water quality. The most prominent of these is Kahinahinaula, known locally as the Queen's Bath. Park visitors use this modified anchialine pond. The pollution of marine waters would also have an effect on the perpetuation of traditional Hawaiian maritime cultural practices.

The above mentioned Kaloko-Honokohau NHP groundwater study as well as one for the entire Kona area (Geohydrology and Numerical Simulation of the Ground-Water Flow System of Kona, Island of Hawaii; U.S. Geological Survey Water-Resources Investigations Report 99-4073) addresses the potential for decreases in ground water levels due to increased water withdrawal. Decreasing ground water levels could change salinity levels in the fishponds and anchialine ponds, adversely affecting the species that inhabit these areas. How Phase III and IV developments would alter ground water levels also needs to be addressed in the EIS.

The 82 additional units will undoubtedly increase traffic into the Kaloko Industrial Park complex and increase traffic on Queen Kaahumanu Highway. We would like to see information in the EIS on the estimated increase in traffic and measures planned to alleviate traffic congestion.

Finally, changes in the landscape can adversely affect the viewscape of a cultural park. We do recognize that development will occur mauka of Kaloko-Honokohau National Historical Park, and that visual elements of the park have been and will continue to be affected by this development. Appropriate plantings would reduce these impacts. The park has developed a Vegetation Management Plan that addresses landscaping. We have offered to act as a resource in helping the developer choose appropriate plants for this project.

On page 1-1, 1.2 Background, paragraph 1 the statement is made: "The Kaloko Industrial Park was conceived to provide **appropriately** located industrial fee simple lands...(emphasis by the park)". Many of the questions above deal with the need for adequate infrastructure, such as central sewer hookup and adequate roads, prior to industrial development. Without such infrastructure in place, whether provided by the county or the developer, it may not be appropriate to put an industrial area near such sensitive natural and cultural resource areas. We look forward to further communications on this project that might benefit all residents of the Kona area. In that regard the park wishes to be a "consulting party" during the EIS process.

Mahalo,

Geraldine Bell
Superintendent

Cc: Wilson Okamoto & Associates, Inc.

6351-01
August 9, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Ms. Geraldine Bell, Superintendent
United States Department of the Interior
National Park Service
Kaloko-Honokohau National Historical Park
73-4786 Kanalani Street, #14
Kailua-Kona, Hawaiii 96740

Dear Ms. Bell:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 7, 2000, regarding the subject EIS Preparation Notice. We offer the following in response to your comments.

In conjunction with the Draft EIS, an assessment has been conducted to determine the potential ground-water effects on the pond and marine environments within the Kaloko-Honokohau National Historical Park and nearshore waters as a result of the proposed project. The assessment also identifies associated mitigative measures, as may be required, to minimize any potential impacts to the pond and marine environment. The Draft EIS will also include a discussion of the Best Management Practices (BMPs) measures to be implemented to mitigate or eliminate any potential contaminants from the proposed project to ground water that could eventually reach the pond and marine environments.

The assessment of potential impacts on ground-water resources also includes an assessment of the impact of ground water withdrawals for potable use, as well as the resulting potential reduction of recharge for the basal lens in the coastal area, as a result of the proposed project and other developments in the area.

A cultural impact assessment has been conducted in conjunction with the Draft EIS to assess the potential impacts of the proposed project on native Hawaiian cultural resources, practices and beliefs, including the Kaloko-Honokohau National Historical Park.

A traffic impact assessment has been conducted for the Draft EIS which includes an analysis of the potential traffic impacts within the project vicinity resulting from the proposed development, as well as existing and future traffic

projections to year 2010, the project's anticipated full build-out date. The traffic impact assessment also incorporates the State Department of Transportation Highways Division's planned improvements to Queen Kaahumanu Highway.

The Draft EIS includes a discussion of the potential visual impacts of the proposed development from mauka-makai public vantage points, and identifies mitigation measures which may be required. Landscaping will be implemented within the proposed development, as deemed appropriate, to minimize or screen the visual impact of the project. Appropriate plant material and variety will be established for the proposed development. We have apprised the developer of your offer as a resource in selecting appropriate plants for the project.

The Draft EIS includes a discussion of the infrastructure improvements required for the proposed development, and mitigation measures for averting or minimizing potential adverse effects, as appropriate.

We would welcome and appreciate the opportunity to meet with your agency to discuss areas of potential concern. As requested, the Kaloko-Honokohau National Historical Park will be retained on the list of parties to be consulted throughout the EIS process for the subject project.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

July 24, 2000

RECEIVED
JUL 25 2000
WILSON OKAMOTO & ASSOC., INC.

Mr. Rodney Funakoshi
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawai'i 96826

Dear Mr. Funakoshi:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
TMK: 7 – 03 – 051: 060
Kaloko, North Kona, Island of Hawaii

This is to acknowledge receipt of the subject EIS Preparation Notice as transmitted by your letter dated July 3, 2000.

Based upon our review of the subject EIS Preparation Notice, we would like to reiterate the areas of concern identified in our letter dated June 13, 2000, that include potential impacts to groundwater and surface water resources, and archaeological, historical, and cultural resources. We understand that the Draft EIS will include studies addressing these areas and the identification of mitigative measures. We will reserve our comments for the review of the Draft EIS.

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

Sincerely,

/ESTHER UEDA
Executive Officer

EU:aa

c: Office of Environmental Quality Control

6351-01
August 7, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Ms. Esther Ueda, Executive Officer
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Dear Ms. Ueda:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of July 24, 2000, regarding the subject EIS Preparation Notice.

In conjunction with the Draft EIS, studies have been conducted to assess the potential impacts to ground water/surface water, archaeological/historical, and cultural resources which may result from the proposed project. The studies will also include mitigation measures for averting or minimizing potential adverse effects, as appropriate.

We appreciate your continued assistance and cooperation in the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

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

REPLY TO ATTENTION OF

July 21, 2000

Civil Works Technical Branch

Ms. Esther Ueda
State of Hawaii
Department of Business
Economic Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804-2359

2000 JUL 25 A 9:34
LAND USE COMMISSION
STATE OF HAWAII

Dear Ms. Ueda:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice (EISPN) for the Kaloko Industrial Park - Phases III and IV - North Kona, Island of Hawaii (TMK 7-3-51: 60). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, a DA permit will not be required for the project.

b. The flood hazard information provided on page 3-9 of the EISPN is correct.

Should you require additional information, please contact Ms. Jessie Dobinchick of my Civil Works Technical Branch staff at (808) 438-8876.

Sincerely,

James Pennaz

James Pennaz, P.E.
Chief, Civil Works
Technical Branch

Copy Furnished:

Mr. Rodney Funakoshi
Wilson Okamoto and Associates
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

(P)1459.(

RECEIVED
AUG 0 8 2000
WILSON OKAMOTO & ASSOC., INC

AUG 7 2000

TO: Ms. Esther Ueda, Executive Director
Land Use Commission
Department of Business, Economic Development and Tourism

SUBJECT: Kaloko Industrial Park, Phases III and IV
EIS Preparation Notice
Tax Map Key 7-3-51:60
Kaloko, North Kona, Island of Hawaii

Thank you for the opportunity to review the subject EIS Preparation Notice. The proposed project does not directly impact any of our facilities. Therefore, we have no comments.

If there are any questions regarding the above, please have your staff call Mr. Tyler Fujiyama of the Planning Branch at 586-0492.

GORDON MATSUOKA
Public Works Administrator

TBF:jk
c: Mr. Rodney Funakoshi, Wilson Okamoto & Associates

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

BENJAMIN J. CAYETANO
GOVERNOR
SELJI F. NAYA, Ph.D.
DIRECTOR
PHILIP J. BOSSERT
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-8736

July 28, 2000

RECEIVED
AUG 01 2000
WILSON OKAMOTO & ASSOC., INC.

To: Esther Ueda, Executive Officer
Land Use Commission

From: David W. Blane, Director
Office of Planning

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key 7-3-51: 60

We have reviewed the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Phases III and IV of the existing Kaloko Industrial Park, North Kona, Hawaii and offer the following recommendations for information to be considered for inclusion into the Draft Environmental Impact Statement (DEIS).

The EISPN indicates that several studies will be conducted for inclusion into the Draft Environmental Impact Statement (DEIS). The studies will include an assessment of the impacts and provide mitigation measures where appropriate.

Studies cited in the EISPN included the following: Biological (botanical and faunal) Surveys; Archaeological Inventory Survey; Cultural Impact Survey; and Traffic Impact Survey. In addition, an assessment will be conducted to determine the potential impacts from the construction and operation of the industrial park on nearshore waters, groundwater, surface water (anchialine ponds) and the marine environment off the Kaloko-Honokohau National Historical Park.

In reference to the assessment of ground and surface water, we recommend that the study also include a sampling/testing of marine life in the nearshore waters and the anchialine ponds to determine the presence, or non-presence of industrial pollutants. We further recommend that similar studies be conducted for the marine life/aquaculture products within the Natural Energy Laboratory of Hawaii (NELH) and Hawaii Ocean Science and Technology (HOST) Park facilities and nearshore waters fronting them in order to determine if the potential exists for

currents to carry industrial pollutants into these facilities. We reiterate our concerns presented at the July 15, 2000 hearing regarding the potential for the ingestion of toxic pollutants by humans through contaminated water supplies and food and the importance of ensuring that all water resources – potable/non-potable groundwater as well as ocean water - are protected and free from levels of pollutants that could adversely impact wildlife resources and public health.

We understand that the biological assessment will address flora and fauna within the project area. However, if there are not any existing studies or recent count of native avian populations within the Kaloko-Honokohau National Historical Park, we recommend that the biological survey include an inventory of the existing populations of native avian species in the wetland habitat at the Historical Park. Such a study would provide a benchmark for measuring the impacts that increased water withdrawls and increases in industrial contaminants may or may not have on those populations.

We are also concerned about the impact of the anticipated growth discussed in the Draft Environmental Assessment (DEIA) on groundwater levels. The major source of fresh groundwater is from subsurface flow originating from areas mauka of the park. In 1999 the U.S. Geological Survey conducted a study on the groundwater levels in Kona (Geohydrology and Numerical Simulation of the Ground-water Flow System of Kona, Island of Hawaii-Report 99-4073. Three simulations were conducted to determine the effect of proposed water withdrawals from the high water-level on coastal discharge and water levels. The results demonstrated that freshwater coastal discharge is reduced by an amount equal to the additional freshwater withdrawal. The same study further indicated that freshwater withdrawals of 25.6 million gallons per day (gpd) may not be possible from the high water-level area between Palani Junction and Holualoa, but it may be possible to withdraw between 5 to 8 million gpd from that area. While the proposed expansion of Kaloko Industrial Park has been estimated at 320,000 gpd, whether industrial, commercial or residential, it would only take 16 to 24 other projects of the same magnitude with similar water demands to reach withdrawal levels approximated by the study of 5 to 8 million gpd.

Another study conducted by the USGS, and cited in the EISPN (Ground-Water Resources in Kaloko-Honokohau National Historical Park, Island of Hawaii, and Numerical Simulation of the effects of Ground-Water Withdrawals-Report 99-4070), determined that withdrawals from wells directly upgradient of the Historical Park had the greatest effect on the model-calculated freshwater coastal discharge within the Park. The groundwater, fishponds, and anchialine ponds in the Park are hydrologically connected. Decreasing groundwater levels could change salinity levels in the fishponds and anchialine ponds within the Historical Park thereby adversely affecting the species that inhabit these areas. Therefore, the DEIS should not only discuss impacts from the proposed expansion of the industrial park on groundwater levels, but should also include impacts resulting from existing and proposed developments on groundwater levels and the probability of discovering new groundwater resources.

From the information provided in the EISPN, it appears that the traffic impact study will analyze the impacts resulting only from the proposed development of the industrial park.

However, the study and its findings should also include information on the cumulative impacts resulting not only from the proposed expansion of the industrial park, but also include traffic impacts from other existing and proposed developments in the region. For example, in the DEIA, the discussion on "Project Need" emphasized the substantial recovery and growth of the economy and industrial real estate sector. It was pointed out that Phases I and II of Kaloko Industrial Park and Kohanaiki Business Park sold more than 80 percent of their available inventory and that within 10 years, regional demand is expected to increase annually by about 15 new finished lots each year. We recommend that the traffic study include the impact of this growth on regional traffic patterns. We further recommend that the applicant contact the State Department of Transportation for information regarding the anticipated timetable for the improvements to Queen Kaahumanu Highway. It is our understanding that the proposed highway improvements may not keep pace with the development in the region.

The EISPN states that individual property owners and/or tenants of the proposed development will be required to install septic tanks or aerobic units with appropriate disposal systems for wastewater in conformance with all State Department of Health (DOH) requirements. Septic tanks are difficult to maintain and costly to repair. The method and materials used in the construction of septic tanks are very important, especially in areas susceptible to seismic activities. Chemical additives used over the long term in the maintenance of septic systems can impact groundwater resources, and over the long term impair the system itself.

Further, septic tank systems intended for sanitary waste are sometimes misused for the disposal of industrial wastes or other fluids that have not been treated, thereby releasing elevated levels of contaminants directly into the groundwater. These practices may occur in septic systems located in automobile service stations, print shops, dry cleaners, shopping centers, equipment manufacturers, and other commercial and industrial establishments. Even the best systems may fail if they are used improperly. In light of these concerns, we further recommend that the DEIS include a discussion of mitigation measures and proposals to educate the property owners and/or tenants on the proper use of septic and aerobic systems they will be required to install.

Septic tank systems are known to leak nutrients, bacteria, and pathogens. Water from septic tanks flows in the direction of groundwater, increasing the potential for polluting ground and surface water resources. At high tide, the polluted water coming from the tank could be pushed up into surface waters located in the park. This is another reason for establishing a benchmark to measure future populations of native waterbirds in the Historical Park.

Therefore, the cumulative effect of many septic systems in one area is of major concern. We recommend that the assessment to determine the potential impacts from the construction and operation of the proposed industrial park to groundwater and the pond and marine environment within the Kaloko-Honokohau National Historical Park and nearshore waters, not only include potential impacts from volatile or semi-volatile compounds, but also include potential impacts from leaking septic tanks.

Thank you for the opportunity to provide comments.

cc: Wilson Okamoto & Associates, Inc.

6351-01
August 7, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX (808)946-2253

Mr. David W. Blane, Director
State of Hawaii
Department of Business, Economic Development & Tourism
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Blane:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of July 28, 2000, regarding the subject EIS Preparation Notice. We offer the following responses to your comments:

The assessment of ground water effects on the marine and pond environments conducted in conjunction with the Draft EIS includes an analysis of the water chemistry and identification of marine habitat in the Aimakapa and Kaloko ponds within the Kaloko-Honokohau National Historical Park, as well as nearshore waters. The assessment also identifies the potential effects of the proposed project on water quality at the Natural Energy Laboratory of Hawaii (NELH) and Hawaii Ocean Science and Technology (HOST) Park located approximately 3.5 miles north of the project site.

As industrial pollutants are not part of the natural composition of the ponds and ocean, it is not possible to predict the effects of varying concentrations of these substances to the natural systems, as is the case for nutrients. As such, the Draft EIS will include a discussion of Best Management Practices (BMPs) measures to be implemented to mitigate or eliminate any potential contaminants from the proposed project to ground water that could eventually reach the pond and marine environments.

The Draft EIS will include an inventory of the existing populations of native avian species in the wetland habitat at the Kaloko-Honokohau National Historical Park.

Your concern regarding the impact of the anticipated growth as discussed in the EIS Preparation Notice on ground water levels is acknowledged. The assessment of potential impacts on ground-water resources conducted in conjunction with the Draft EIS includes an assessment of the impact of ground

water withdrawals for potable use, as well as the resulting potential reduction of recharge for the basal lens in the coastal area, as a result of the proposed project and other developments in the area.

A traffic impact assessment has been conducted for the Draft EIS which includes an analysis of the potential traffic impacts within the project vicinity resulting from the proposed development, as well as existing and future traffic projections to year 2010, the project's anticipated full build-out date. The traffic impact assessment also incorporates the State Department of Transportation Highways Division's planned improvements to Queen Kaahumanu Highway.

Measures to educate the property owners and/or tenants of the individual lots within the proposed development on the proper use of septic systems will be discussed in the Draft EIS. The assessment of impacts on ground-water resources and the marine and pond environments also identifies the potential impacts from individual wastewater systems in the proposed development, and associated mitigative measures, as may be required.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM
HOUSING AND COMMUNITY DEVELOPMENT CORPORATION OF HAWAII
677 QUEEN STREET, SUITE 300
Honolu'u, Hawaii 96813
FAX: (808) 587-0600

SHARYN L. MIYASHIRO
ACTING EXECUTIVE DIRECTOR

ROBERT J. HALL
ACTING EXECUTIVE ASSISTANT

IN REPLY REFER TO:
00:PEO/1764

July 12, 2000

RECEIVED
JUL 17 2000
WILSON OKAMOTO & ASSOC., INC.

Ms. Esther Ueda
Executive Officer
State Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Dear Ms. Ueda:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for Kaloko Industrial Park, Phases III and IV

We have reviewed the subject EISPN and have no comments to offer at this time.

Thank you for the opportunity to comment.

Sincerely,

Sharyn L. Miyashiro
Acting Executive Director

c: Rodney Funakoshi, Wilson Okamoto & Associates

BENJAMIN J. CAYETANO
GOVERNOR

PAUL G. LeMAHIEU, Ph.D.
SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

July 19, 2000

RECEIVED
JUL 31 2000
WILSON OKAMOTO & ASSOC, INC.

MEMO TO: Ms. Esther Ueda, Executive Officer
Land Use Commission, DBED&T

F R O M: Paul G. LeMahieu, Ph.D., Superintendent
Department of Education

SUBJECT: Kaloko Industrial Park, Phases III and IV EISPN

The Department of Education has no comment on the subject EIS Preparation Notice.

Thank you for the opportunity to respond.

PLeM:SB:hy

cc: P. Yoshioka, DAS
Rodney Funakoshi, Wilson Okamoto & Assoc.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

JL 6 2000

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6351-01
July 3, 2000

DEPT OF EDUCATION
SUPT'S OFFICE
Jul 5 2 21 PM '00

WILSON OKAMOTO & ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX: (808)946-2253

Mr. Paul Le Mahieu, Ph.D., Superintendent
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Tax Map Key: 7-3-51: 60
Kaloko, North Kona, Island of Hawaii

Dear Mr. Le Mahieu:

Enclosed for your review is the EIS Preparation Notice for the Kaloko Industrial Park, Phases III and IV which was prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Title 11, Chapter 200 Administrative Rules, Department of Health, State of Hawaii. Please send original comments to:

State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359
ATTENTION: Ms. Esther Ueda

Please send a copy of the comments to:

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826
ATTENTION: Mr. Rodney Funakoshi

Your comments must be received or postmarked by August 7, 2000. Your input in the EIS Preparation Notice is appreciated.

Sincerely,

Rodney Funakoshi, Project Manager

Enclosure

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

RECEIVED
AUG 09 2000
WILSON OKAMOTO & ASSOC., INC.

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to
File

August 4, 2000

00-124/epo

Mr. Rodney Funakoshi, AICP
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Subject: Environmental Impact Statement Preparation Notice
Kaloko Industrial Park, Phases III and IV
Kaloko, North Kona, Island of Hawaii
TMK: 7-3-51:60

Thank you for allowing us to review and comment on the subject project, which proposes to complete the development of the existing Kaloko Industrial Park by developing a 102.3 acre parcel which comprises Phases III and IV of the light industrial park in Kaloko, North Kona, Island of Hawaii.

Wastewater

The subject project is located in the non-critical wastewater disposal area as determined by the Hawaii County Wastewater Advisory Committee.

As there is no existing service system in the area and none will be constructed in the near future, the Department of Health (DOH) concurs with the proposed construction of treatment individual wastewater systems (IWSs), such as septic tank systems. However, should sewers become available in the near future, connection will be required.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems," and we reserve the right to review these wastewater plans.

Should you have any questions on this matter, please contact the Planning/Design Section of the Wastewater Branch at (808) 586-4294.

Clean Air Branch

Fugitive Dust

The proposed project includes mass grading, constructing roadways and installing utilities for industrial, business and commercial development. The location map for the project indicates construction to be in close proximity to existing light industrial and commercial businesses and a major highway.

Due to the nature and location of the project, there is a significant potential for fugitive dust emissions during the mass grading and construction activities for this project. Therefore, implementation of adequate dust control measures during all phases of this project are necessary. Construction activities must comply with provisions of Hawaii Administrative Rules (HAR), "Air Pollution Control", Chapter 11-60.1, Section 11-60.1-33 on Fugitive Dust.

The contractor should provide adequate measures to control dust from road areas and during the various phases of construction activities. These measures include, but are not limited to:

a. planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing material transfer points and on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. providing an adequate water source at site prior to start-up of construction activities;

c. landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. controlling of dust from shoulders, project entrances, and access roads;

e. providing adequate dust control measures during weekends, after hours and prior to daily start-up of construction activities; and

f. controlling of dust from debris being hauled away from project site.

Air Quality Data Corrections:

Although the air quality data used in the report does not significantly affect the conclusions of the environmental impacts there are some updates and corrections that should be made to the data:

The report indicated that no sulfur dioxide (SO2) data was collected from January 1998 to September 1998 at the Konawaena Air Monitoring Station. SO_2 monitoring at the Konawaena Station has been in continuous operation since April 1997. Attached is an updated table summarizing the 24-hour average SO_2 concentrations for the period of April 1997 to December 1999.

Similarly, the statement that there were 23 months of data collection with seven days of invalid data, should be changed to 33 months of data collection with 10 days of invalid data.

If there are any questions please contact Ms. Susan Kihara of my staff at 586-4200.

Table 3-4
Monthly Summary of 24-Hour Average Sulfur Dioxide (SO_2) ($\mu g/m^3$)
Preliminary Data, Kona Special Monitoring Station
1997 - 1999

	1997		1998		1999	
	Range	Average	Range	Average	Range	Average
JAN	ND	ND	2-39	14.3	1-12	5.3
FEB	ND	ND	2-17	5.8	3-18*	6.4*
MAR	ND	ND	2-24	9	3-17	7.6
APR	0-4	2.5	3-36	13.7	4-12	6.8
MAY	0-8	2.1	4-36	9.8	3-18*	6.9*
JUNE	0-6	2.3	5-17	9.8	3-14	4.9
JULY	0-14	4.5	3-24	9.4	4-10	5.7
AUG	0-26	7.6	5-28	10.4	4-8	6
SEPT	0-16	5.2	3-20	8.3	3-9	5.1
OCT	0-40	6.6	5-11	6.6	5-8	5.8
NOV	0-54	11.5	4-14	8	5-11	6.6
DEC	2-32	13.8	2-17*	7*	3-12	5.2

Source: State of Hawaii Department of Health, Clean Air Branch
Notes: Range refers to the lowest and highest 24-hour $\mu g/m^3$ value recorded in the month.
Average refers to the arithmetic mean of all hours recorded in the month.
* Denotes months which contained one or more days of invalid data.
ND denotes months for which no data was available.

Hazardous Waste

Businesses in industrial areas tend to generate hazardous waste paints, solvents and heavy metals, such as lead, arsenic and cadmium. Therefore potential tenants should be aware of the State hazardous waste regulations found in Chapters 11-260 through 11-280 of the Hawaii Administrative Rules.

Should you have any questions on this matter, please contact Mr. Thomas Brand of the Solid & Hazardous Waste Branch at 586-4226.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: WWB
CAB
SHWB

6351-01
August 9, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH. (808) 946-2277
FAX. (808) 946-2253

Mr. Gary Gill, Deputy Director
State of Hawaii
Department of Health
Environmental Health Administration
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Gill:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 4, 2000, regarding the subject EIS Preparation Notice. We offer the following in response to your comments:

Wastewater

The Draft EIS includes a discussion of the wastewater system improvements required for the proposed development, and mitigation measures for averting or minimizing potential adverse effects, as appropriate. Your Department's concurrence with the proposed installation of individual wastewater systems is acknowledged. The individual property owners and/or tenants of the proposed development will be required to install and operate their respective individual wastewater systems in conformance with the applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems".

Based on preliminary discussions with the County of Hawaii Department of Public Works, the County is initiating plans for eventually extending sewer service to the north of the Kealakehe Wastewater Treatment Plant. The potential requirement for installation of a sanitary sewer system for the proposed development will be incorporated in project plans.

Clean Air Branch

Fugitive Dust:

The construction contractor(s) for the proposed development will be required to comply with the provisions of HAR, "Air Pollution Control", Chapter 11-60.1, Section 11-60.1-33 on Fugitive Dust. A discussion of this is included in the

Draft EIS. The contractor(s) will also be required to implement adequate measures to control dust from road areas and during the various phases of construction activities, including the applicable measures identified in your letter.

Air Quality Data Corrections:

We appreciate the updated and corrected air quality data on sulfur dioxide (SO_2). The discussion on air quality in the Draft EIS will be revised accordingly to reflect the appropriate data.

Hazardous Waste

The individual property owners and/or tenants of the proposed development will be required to comply with the State hazardous waste regulations contained in Chapters 11-260 through 11-280 of the Hawaii Administrative Rules.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

RECEIVED
JUL 14 2000
WILSON OKAMOTO & ASSOC, INC.

July 13, 2000

Esther Ueda
Land Use Commission
235 South Beretania St., 4th floor
Honolulu, HI 96813

Dear Ms. Ueda:

SUBJECT: Environmental impact statement (EIS) preparation notice for Kaloko Industrial Park, Phases III and IV, North Kona, TMK: 7-3-51:60

We have the following comments to offer:

1. Land Uses: 82 one-acre lots will be developed on the 102-acre parcel. What will the balance of 40 acres be used for?

2. Phasing: The adjacent Kaloko Industrial Park has been enumerated as Phases I and II, and the proposed industrial park as Phases III and IV. If additional phases beyond IV are planned, then all currently proposed and future phases must be described in a single document, such as a master plan. The EIS law does not allow segmentation of larger projects, but requires disclosure of projects in their entirety. Please address this in the draft EIS.

3. Cumulative Impacts: The Environmental Impact Statement law requires that full disclosure of cumulative impacts be made on projects that are related geographically. In the draft EIS provide such an analysis for those mentioned in Sections 1.4.2.1 and 1.4.22. Include also the proposed UH West Hawaii Center.

4. Permits: In Section 4.10 list the status, or the date (or anticipated date) of filing, of each permit. Will a permit be required from the Commission on Water Resources Management?

5. Recycling: Will recycling measures be instituted by the park management, or required of the individual tenants? Will the tenants be required to adopt resource conservation measures to promote environmentally sensitive and energy efficient design, such as low-flush toilets, solar panels or energy-efficient fixtures? Include a discussion of this in the draft EIS.

6. Water usage: Is Kona currently experiencing a drought? If so, how do you propose to irrigate new landscaping? Can you use reclaimed water? If you have a water commitment from the county Department of Water Supply or from the Commission on Water Resources Management be sure to include copies of all correspondence.

7. Figures: The north arrow in Figure 1.3 has an incorrect orientation. Please correct this in the draft EIS.

If you have any questions call Nancy Heinrich at 586-418.

Sincerely,

GENEVIEVE SALMONSON
Director

c: Rodney Funakoshi

6351-01
August 7, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808) 946-2277
FAX (808) 946-7253

Ms. Genevieve Salmonson, Director
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, 4th Floor
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of July 13, 2000, regarding the subject EIS Preparation Notice. We offer the following in responses to your comments:

1. Land Uses: The 82-lot count is an *approximate* number of lots proposed to be developed, with the average lot size slightly more than one acre in size. The remaining acreage within the site will include the project roadways which, for design purposes, typically account for about 20 percent of the overall acreage.

2. Phasing: The proposed Phases III and IV will complete the development of the Kaloko Industrial Park. No additional phases of the Kaloko Industrial Park are planned.

3. Cumulative Impacts: The Draft EIS will address cumulative impacts resulting from the proposed project and other developments in the project vicinity, as appropriate.

4. Permits: The status or anticipated filing date of each permit will be included in **Section 4.10 Permits and Approvals** of the Draft EIS. A permit from the Commission on Water Resources Management is not anticipated to be required for the proposed project.

5. Recycling: A discussion of recycling/conservation measures which may be instituted by the individual tenants of the proposed industrial park will be included in the Draft EIS.

6. Water Usage: The Kona region, as well as various other regions within Hawaii Island and the State, have been receiving very low rainfall amounts in recent times. For irrigation of landscaping within the proposed industrial park, the individual tenants will be encouraged to implement water conservation measures. Such measures could include use of drip irrigation or xeriscape plants for landscaping.

Although the use of reclaimed water for landscaping irrigation purposes may be possible by the individual tenants, given a readily available supply, landscaped areas are typically a very small portion of industrial and commercial lots, such that a reclaimed water system would not be cost-effective in relation to the amount of usage that would actually be realized.

As indicated in **Section 3.16.1 Water System** of the EIS Preparation Notice, water commitments for the proposed development have been secured from the County of Hawaii Department of Water Supply (DWS). Attached is a copy of a letter dated August 4, 2000 from the County DWS confirming that the developer has a water commitment for 851 units of water which expires on May 31, 2001.

7. Figures: **Figure 1-3 Existing and Proposed Uses Within the Project Vicinity** will be corrected in the Draft EIS to reflect the correct orientation of the north arrow. Thank you for calling this to our attention.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

Attachment

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

COPY

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JAMES E. KANEKO

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

July 13, 2000

RECEIVED
JUL 19 2000
WILSON OKAMOTO & ASSOC., INC.

LOG NO: 25793 ✓
DOC NO: 0007PM15

Ms. Esther Ueda, Executive Director
State of Hawaii Department of Business,
Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Dear Mr. Moore:

SUBJECT: Environmental Impact Statement Preparation Notice
Kaloko Industrial Park, Phases III and IV
Kaloko, North Kona, Hawaii Island, TMK: 7-3-51:60

This is in response to the request for comments on the subject document, which was received in our office on July 6, 2000.

The applicant, TSA International, Ltd. seeks to complete the development of the existing Kaloko Industrial Park. This would involve the development of a 102.3 acre parcel.

The EISPN indicates that an archaeological inventory survey will be conducted for the Draft EIS to determine the presence/absence of historic sites in the Petition Area, and to identify any mitigation measures that might be required. The results of the survey should be submitted in written format to our office for review and approval.

If you or your staff should have any questions about the requirements for archaeological inventory survey reports please contact our Hawaii Island archaeologist, Patrick McCoy (692-8029).

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:dnm

c. Rodney Funakoshi, Wilson Okamoto & Associates, Inc.

JUL 17 2000

6351-01
August 7, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX (808)946-2253

Mr. Don Hibbard, Administrator
State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Mr. Hibbard:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of July 13, 2000 (LOG NO: 25793, DOC NO: 0007PM15), regarding the subject EIS Preparation Notice.

The archaeological report entitled *Archaeological Inventory Survey, Kaloko Industrial Park, Phases III and IV* was prepared by Haun & Associates (May 3, 2000) and submitted to your Division for review and approval on May 8, 2000. A copy of the inventory survey report will also be included in the Draft EIS for the subject project.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
25 AUPUNI STREET • HILO, HAWAII 96720
TELEPHONE (808) 961-8660 • FAX (808) 961-8657

August 4, 2000

RECEIVED
AUG 07 2000
WILSON OKAMOTO & ASSOC., INC.

State of Hawaii
Department of Business Economic Development & Tourism
Land Use Commission
ATTENTION: MS. ESTER UEDA
P.O. Box 2359
Honolulu, HI 96804-2359

ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE
KALOKO INDUSTRIAL PARK, PHASE NOS. III AND IV
KALOKO, ISLAND OF HAWAII
TAX MAP KEY: 7-3-051:060

We have reviewed the subject notice and our comments follow.

There are two revisions that need to be made to page Nos. 3-21. Under Section *3.16.1 Water System*, there are only two water storage tanks on Hina Lani Street. The one with the spillway elevation of 934 has not been constructed. Under *Impacts and Mitigation Measures*, the peak-hour flow is calculated at five times the average day and is equal to 1,139 gallons per minute of 68,333 gallons per hour.

We can confirm that the developer has a water commitment for 851 units of water, with each unit equal to 600 gallons per day. This commitment expires on May 31, 2001.

If you have any questions, please contact our Water Resources and Planning Branch at 961-8665.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

BCM:gms

copy - Wilson Okamoto & Associates, Inc.

Water Use Permits...

6351-01
August 7, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Milton D. Pavao, P.E., Manager
County of Hawaii
Department of Water Supply
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Pavao:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 4, 2000, regarding the subject EIS Preparation Notice.

Reference to the 1.0 MG water storage tank located at the spillway elevation of 934 feet will be deleted from the Draft EIS. Thank you for calling this to our attention.

In Section 3.17.1 Water System Impacts and Mitigation Measures in the Draft EIS, reference to 68,333 gallons per hour or 1,139 gallons per minute will be included under the peak hour flow demands.

We acknowledge your confirmation that the developer has a water commitment for 851 units of water which expires on May 31, 2001.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Russell Kokubun
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8742

August 7, 2000

Nathan T. Natori, Esq.
Davis Wright Tremaine
1360 Pauahi Tower
1001 Bishop Street
Honolulu, HI 96813

Dear Mr. Natori:

Environmental Impact Statement Notice of Preparation (EISPN)
Kaloko Industrial Park, Phases III and IV
Applicant: TSA International, Ltd.
Tax Map Key: 7-3-51:60

Thank you for the opportunity to review and comment on the EISPN for the Kaloko Industrial Park, Phases III and IV project. We have the following comments to offer:

1. The goals, policies, standards and courses of action of the General Plan and the applicability to the proposed project should be discussed in the Draft Environmental Impact Statement (DEIS).

2. The Keahole to Kailua Development Plan discusses the sewerage plan for the North Kona area. This plan should be incorporated and addressed in the DEIS, including an assessment of connecting to the County's Kealakehe Wastewater Treatment Plant.

3. The General Plan and the Keahole to Kailua Development Plan propose the construction of a mid-elevation lateral connection between Palani Road and Ka'iminani Drive. The DEIS should include discussion relating to said mid-elevation roadway as it appears to be in the vicinity of the petition area. In addition, discussion should include any roadway interconnection with the adjacent proposed Kaloko-Honokohau Business Park.

4. The DEIS should discuss the cumulative infrastructure impact such as roads, sewer, water and drainage from the subject project and proposed adjacent industrial project south of the petition area.

5. The location of the Mixed Industrial-Commercial (MCX) zoning is proposed between the Limited Industrial (ML) zoned lands. The DEIS should discuss the rationale of the proposed MCX zoning location.

6. Page 1-7, Paragraph 2: The contested Special Management Area (SMA) Use Permit was drawn from the Planning Commission rather than the Planning Department.

7. Page 3-13: Clarify the type of document prepared by The Hallstrom Group, Inc. and include as part of the DEIS.

8. Page 4-11, 4.9: Clarify that any development within the Special Management Area is subject to the requirements of the SMA laws. It is not always the case that a SMA Use Permit is required. Therefore, it should be clarified that final decision for a SMA Use Permit is by the Planning Commission and a SMA Minor Permit is by the Planning Director.

9. Page 4-11, 4.10: Clarify that final decision for a change of zone is the Hawaii County Council rather than the Planning Department. Include subdivision approval under Planning Department.

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

Sincerely,

VIRGINIA GOLDSTEIN
Planning Director

AK:pak
p:\wpwin60\alicewin\LETTERS\EISPNTSA01.apk

xc: Ms. Genevieve Salmonson, Director, OEQC
Ms. Esther Ueda, Executive Director, LUC
Mr. Rodney Funakoshi
West Hawaii Office

6351-01
August 10, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX. (808)946-2253

Ms. Virginia Goldstein, Director
County of Hawaii
Planning Department
25 Aupuni Street, Room 109
Hilo, Hawaii 96720-4252

Dear Ms. Goldstein:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 7, 2000, regarding the subject EIS Preparation Notice. We offer the following responses to your comments:

1. The Draft EIS includes a discussion of conformance of the proposed project to the applicable goals, policies, standards, and courses of action of the Hawaii County General Plan.

2. The Draft EIS includes a discussion of the conformance of the proposed project to the applicable provisions of the Keahole to Kailua Development Plan, as well as provisions for eventual connection to the County's municipal sewer system.

3. We assume that the mid-elevation lateral connection between Palani Road and Kaiminani Drive is located mauka of the Petition Area and, therefore, should not be affected by the proposed project. The traffic impact assessment prepared for the proposed project assumes eventual roadway connection with the adjacent proposed Kaloko-Honokohau Business Park.

4. A discussion of the cumulative traffic impacts is addressed in the Draft EIS. Potential impacts from the proposed project as well as cumulative impacts of sewer, storm water, and ground-water withdrawals on groundwater and the marine and pond environments makai of the Petition Area are assessed in the Draft EIS.

5. The rationale of the proposed MCX, Industrial-Commercial Mixed District are planned to be addressed in the zoning application for the proposed development.

6. The Draft EIS will reflect that the contested Special Management Area (SMA) Use Permit was withdrawn from the County Planning Commission rather than the County Planning Department.

7. The document prepared by The Hallstrom Group, Inc. is a market analysis which is not usually needed or included in EIS documents. The document will be included as part of the State Land Use District Boundary Amendment Petition.

8. Your clarification regarding the Special Management Area laws as suggested will be incorporated in the Draft EIS.

9. Your clarifications regarding change of zone and subdivision will be incorporated in the Draft EIS.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

Stephen K. Yamashiro
Mayor

Wayne G. Carvalho
Police Chief

James S. Correa
Deputy Police Chief

County of Hawaii
POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-2702

July 11, 2000

State of Hawaii
Department of Business, Economic Development
and Tourism
Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

RECEIVED
JUL 12 2000
WILSON OKAMOTO & ASSOC, INC.

Attention: Ms. Esther Ueda

To Whom It May Concern:

SUBJECT: KALOKO INDUSTRIAL PARK, PHASES III AND IV
ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE
TAX MAP KEY: 7-3-51: 60
KALOKO, NORTH KONA, ISLAND OF HAWAII

Staff has reviewed the above referenced document and reserves comments pending the traffic assessment being prepared in the draft EIS as stated on page 3-24.

Thank you for the opportunity to comment.

Sincerely,

WAYNE G. CARVALHO
POLICE CHIEF

THOMAS J. HICKCOX
ASSISTANT POLICE CHIEF
FIELD OPERATIONS BUREAU

DAF:lk

cc: Wilson Okamoto & Associates, Inc.

Stephen K. Yamashiro
Mayor

Edward Bumatay
Fire Chief

Russel M. Miyao
Deputy Fire Chief

County of Hawaii

FIRE DEPARTMENT

777 Kilauea Avenue • Mall Lane, Room 6 • Hilo, Hawaii 96720-4239
(808) 961-8297 • Fax (808) 961-8296

July 12, 2000

RECEIVED
JUL 13 2000
WILSON OKAMOTO & ASSOC., INC.

State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Attention: Esther Ueda

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement Preparation Notice
Tax Map Key: 7-3-51:60
Kaloko, North Kona, Island of Hawaii

We have reviewed the above-referenced EIS Preparation Notice and have the following comment:

Page 3-19, 3.15.2 Fire Protection, second paragraph: We do not have a fire station in Kainaliu.

Please feel free to call me should you have any questions.

EDWARD BUMATAY
Fire Chief

EB/mo

cc: ✓Rodney Funakoshi, Wilson Okamoto & Associates, Inc.

6351-01
August 7, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Edward Bumatay, Fire Chief
County of Hawaii
Fire Department
777 Kilauea Avenue
Mall Lane, Room 6
Hilo, Hawaii 96720-4239

Dear Mr. Bumatay:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of July 12, 2000, regarding the subject EIS Preparation Notice.

Reference to a fire station in Kainaliu will be deleted from the Draft EIS. Thank you for calling this to our attention.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

GTE Hawaiian Tel

Beyond the call

GTE Hawaiian Telephone Company Incorporated
P.O. Box 2200 - Honolulu, HI 96841 - (808) 546-4511

July 26, 2000

RECEIVED
AUG 02 2000
WILSON OKAMOTO & ASSOC., INC.

Ms. Esther Ueda
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Tax Map Key: 7-3-51:60
Kaloko, North Kona, Island of Hawaii

Dear Ms. Ueda:

We have reviewed the EIS for Kaloko Industrial Park, Phases III and IV and would like to make a revision to Section 3.16.5, Electrical and Communications Systems, Communications System.

As stated in the paragraph regarding the communications system, GTE Hawaiian Telephone will provide service to the proposed development utilizing HELCO power poles, however, GTE does not have any "direct burial cables" in the area. In order to provide service, GTE will also require an easement from the developer for electronic equipment. The easement will need to have adequate separation from the proposed HELCO substation mentioned in the previous paragraph regarding the electrical system. Desired easement locations will be sent to the developer's consultant, Wilson Okamoto & Associates, Inc.

Thank you for the opportunity to provide input to the EIS Preparation Notice.
If you have any questions, please contact Julie Sakasegawa at 546-5445.

Sincerely,

Matthew Yung

Matthew Yung
Access Design Supervisor

my/js

c: Gordon Yadao (GTE Hawaiian Tel)
Michael Chang (GTE Hawaiian Tel)
Julie Sakasegawa (GTE Hawaiian Tel)
Rodney Funakoshi (Wilson Okamoto & Assoc.)

WILSON OKAMOTO & ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

6351-01
August 7, 2000

Mr. Matthew Yung, Access Design Supervisor
GTE Hawaiian Telephone Company Incorporated
P.O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Yung:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of July 26, 2000, regarding the subject EIS Preparation Notice.

Further coordination will be conducted with GTE Hawaiian Telephone Company regarding requirements for telephone service, including an easement for electronic equipment, during the project's design phase.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi

Rodney Funakoshi, Project Manager

CORRECTION

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

GTE Hawaiian Tel
Beyond the call

GTE Hawaiian Telephone Company Incorporated
P.O. Box 2200 - Honolulu, HI 96841 - (808) 546-4511

July 26, 2000

RECEIVED
AUG 02 2000
WILSON OKAMOTO & ASSOC., INC.

Ms. Esther Ueda
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Tax Map Key: 7-3-51:60
Kaloko, North Kona, Island of Hawaii

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If you have any questions, please contact Julie Sakasegawa at 546-5445.

Sincerely,

Matthew Yung
Access Design Supervisor

my/js

c: Gordon Yadao (GTE Hawaiian Tel)
Michael Chang (GTE Hawaiian Tel)
Julie Sakasegawa (GTE Hawaiian Tel)
Rodney Funakoshi (Wilson Okamoto & Assoc.)

6351-01
August 7, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808)946-2277
FAX: (808)946-2253

Mr. Matthew Yung, Access Design Supervisor
GTE Hawaiian Telephone Company Incorporated
P.O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Yung:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

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Further coordination will be conducted with GTE Hawaiian Telephone Company regarding requirements for telephone service, including an easement for electronic equipment, during the project's design phase.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi

Rodney Funakoshi, Project Manager

DAVID K. ROY, JR.,
CONSULTANT

Date August 7, 2000
Time
To WILSON OKAMOTO & ASSOCIATES, INC. fax no. 946-2253

From DAVID K. ROY, JR. fax No 324-1162

Re
Total no of pages (including this page) 9

Message POSITION STATEMENT OF NAKOKUA-KALOKO-HONOKOHAU, INC.

P. O. Box 596, Kailua, Kona, Hi. 96745
Phone 808-322-3281 - Fax 808-324-1162

FOR IMMEDIATE RELEASE

CONTACT DAVID ROY
CHAIRPERSON, KALOKO-HONOKOHAU ADVISORY COMMITTE
P.O. BOX 595 KAILUA-KONA, HI 96745
322-3281

ADVISORY GROUP SEEKS TO PROTECT NATIONAL PARK FROM THREAT OF POLLUTION

July 20, 2000, Kaloko - Honokohau National Historical Park Advisory Commission released a proposal to protect the fishponds in the National Historical / Cultural Park. The Kaloko Industrial Park area expansion to the East threatens to pollute the water quality of three major ancient Hawaiian fishponds within the National Park. Impacts pose an imminent danger to coastal and near-shore marine environments and subsistence and commercial fishing activity.

The Advisory Committee, Nā Kōkua Kaloko Honokōhau, is a community consortium of educators, cultural practitioners, environmentalists, and business people, whose purpose is to give advice to the National Park in its Congressional authorization "to provide a center for the preservation, interpretation, and perpetuation of traditional native Hawaiian activities and culture. In 1974, the Advisory Commission, in partnership with the National Park service completed the study report called "*The Spirit of Kaloko Honokōhau*" enabling the 1978 authorization establishing the Kaloko-Honokohau National Historical Park.

The motivational force behind the *Spirit of Ka-loko Hono-kō-hau* is an inherited Mo'o Ku'auhau-the genealogy that expresses a millennium of harmonious kinship with the natural environment and the cultural imperative to be efficient stewards over our precious island resources. Historically, the sacred fishponds of Kaloko-Honokohau were vital economic and political resources. Today, they remain critical elements to the perpetuation of Hawaiian cultural practices and contribute to the overall quality of life in our multi-cultural community.

Nā Kōkua proposes a new and innovative mechanism to mitigate negative impacts and avoid litigative actions. Nā Kōkua proposes that the stakeholders form a consortium to discuss alternatives to implement fair and just planning prerogatives. Options should include, but not be limited to, the feasibility of incorporating a community based economic development project to capture, process, and reuse waste-water and other waste fluids to eliminate run-off pollution to the neighboring community and its shared environment. This partnership should encourage citizen participation along with Federal, State and County representation.

In order to maintain the integrity of the coastal resources, all parties in shared environments must be mindful and respectful that we are bound to each other in symbiotic relationships; and we must have the maturity to know that damage to one part will cause irreparable harm to the whole community.

###

Statement of Na Kokua Kaloko Honokohau

Na Kokua Kaloko Honokohau is a community consortium of educators, cultural practitioners, environmentalists, and business people, whose purpose is to give advise to the Kaloko Honokohau National Historical Park in its Congressional authorization "to provide a center for the preseration, interpretation, and perpetuation of traditional native Hawaiian activities and culture".

In 1974, after years of profound and exhaustive research, The Kaloko Honokohau Study Advisory Commission in partnership with the National Park Service completed the study report called "The Spirit of Kaloko Honokohau", providing a basis for the 1978 enactment of Public Law 95-625 authorizing the establishment of Kaloko-Honokohau National Historical Park.

The motivation for the "Spirit of Kaloko Honokohau" is an inherited Mo'o Ku'auhau-the genealogy that expresses a millennium of harmonious kinship with the natural environment and the cultural imperative that we be efficient stewards for our precious island resources.

Our history and traditions remind us that we are blessed with winds that caress us, fills our sails, and gives us encouragement. It allows us to see the stars that give us 'ike (insight) and understanding, that we may travel many miles and transverse countless generations. Our customs and practices remind us of our relationship to the seas that sustain us, and the waters that comfort us.

Of particular concern, are the unique and sacred fishponds of Kaloko-Honokohau. Historically, they were vital economic and political resources. Today, they remain critical elements to the perpetuation of

Hawaiian cultural practices and contribute to the overall quality of life in our multi-cultural community.

These cultural motivations compel us to defend our Wahi Pana-our Sacred Places. It demands that we assert our customary and traditional right to protect the cultural resources at Kaloko-Honokohau. Three paramount features of Kaloko-Honokohau are: 1. Kaloko Loko Kuapa, an 11 acre fishpond that is a natural embayment with a man-made sea wall; 2. 'Aimakapa Loko Pu'uone, a 15 acre fishpond that is a natural pond formed behind a natural barrier; and , 3. 'Ai'opio , which is a 1.7 acre Loko I'a, an area enclosed by a wall of stone and coral with an opening to the sea which is closed with a net thus entrapping fish within the Loko. At high tide, fish enter this enclosure and when the opening is then closed, with a net, they are entrapped.It is for this reason that it does not have a Makaha (a sluice gate) and is called a fish trap.

These ponds were vital economic and political resources in historical times and now they remain critical elements to the perpetuation of Hawaiian cultural practices, and contribute to the overall quality-of-life in our multicultural society.

It is extremely important to maintain the integrity of the fishpond complex. All stakeholders who share these common resources must be good stewards over these precious assets that are ours to maintain, and are bound to each other in a symbiotic relationship; and we must have the maturity to know that damage to one party will cause irreparable harm to the whole community.

The Kaloko Industrial Park expansion area to the South, North and mauka (towards the mountain) of the Kaloko-Honokohau Cultural Park, threatens to indiscriminately pollute the water quality of the fishpond; they also pose an imminent danger to ocean and near shore marine environments that would

adversely affect subsistence and commercial fishing activities.

Na Kokua proposes a new and innovative mechanism to mitigate negative impacts and avoid litigative actions. Na Kokua proposes that the stakeholders form a consortium to discuss alternatives to implement fair and just planning prerogatives.

Options should include, but not be limited to, the feasibility of incorporating a community based economic development project to capture, process, and reuse waste-water and other waste fluids to eliminate run-off pollution to the neighboring community and its precious environment. To promote safe and responsible planning, this partnership should encourage citizen participation with Federal, State and County administrative agencies and share successes with other communities in similar circumstances; with commitment, foresight, and measurable accomplishments combining jointly with our

enthusiasm to improve the quality of life by creating healthy, safe, and prosperous conditions enjoyed for countless ages by our Kupuna, pollution could be avoided, or at the least, mitigated.

Na Kokua's proposed initiatives offers opportunity for environmental justice and multi-cultural appreciation. We submit that the developers will be the new source of pollution problems unless they are sensitive and cooperate with the community that stands to be impacted by the pollution and by developing a means of addressing this problem with proper application of recycle and reusable practices. Na Kokua believes this kind of concern would be best served by the development of a community based management system in cooperation with Federal, State, and County agencies who would be accountable for monitoring the program.

Also, Na Kokua Kaloko Honokohau believes that the National Park Service has a meaningful investment

In Kaloko Honokohau to the extent of over 63 million dollars. Therefore it must protect and promote this historical treasure for our citizens, their children, their grandchildren, and generations to come.

Na Kokua Kaloko Honokohau further finds that it is imperative that the Hawaiians and Citizens at large honor and respect the final resting place of our Na'I Aupuni-Kamehameha 'Akahi, together with all that comprises our rich heritage that is Hawaii.

Finally, Na Kokua Kaloko Honokohau requests that developer grant Na Kokua a "Consulting Party" status in order to facilitate full participation in the planning process.

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

6351-01
August 7, 2000

Mr. David K. Roy, Jr.
Na Kokua Kaloko-Honokohau, Inc.
P.O. Box 596
Kailua-Kona, Hawaii 96745

Dear Mr. Roy:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for submitting your position statement of August 7, 2000, regarding the subject project.

In conjunction with the Draft EIS, an assessment has been conducted to determine the potential ground-water effects on the pond and marine environments within the Kaloko-Honokohau National Historical Park and nearshore waters as a result of the proposed project. The assessment also identifies associated mitigative measures, as may be required, to minimize any potential impacts to the pond and marine environment. The Draft EIS will also include a discussion of the Best Management Practices (BMPs) measures to be implemented to mitigate or eliminate any potential contaminants from the proposed project to ground water that could eventually reach the pond and marine environments.

A cultural impact assessment has been conducted in conjunction with the Draft EIS to assess the potential impacts of the proposed project on native Hawaiian cultural resources, practices and beliefs, including the Kaloko-Honokohau National Historical Park.

Your organization's efforts in proposing a consortium to address the effects on the area's resources from various proposed developments is acknowledged. We would welcome and appreciate the opportunity to meet with your organization to discuss areas of potential concern. As requested, Na Kokua Kaloko-Honokohau, Inc. will be retained on the list of parties to be consulted throughout the EIS process for the subject project.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi

Rodney Funakoshi, Project Manager

SIERRA CLUB, HAWAI'I CHAPTER
P.O. Box 2577
Honolulu, HI 96803
tel: 538.6616

Director: Jeffrey Mikulina
mikulina@lava.net
fax: 537.9019

July 20, 2000

Russell Kumabe
Hawaii State Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Genevieve Salmonson
Office of Environmental Quality Control
235 S. Beretania St. #702
Honolulu, HI 96813

RECEIVED
JUL 2 6 2000
WILSON OKAMOTO & ASSOC., INC.

Rodney Funakoshi
Wilson Okamoto & Associates, Inc.
1907 South Beretania #400
Honolulu, HI 96826

Nathan Natori
TSA International
1441 Kapiolani Boulevard #1905
Honolulu, HI 96814

RE: KALOKO INDUSTRIAL PARK, PHASES III & IV

The Sierra Club, Moku Loa Group recently submitted extensive comments on the Kaloko-Honokohau Business Park to the LUC, OEQC and others. As a preliminary matter, we wish to point out:

• Our comments were based, in part, on the physical appearance of the Kaloko Industrial Park. We should not repeat the mistakes of the past.

• Hawaii Administrative Rules 11-200-2 defines "cumulative impact" as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." It is imperative that the LUC and the OEQC ensure that these two adjacent projects are planned in conjunction with one another and that the cumulative impacts of both projects are fully addressed.

• Any consideration to urbanize an area strategically located halfway between the Kona International Airport at Keahole and Kailua-Kona along Queen Kaahumanu Highway should start with an examination of Nimitz Highway by the Honolulu Airport. Do we want to repeat the same mistakes Honolulu has made? Commentators lament the ugly, industrial strip of car lots and warehouses that greet tourists upon their arrival. Hawaii County has already taken the first step at replicating the Honolulu experience with the existing Kaoloko Industrial Area. Should we continue on that path?

• The petition area adjoins the stunningly beautiful Kaloko-Honokohau National Historic Park. The wilderness quality – including the scenic beauty – must be preserved. Views of warehouses, neon lights, and other tall structures are simply inappropriate.

Because of these concerns, the Land Use Commission should adopt strict standards to protect viewplanes. The LUC should not defer adoption of these standards to the county because (1) these are legitimate state interests; and (2) the county has demonstrated its inability and unwillingness to protect scenic viewplanes (See e.g. Yuen v. Board of Appeals, in which a state circuit court found that the Planning Commission and Planning Department improperly failed to consider the impact of a cellular tower on the scenic beauty of Maulua Gulch; and the Friends of Red Road, in which a circuit court found that the county simply relied on the representations of the private consultants instead of independently reviewing the environmental impacts).

Therefore, the Sierra Club recommends that if the LUC is inclined to approve this petition, it do so with the following conditions:

1) A no build (except for roads and sidewalks) buffer be created from Queen Kaahumanu Highway mauka 300 feet.

2) Heights be limited to 25 feet. Walls on the makai side shall be restricted to no more than 12 feet of uninterrupted wall height.

3) Use of mirrored glass, reflective sun screens or other highly reflective materials for exterior windows shall be prohibited. Except for any flat roof, roof coverings shall be of non-reflective material and of a color and tone compatible with the area surroundings. No illuminated signs shall be allowed.

4) Landscaping shall be used to help all structures blend in with the surrounding environment and to mitigate the visual impacts of development on public views. Native plants and trees instead of exotic plants shall be used unless impractical.

In addition to these conditions intended to preserve the character of the national park and the visitor experience, the Sierra Club Moku Loa Group recommends these additional conditions:

5) All significant pre-contact archaeological sites shall be preserved in their entirety (including a buffer area). At a minimum, these should include burials, petroglyphs, the entire network of trails, agricultural complexes, habitation sites, boundary walls and ahu. With the exception of any burial sites, other archaeological sites should be identified with interpretative

Recycled

signs. Until more complete information is provided in the DEIS, we will reserve judgment as to how best to protect all the historic resources.

6) All native trees shall be preserved. Given the rareness of native dryland forest, it makes sense to preserve as much of our biological heritage as possible. The DEIS should include a map that identifies where the various native trees are located. It may be possible to identify an archaeological/botanical preserve in the project area. It is imperative that the analysis of cultural and biological resources be done in conjunction with the adjacent Kaloko-Honokohau Business Park EIS. Trees and archaeological sites know no property lines.

7) It is essential that the outstanding water quality off of the National Park be protected. This project is likely to produce polluted runoff (including oil, heavy metals from the industrial area, and sediments). Moreover, given the porous nature of the volcanic rock, polluted water is likely to drain through the lava down into the ocean. It is insufficient for the DEIS to claim that the project shall comply with all pollution laws. The fact is, there are no enforceable laws to prevent polluted runoff from contaminating coastal waters. Nor, does the Department of Health have the regulatory authority to ensure that underground injection wells do not contaminate coastal waters. Finally, experience in Kaka'ako on O'ahu and other industrial areas demonstrates that compliance with the few DOH standards that do exist is far from universal.

The only way to protect water quality from a development like this is to incorporate clear standards in any LUC approval. These standards must include precise technology requirements. For example, all runoff -- instead of simply draining into an underground injection hole -- should be treated on site. Underground injection should be prohibited. The use of hazardous substances (except for those used by automobiles driving in the area) in the area should be prohibited. It is essential that conditions such as this be required now since DOH does not have the authority to require them.

Finally, we would like to request that the DEIS carefully examine the issue of energy. The expansion of the Keahole powerplant (down the road) has been an extremely divisive issue for the community. How much more energy will this project consume? More importantly, the DEIS should study whether it would be economical to include photovoltaic cells on the top of all flat roofs. By incorporating photovoltaic cells into building design early in the planning process, we believe that the developer could make money, while reducing Hawaii's dependence on fossil fuels. Electricity from solar energy could be used to power the entire business park, with surplus being sold to HELCO.

We look forward to a full discussion of these issues in the DEIS.

Sincerely,

David Kimo Frankel
Chapter Chair

6351-01
August 7, 2000

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS PLANNERS
1907 S. BERETANIA ST. SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. David Kimo Frankel, Chapter Chair
Sierra Club, Hawaii Chapter
P.O. Box 2577
Honolulu, Hawaii 96803

Dear Mr. Frankel:

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of July 20, 2000, regarding the subject EIS Preparation Notice. We offer the following responses to your comments:

The Draft EIS will address cumulative impacts resulting from the proposed project and the adjacent proposed Kaloko-Honokohau Business Park, as well as other developments in the project vicinity, as appropriate. Ongoing coordination has been established in the planning of the subject project and the Kaloko-Honokohau Business Park project. Notably, this includes an assessment of ground water effects on the marine and pond environments downslope of the two projects conducted by the same consultant team, which allows for a simultaneous evaluation of the cumulative effects of both projects.

Urbanization of the area between the Kona International Airport at Keahole and Kailua-Kona is consistent with the designation of new urban concentrations and urban growth areas as shown on State and County of Hawaii land use plans. The 1992 State Office of Planning's *Five-Year Boundary Review* recommends that the region extending from Keahole to Kailua, which includes the project site, be reclassified to the Urban District. This recommendation is made within the context of other existing State and County land use policies for the region as a whole. The State Office of Planning's *West Hawaii Regional Plan* directs future urbanization to the Kailua-Kona to Keahole Subregional Planning Area. The County of Hawaii's *General Plan Land Use Pattern Allocation Guide Map* (LUPAG) and *Keahole to Kailua Development Plan* designate the project site as Industrial, and for Limited Industrial and Urban Expansion, respectively.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, architectural design criteria will be developed and implemented for the project. Such criteria would include consideration of building profiles and design, exterior color and surface treatment such as use

of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

The provisions for protection or preservation of scenic view planes and resources are established in various State and County of Hawaii plans, policies and controls, including the Hawaii State Plan (Chapter 226, HRS), Hawaii Coastal Zone Management (CZM) Program (Chapter 205A, HRS, as amended), and County of Hawaii General Plan. A discussion of the conformance and consistency of the proposed project to the applicable State and County plans, polices and controls will be included in the Draft EIS.

The following are in response to the conditions as recommended by the Sierra Club in regard to the State Land Use District Boundary Amendment Petition for the subject project:

1. At its closest point, the project site is located approximately 1,800 feet mauka of Queen Kaahumanu Highway, thus lies beyond the suggested 300-foot buffer.

2. A zone change will be requested from the County of Hawaii Planning Department to rezone the project site from Open District to ML, Limited Industrial District (approximately 66.5 acres) and MCX, Industrial-Commercial Mixed District (approximately 35.8 acres). The height limit in both of these zoning districts is 45 feet as established in the Hawaii County Zoning Code (Chapter 25 of the Hawaii County Code).

   The required wall heights within the proposed development will be largely determined by topographic conditions of the individual lots; however, as deemed appropriate, wall heights from an aesthetic standpoint will also be considered.

3. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

4. Landscaping will be implemented within the proposed development, as deemed appropriate, to minimize or screen the visual impact of the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with landscaping criteria

developed for the project. Appropriate plant material and variety will be established for the proposed development.

5. An archaeological inventory survey has been conducted for the Draft EIS to determine the presence of any archaeological or historic sites or features that may be located within the project site, and to identify any mitigative measures that may be required.

6. In conjunction with the Draft EIS, a botanical survey has been conducted to document flora species that are present within the project site and to determine the presence of any proposed or listed threatened or endangered species. The survey identifies mitigative measures, as may be required, to minimize any potential impacts on flora species.

   As previously indicated, a coordinated approach has been established in the planning of the subject project and the adjacent proposed Kaloko-Honokohau Business Park project.

7. In conjunction with the Draft EIS, an assessment has been conducted to determine the potential ground water effects on the pond and marine environment within the Kaloko-Honokohau National Historical Park and nearshore waters as a result of the proposed project. The assessment also identifies associated mitigative measures, as may be required, to minimize any potential impacts in the pond and marine environment.

   The Draft EIS will also include a discussion of Best Management Practices (BMPs) measures to be implemented to mitigate the impacts of storm water runoff discharging pollutants, including toxic substances, into the ground-water system resulting from the proposed project.

The projected power consumption for the proposed development, based on 4,000 KWH/month/lot, is estimated at 328,000 KWH per month. Preliminary consultation with HELCO indicates that a new substation may be required to service the proposed development. Alternatively, the use of photovoltaic cells for a light industrial development of the proposed nature is deemed to be infeasible. First, the size of the rooftops of the individual buildings would be inadequate to accommodate the amount of photovoltaic cells that would be necessary to generate the required power demand for the intended uses. Secondly, given the availability of existing electrical system facilities in the adjacent Kaloko Industrial Park and nearby Queen Kaahumanu Highway, it is logical and more cost-effective to use electrical power rather than photovoltaic cells for the proposed development.

We appreciate your interest and participation in the consultation phase of the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

12.3 Draft EIS Consultation

The following agencies, organizations and elected officials were consulted and comments solicited for the Draft EIS. As of October 13, 2000, a total of 15 comment letters were received. Of those who replied, some had no comments (✓) while others provided substantive comments (✓✓). Copies of written comments and responses are provided.

Federal

✓✓ U.S. Army Corps of Engineers
✓✓ U.S. Fish and Wildlife Service
U.S. Geological Survey
U.S. Department of Agriculture Natural Resources Conservation Service
U.S. Department of the Interior Kaloko-Honokohau National Historical Park

State of Hawaii

Department of Agriculture
✓ Department of Accounting and General Services
Department of Business Economic Development & Tourism (DBED&T)
DBED&T Energy Resources and Technology Division
✓✓ DBED&T Land Use Commission
✓✓ DBED&T Office of Planning
DBED&T Housing and Community Development Corporation of Hawaii
✓✓ Department of Defense
✓ Department of Education
Department of Hawaiian Home Lands
Department of Health (DOH) Environmental Planning Office
✓✓ DOH Office of Environmental Quality Control
Department of Land and Natural Resources (DLNR)
DLNR Historic Preservation Division
✓ DLNR Office of Hawaiian Affairs
✓✓ Department of Transportation
University of Hawaii at Manoa (UHM) Environmental Center
UHM Water Resources Research Center

County of Hawaii

Civil Defense Agency
Department of Parks and Recreation
✓✓ Department of Public Works
Department of Water Supply
Planning Department
Planning Department West Hawaii Office
✓ Police Department
Fire Department

Elected Officials

Senator Andrew Levin
Representative Jim Rath
Councilmember Curtis Tyler

Public Utility Agencies

✓✓ Verizon Hawaii Inc.
Hawaii Electric Light Company
Sun Cablevision

Organizations

Hawaii Leeward Planning Conference
Kona Hawaiian Civic Club
Kona Outdoor Circle
Kona-Kohala Chamber of Commerce
Na Kokua Kaloko-Honokohau
Moku Loa Group, Sierra Club, Hawaii Chapter
✓✓ Sierra Club, Hawaii Chapter
Queen Liliuokalani Trust
Belt Collins Hawaii

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

REPLY TO ATTENTION OF

August 29, 2000

RECEIVED
AUG 30 2000
WILSON OKAMOTO & ASSOC., INC.

Civil Works Technical Branch

Mr. Rodney Funakoshi, Project Manager
Wilson Okamoto and Associates
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for the Kaloko Industrial Park Project, Phases III and IV, North Kona, Island of Hawaii. We do not have any additional comments to make beyond those previously provided in our letters dated April 11, 2000 and July 21, 2000.

Should you require additional information, please contact Ms. Jessie Dobinchick of our Civil Works Technical Branch staff at (808) 438-8876.

Sincerely,

Steven Yamamoto, P.E.
Acting Chief, Civil Works
Technical Branch

WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH: (808) 946-2277
FAX: (808) 946-2253

6351-01
October 17, 2000

Mr. Steven Yamamoto, P.E., Acting Chief
Civil Works Technical Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858-5440

Dear Mr. Yamamoto:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 29, 2000, regarding the subject Draft EIS. We acknowledge your previous letters of April 11, 2000 and July 21, 2000 that a Department of the Army permit will not be required for the project, and that the flood hazard information provided in the Draft EIS is correct.

We appreciate your time and effort in reviewing the Draft EIS.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

WILSON OKAMOTO & ASSOC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

In Reply Refer To: JMC

OCT 12 2000

Esther Ueda
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Re: Draft Environmental Impact Statement for Kaloko Industrial Park, Phases III and IV

Dear Ms. Ueda:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Impact Statement (DEIS) for Kaloko Industrial Park, Phases III and IV (Park), on the island of Hawaii. The project sponsor is TSA International, Limited. The DEIS evaluates environmental impacts associated with the development of a 102.3-acre parcel into 82 lots comprising phases III and IV of the light industrial park in Kaloko, North Kona. The following comments are provided for your consideration.

The Service believes that the DEIS adequately describes the proposed project and most of the significant species that occur at the proposed project site. However, the final EIS should mention that the federally endangered Hawaiian hawk *(Buteo solitarus)* and the federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) are known to occur in the general vicinity and may occur intermittently at the project site as they transit through the area. The Service also recommends that the final EIS more fully describe the anchialine pool fauna in the vicinity of the proposed project site.

The DEIS assesses project-related impacts to fish and wildlife resources anticipated to result from the project. The Service is concerned that stormwater runoff containing sediments and other contaminants originating at the proposed project site may adversely affect waterbirds known to use the coastal freshwater and anchialine pool environments along the coast in and around the Kaloko-Honokohau National Historical Park, immediately downslope of the Industrial Park. Although this issue is addressed in the DEIS, we recommend that the final EIS describe the Best Management Practices (BMPs) and other specific measures that will be implemented to control runoff from contaminating adjacent coastal habitats.

Furthermore, sensitive and unique endangered plant habitat exists immediately upslope of the proposed project site, and the Service recommends the implementation of the measures to reduce the potential risks of wildfire, as identified in the April 2000 Botanical Survey report by Winona P. Char. A fuelbreak that is 30 to 50 feet wide along the east side of the development would be effective in reducing the risk that a wildfire started at the park could affect endangered plants on the Kaloko flow to the south and upslope of the project site. Such a fuel break could be initially created with a bulldozer and periodically maintained with herbicide or by physical clearing. We also support the recommendations proposed for the *Bidens micrantha* subspecies *ctenophylla* regarding collection of seeds and cuttings and propagation and establishment of a population representing *Bidens* #1, *Bidens* #2, and *Bidens* #3 at the Amy Greenwell Botanical Garden.

The Service appreciates the opportunity to comment on the proposed project. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Mick Castillo at (808) 541-3441.

Sincerely,

Paul Henson

Paul Henson
Field Supervisor
Ecological Services

cc: NPS, Honolulu
DOFAW, Hawaii
DAR, Hawaii
OEQC, Hawaii
Wilson Okamoto & Assoc., Honolulu

6351-01
October 17, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mr. Paul Henson, Field Supervisor
Ecological Services
United States Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

Dear Mr. Henson:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of October 12, 2000, regarding the subject Draft EIS.

Regarding the presence of significant avian species, the following will be added to **Section 3.10.2 Fauna** of the Final EIS (added text is shaded):

> "Although the federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was not detected during the survey, it is likely that they overfly the Petition Area upon occasion, as they have been observed innumerous lowland areas in North Kona on a seasonal basis. The federally endangered Hawaiian hawk (*Buteo solitarus*) is also known to occur in the general vicinity and may occur intermittently on the Petition Area as they transit through the area."

Regarding anchialine pool fauna, the following discussion will be added to **Section 3.6.1 Pond Environment** of the Final EIS:

> "A 1997 biological survey found 64 anchialine pools/pool complexes in the Kaloko-Honokohau National Historical Park boundaries (Brock and Kam). In summary, the biological resources of most anchialine pools in the Park have been impacted by the introduction of alien fish species and, in a few cases, impacted by collecting for human consumption. There was no evidence of water pollution from human sources using the limits of detection available to the study. In 21 of these ponds (33 percent), the *opae'ula (Halocaridina rubra*) was present, a small red shrimp species usually indicative of biologically undisturbed anchialine systems in Hawaii. But, in only 10 (16percent) of these ponds was

> *Halocaridina rubra* consistently present during daylight hours. Thus, 67 percent of the anchialine pools inventoried in the study did not have the usual array of anchialine hypogeal species. Obvious deterrents include predatory fish, both native and nonnative. Twenty-eight (44 percent) of the pools contained alien fish species, mostly guppies (*Poecilia reticulata*) that lowered the value of this habitat for the suite of important hypogeal species.
>
> A group of pools clustered around the milo thicket in a mauka-makai depression near the jeep access road have a unique mix of native marine species along with several anchialine species. Some of these more normally marine species such as the yellowstripe goatfish or weke (*Mulloides flavolineatus*) have successfully survived in reduced salinities. Despite the presence of fish, these ponds have retained several unique anchialine features including the limpets or hihiwai-kai (*Theodoxus carlosus* and *T. neglectus*) and glass shrimp or 'opae (*Palaemon debilis*)."

In recognition of expressed concerns regarding the need for mitigating the impacts of storm water runoff and pollutants adversely impacting the ground-water system, a pollution prevention plan will be developed for use by the individual lot owners and tenants/operators of the proposed development. The plan will address potential pollutants, handling procedures mandated by Federal, State and local regulations, and recommended best management practices and controls. A discussion of the pollution prevention plan will be included in the Final EIS as follows:

> "To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be developed for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project."

The above discussion will be included in the following sections of the Final EIS:

- **Project Summary - Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures** - Ground Water and Marine and Pond Environments

- **3.5 Ground Water** – Impacts and Mitigation Measures
- **3.6 Marine and Pond Environments – 3.6.4 Effects of Toxic Materials and Mitigation Measures and 3.6.6 Cumulative Impacts and Mitigation Measures**
- **3.17.3 Drainage System** – Impacts and Mitigation Measures
- **4.1 Hawaii State Plan**

  SEC. 226-11 Objectives and policies for the physical environment – land-based, shoreline, and marine resources.

  SEC. 226-13 Objectives and policies for the physical environment – land, air and water quality.
- **4.4 Hawaii Coastal Zone Management Program**

  1. Recreational Resources

  4. Coastal Ecosystems

  6. Coastal Hazards
- **4.6 County of Hawaii General Plan**

  D. Flood Control and Drainage

  G. *Natural Resources and Shoreline*
- **4.6.2 County of Hawaii General Plan Revision Program**

  Environmental Quality Element

  Flood Control and Drainage Element

  Natural Resources and Shoreline Element

Regarding the potential risks for wildfire and need for a firebreak, we would suggest that the proposed development in the Petition Area, by virtue of its industrial-commercial development character, would somewhat provide such a

function, in terms of the site areas which will be cleared of vegetation, mass graded or be mostly paved or developed with steel-frame or concrete buildings. The botanical survey recommendations regarding the Bidens on the project site will be followed.

We appreciate your time and effort in reviewing the Draft EIS.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

RECEIVED
SEP 08 2000
WILSON OKAMOTO & ASSOC, INC.

(P)1539.0

SEP -7 2000

TO: Ms. Esther Ueda, Executive Director
Land Use Commission
Department of Business, Economic Development and Tourism

SUBJECT: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Tax Map Key: 7-3-51:60
Kaloko, North Kona, Island of Hawaii

Thank you for the opportunity to review the subject Draft EIS. The proposed project does not directly impact any of our facilities. Therefore, we have no comments.

If there are any questions regarding the above, please have your staff call Mr. Tyler Fujiyama of the Planning Branch at 586-0492.

GORDON MATSUOKA
Public Works Administrator

TBF:mo
c: Ms. Genevieve Salmonson, OEQC
Mr. Rodney Funakoshi, Wilson Okamoto & Associates

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

October 5, 2000

Mr. Rodney Funakoshi
Project Manager
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawai'i 96826

Dear Mr. Funakoshi:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
TMK: 7 – 03 – 051: 060
Kaloko, North Kona, Island of Hawaii

This is to acknowledge receipt of the subject Draft EIS as transmitted by your letter dated August 17, 2000.

Based upon our review of the subject Draft EIS we have the following comments:

1. The reference and description of the acreage and configuration of the Petition Area should be amended in the Final EIS based upon the results of Boundary Interpretation No. 00-21. It is our understanding that an amended survey map will be submitted for staff's review.

2. In regard to Figure 1-3, the north arrow has an incorrect orientation and should be corrected in the Final EIS. Refer to comments from the Office of Environmental Quality Control in its letter dated July 13, 2000.

3. In regard to Section 3.5 Groundwater, Petitioner should be cautious in using dry wells for the proposed drainage system in light of concerns of surface runoff entering groundwater and affecting surface water quality. Similar concerns were raised by the Office of Planning ("OP") in its letter dated September 25, 2000; Natural Resource Conservation Service in its letter dated August 10, 2000; Kaloko-Honokohau National Historic Park in its letter August 7, 2000; and Sierra Club, Hawaii Chapter, in its letter dated July 20, 2000.

It was pointed out by Tom Nance in a meeting on August 29, 2000, that groundwater can travel from the Petition Area to coastal areas in a matter of days or weeks. We reiterate that this is a significant concern brought by various reviewers.

4. In regard to Section 3.17.3 Drainage System, OP in its aforementioned letter, was concerned with the need to evaluate proposed mitigation measures, such as asphaltic concrete roadside swales, drain inlets, and dry wells, and Best Management Practices such as filtration and infiltration measures. OP was also concerned with the need to describe the advantages and disadvantages of the proposed measures in removing contaminants.

   In light of the concern of potential groundwater and surface water contamination, we recommend discussion in the Final EIS assessing the effectiveness of the proposed measures, and reiterating statements in Section 3.5, Groundwater, that individual lot owners will be required to develop storm drainage systems employing filtration or infiltration methods prior to discharge.

5. In regard to Section 3.17.4 Roadway System and Traffic, the Planning Department, County of Hawaii ("Planning Department") and the Department of Public Works, County of Hawaii in their letters dated August 7, 2000 and September 19, 2000 respectively, identified a proposed connector road described in the Keahole to Kona Development Plan. It is our understanding that this proposed roadway will connect through Palani Road and Ka'iminani Drive and traverse through the Petition Area. The Final EIS should discuss this proposed roadway and what will be required in light of existing and proposed roadway improvements.

   Also, in regard to Table 3-10, Year 2010 Conditions With and Without Project, please clarify the difference of the PM Level of Service ("LOS") described in the Draft EIS and the Draft Environmental Assessment ("EA") for the Queen Kaahumanu Highway/Hina Lina Street intersection. The Draft EIS describes the PM LOS for left turns at C with the project and the Draft EA describes the PM LOS for left turns at D with the same volume of traffic.

6. In regard to Section 4.9, County of Hawaii Special Management Plan, a reference to Special Management Area ("SMA") laws should correct from "SAM laws" to SMA laws.

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

Sincerely,

ESTHER UEDA
Executive Officer

EU:aa

c Office of Environmental Quality Control

6351-01
October 17, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX (808)946-2253

Ms. Esther Ueda, Executive Officer
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Dear Ms. Ueda:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of October 5, 2000, regarding the subject Draft EIS. We offer the following responses to your comments:

1. Reference to and description of the acreage and configuration of the Petition Area will be amended as appropriate in the Final EIS based upon Boundary Interpretation No. 00-21. Specifically, references to the acreage will be amended from approximately 102.3 to 102 acres. Reference to Boundary Interpretation No. 00-21 will be made in the **Project Summary** section of the Final EIS as follows:

   "**Land Area:** Approximately 102.3 Acres (Revised per State Land Use Commission Boundary Interpretation No. 00-21)"

2. **Figure 1-3** in the Draft EIS depicts the correct orientation of the north arrow.

3. and 4.

   The concern expressed over the potential for pollutants contaminating water resources and the measures which may be undertaken by the proposed development to protect these resources is acknowledged. At this time, it is uncertain what types of light industrial and commercial businesses will actually locate in the development. As such, the Draft EIS identifies Best Management Practices (BMPs) which *could* be used to mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, such as flow-through-based water quality control measures.

To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed development. The plan will address potential pollutants, handling procedures mandated by Federal, State and local regulations, and recommended best management practices and controls. A discussion of the pollution prevention plan will be included in the Final EIS as follows:

"To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project."

The above discussion will be included in the following sections of the Final EIS:

- **Project Summary - Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures** - Ground Water and Marine and Pond Environments
- **3.5 Ground Water** – Impacts and Mitigation Measures
- **3.6 Marine and Pond Environments – 3.6.4 Effects of Toxic Materials and Mitigation Measures and 3.6.6 Cumulative Impacts and Mitigation Measures**
- **3.17.3 Drainage System** – Impacts and Mitigation Measures
- **4.1 Hawaii State Plan**

  SEC. 226-11 Objectives and policies for the physical environment – land-based, shoreline, and marine resources.

SEC. 226-13 Objectives and policies for the physical environment – land, air and water quality.

- **4.4 Hawaii Coastal Zone Management Program**

  2. Recreational Resources

  5. Coastal Ecosystems

  6. Coastal Hazards

- **4.6 County of Hawaii General Plan**

  D. Flood Control and Drainage

  G. Natural Resources and Shoreline

- **4.6.2 County of Hawaii General Plan Revision Program**

  Environmental Quality Element

  Flood Control and Drainage Element

  Natural Resources and Shoreline Element

The proposed development's drainage improvements are limited to asphaltic concrete roadside swales, drain inlets and dry wells within the project's roadways. The drainage improvements will be dedicated to the County of Hawaii as part of the project's roadway system and will subsequently be maintained by the County. The pollution prevention plan and BMPs discussed above are directed at the industrial and commercial lots which have the most potential for generating toxic pollutants.

5. The proposed connector roads described in the *Keahole to Kailua Development Plan* and mentioned in the County of Hawaii Planning Department and County of Hawaii Department of Public Works letters of August 7, 2000 and September 19, 2000, respectively, refer to two separate roads.

The proposed mid-elevation lateral connection between Palani Road and Kaiminani Drive as mentioned in the County Planning Department's letter is located mauka of the subject Petition Area and, therefore, should not be affected by the proposed project.

The proposed roadway mentioned in the County Department of Public Works' letter is identified as "Main Street", a collector roadway with an 80-foot wide right-of-way running parallel to Queen Kaahumanu Highway from Kealakehe Drive to Hina Lani Street through the Limited Industrial area, including the Petition Area. A discussion of this proposed collector roadway is included in **Section 4.7 Keahole to Kailua Development Plan** of the Draft EIS (see below). **Section 4.7**, paragraph 5, in the Final EIS will be clarified as follows (added text is shaded):

> "The *Keahole to Kailua Development Plan* also includes a network of major arterial and collector roads that will form the overall framework for the future development of the area. The Development Plan proposes a collector roadway identified as "Main Street" with an 80-foot wide right-of-way running parallel to Queen Kaahumanu Highway from Kealakehe Drive to Hina Lani Street through the Limited Industrial area, including the Petition Area. The Development Plan, however, acknowledges the potential shifting and changing of roadway alignments as actual development occurs in the future.
>
> The intent of this parallel roadway is to facilitate traffic circulation between the Limited Industrial area and the Urban Expansion areas to the north, keeping local traffic off of Queen Kaahumanu Highway. In regard to the proposed development, Kamanu Street, a primary collector road which traverses in a north-south direction from Hina Lani Street parallel to Queen Kaahumanu Highway, will be extended approximately 350 feet to the south boundary of the property."

The difference in the PM Level of Service (LOS) (with project) at the Queen Kaahumanu/Hina Lani Street intersection as described in Table **3-10, Year 2010 Conditions With and Without Project** of the Draft Environmental Assessment (EA) (LOS D) and subject Draft EIS (LOS

C) is attributed to the difference in the traffic forecasting methodology employed for the respective traffic impact assessments.

For the Draft EA, the travel forecast was based upon historical traffic count data obtained from the State Department of Transportation (DOT) Highways Division. For the Draft EIS, the travel forecast is based upon the average annual traffic growth rate as described in the Hawaii Long Range Land Transportation Plan (HLRLTP). The HLRLTP estimates that the average daily traffic on Queen Kaahumanu Highway would increase at an average rate of 3.5 percent per year. We opted for the use of this Plan to more accurately reflect the anticipated cumulative impacts of traffic growth in the region.

6. **Section 4.9 County of Hawaii Special Management Area** will reflect the following correction in the Final EIS:

"Any development located within the SMA is subject to requirements of the ~~SAM~~ SMA laws which are administered by the Planning Commission (SMA Use Permit) and Planning Director (SMA Minor Permit)."

Thank you for calling this to our attention.

We appreciate your continued assistance and cooperation in the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

BENJAMIN J. CAYETANO
GOVERNOR
SELR F. MAYA, Ph.D.
DIRECTOR
SHARON S. HARIMATEU
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

RECEIVED
SEP 27 20
WILSON OKAMOTO & ASSOC, INC.

Ref. No. P-8817

September 25, 2000

To: Esther Ueda, Executive Officer
Land Use Commission

From: David W. Blane, Director
Office of Planning

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

We have reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Phases III and IV of the existing Kaloko Industrial Park, North Kona, Hawaii and offer the following recommendations to be considered for inclusion into the Final Environmental Impact Statement (FEIS).

We remain concerned over the potential for pollutants contaminating water resources such as potable/non-potable groundwater including the wetland environment at Kaloko Honokokau National Historic Park, ocean water, and which measures may be undertaken by the developer to protect these resources. The DEIS provides little assurance of which Best Management Practices (BMPs) will be incorporated into the proposed Phase III and IV of the Kaloko Industrial Park. Proposed drainage improvements described in the DEIS state that drainage improvements *will include* asphaltic concrete roadside swales, drain inlets, and dry wells within the project's roadways. The DEIS further states that in order to mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, proposed mitigation actions *could include* filtration or infiltration measures. These actions could include flow-through-based water quality control treatments that use filters and vegetated swales in conjunction with dry wells. The DEIS provides no assurance over which of the Best Management Practices cited *will be* implemented. Under what conditions are these flow-through measures proposed to be incorporated into the design and construction of the project?

Finally, in order to evaluate the mitigating measures proposed, the FEIS should include a thorough discussion on the advantages and disadvantages of each of the drainage improvements and BMPs the developer proposes to incorporate into the design of the project. Depending on the environment in which they will be used, maintenance procedures for upkeep of the systems, and/or their use in conjunction with other BMPs, each of the drainage improvements proposed to be used (asphalt, swales, drain inlets, dry wells) have varying degrees of success in removing pollutants. For example, a disadvantage of the asphalt concrete measure proposed is failure due to clogging either from construction accumulated sediment and oil or resurfacing. The asphalt concrete measure must be maintained frequently to continue functioning. This measure, as well as the others proposed, all require high maintenance to ensure operational efficiency. How will the developer provide for the monitoring and maintenance of the proposed drainage improvements?

The Petitioner should also include a discussion on civil defense requirements. The discussion should include existing warning systems within the existing Kaloko Industrial Park, and if these are adequate for the proposed project.

Information provided in the DEIS indicates that a new electrical substation may be required to service the proposed development and requirements for the substation and associated electrical improvements will be determined during the design phase of the project. The Petitioner should provide a discussion regarding the possible location of the facility and the required acreage that may be necessary for the substation.

Should you have any questions, please call Judith Henry at 587-2803.

Sincerely,

David W. Blane
Director
Office of Planning

cc: Genevieve Salmonson, OEQC
✓Rodney Funakoshi

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU HI 96826
PH (808) 946-2277
FAX (808) 946-2253

Mr. David W. Blane, Director
State of Hawaii
Department of Business, Economic Development & Tourism
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Blane:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of September 25, 2000 (Ref. No. P-8817), regarding the subject Draft EIS.

Your concern over the potential for pollutants contaminating water resources and the measures which may be undertaken by the proposed development to protect these resources is acknowledged. At this time, it is uncertain what types of light industrial and commercial businesses will actually locate in the development. As such, the Draft EIS identifies Best Management Practices (BMPs) which *could* be used to mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, such as flow-through-based water quality control measures.

To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed development. The plan will address potential pollutants, handling procedures mandated by Federal, State and local regulations, and recommended best management practices and controls. A discussion of the pollution prevention plan will be included in the Final EIS as follows:

> "To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project."

The above discussion will be included in the following sections of the Final EIS:

- **Project Summary - Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures - Ground Water and Marine and Pond Environments**
- **3.5 Ground Water – Impacts and Mitigation Measures**
- **3.6 Marine and Pond Environments – 3.6.4 Effects of Toxic Materials and Mitigation Measures and 3.6.6 Cumulative Impacts and Mitigation Measures**
- **3.17.3 Drainage System – Impacts and Mitigation Measures**
- **4.1 Hawaii State Plan**

  SEC. 226-11 Objectives and policies for the physical environment – land-based, shoreline, and marine resources.

  SEC. 226-13 Objectives and policies for the physical environment – land, air and water quality.

- **4.4 Hawaii Coastal Zone Management Program**

  1. Recreational Resources

  4. Coastal Ecosystems

  6. Coastal Hazards

- **4.6 County of Hawaii General Plan**

  D. Flood Control and Drainage

  G. Natural Resources and Shoreline

- **4.6.2 County of Hawaii General Plan Revision Program**

  Environmental Quality Element

  Flood Control and Drainage Element

  Natural Resources and Shoreline Element

The proposed development's drainage improvements are limited to asphaltic concrete roadside swales, drain inlets and dry wells within the project's roadways. The drainage improvements will be dedicated to the County of Hawaii as part of the project's roadway system and will subsequently be maintained by the County. The pollution prevention plan and BMPs discussed above are directed at the industrial and commercial lots which have the most potential for generating toxic pollutants.

By letters of August 28, 2000 and October 9, 2000, the State Department of Defense, Office of the Director of Civil Defense requested the installation of a siren within the proposed development. According to the Office of the Director of Civil Defense, at the present time, the closest siren to the proposed project is located at Honokohau Harbor and offers no outdoor warning coverage to the project location. Further coordination regarding the installation of a siren will be conducted with the Office of the Director of Civil Defense during the project's design phase.

The potential requirement for a new electrical substation and its location and acreage will be more appropriately determined in further consultation with HELCO during the project's design phase. This will be reflected in the Final EIS, **Section 3.17.5 Electrical and Communications Systems** – Impacts and Mitigation Measures – Electrical System, second paragraph, as follows:

"Preliminary consultation with HELCO indicates that a new substation may be required to service the proposed development. The project may therefore be required to set aside an area dedicated for a substation. The project is proposed to be serviced by overhead power lines. Further requirements for a potential substation, including its location and acreage, and associated electrical improvements will be determined in consultation with HELCO during the project's design phase."

We appreciate your time and effort in reviewing the Draft EIS.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

BENJAMIN J. CAYETANO
GOVERNOR

MAJOR GENERAL EDWARD L. CORREA, JR.
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

October 9, 2000

TO: Department of Business, Economic Development and Tourism
Land Use Commission

ATTN: Ms. Esther Ueda

FROM: Edward T. Teixeira
Vice Director of Civil Defense

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE KALOKO INDUSTRIAL PARK, PHASES III AND IV

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the Kaloko Industrial Park, Phases III and IV, Kaloko, North Kona, island of Hawaii, TMK 7-3-51: 60.

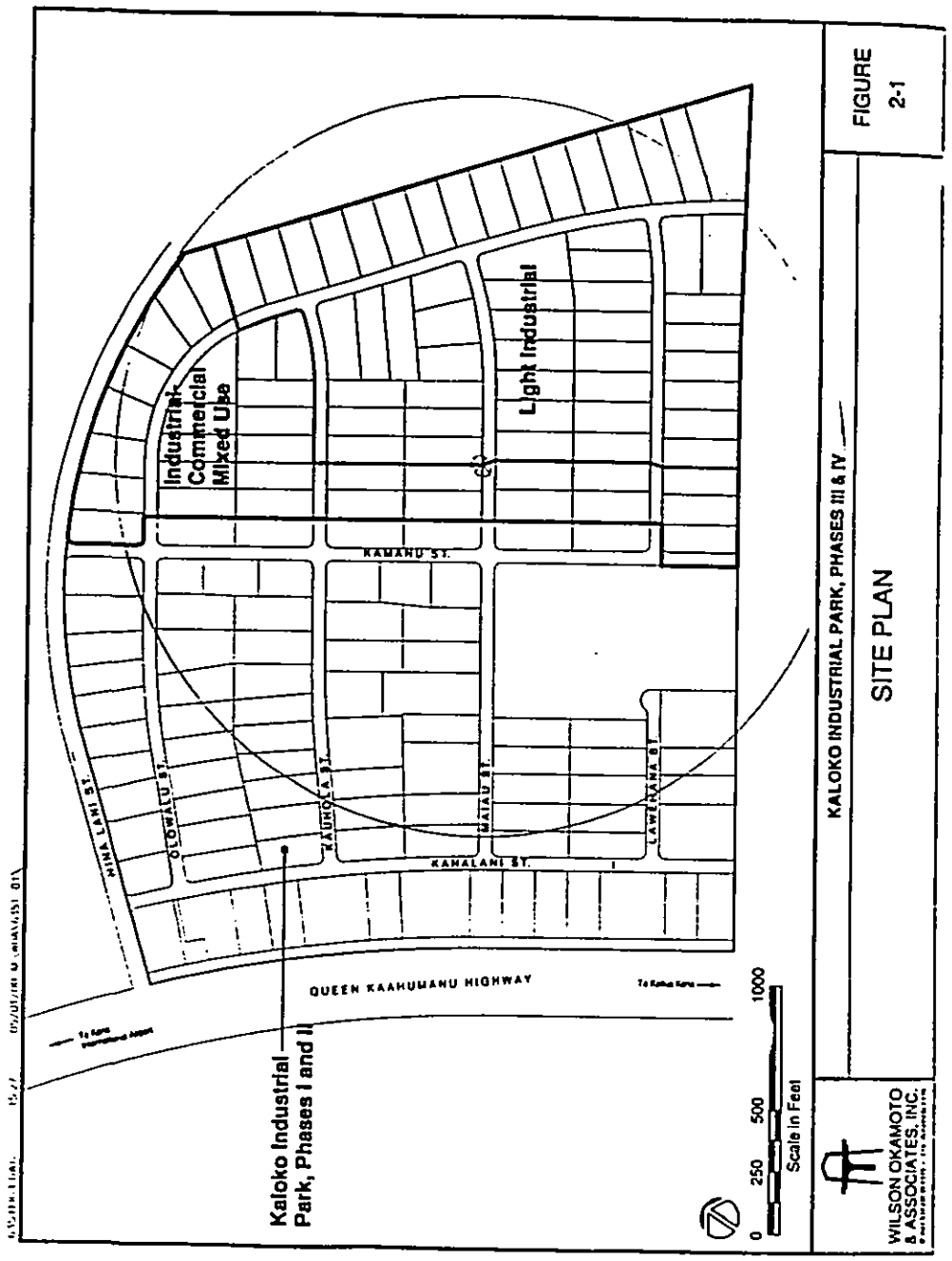
Request that the developer add a siren using solar power with 115 Dbc omni directional speaker array. Suggest that the siren be installed in a central location adjacent to Maiau Street. At the present time, the closest siren to this project is located at Honokohau Harbor and offers no outdoor warning coverage to this project location.

Technicians and planners are available to assist and answer any questions you may have. If there are any questions, please have your staff call Mr. Norman Ogasawara, State Civil Defense, at 733-4300.

c: Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826
Attn: Mr. Rodney Funakoshi

LTC Ron Swafford
HIARNG, Env. Section, Bldg. 306

Department of Health
Office of Environmental Quality Control
235 South Beretania St., Rm 702
Honolulu, Hawaii 96813
Attn: Ms Genevieve Salmonson



BENJAMIN J. CAYETANO
GOVERNOR

MAJOR GENERAL EDWARD L. CORREA, JR.
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

August 28, 2000

RECEIVED
AUG 30 2000
WILSON OKAMOTO & ASSOC., INC.

TO: Department of Business, Economic
Development & Tourism
Land Use Commission
P. O. Box 2359
Honolulu, HI 96804-2359

ATTN: Ms. Esther Ueda

FROM: Edward T. Teixeira
Vice Director of Civil Defense

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR THE KALOKO INDUSTRIAL PARK, PHASES III AND IV

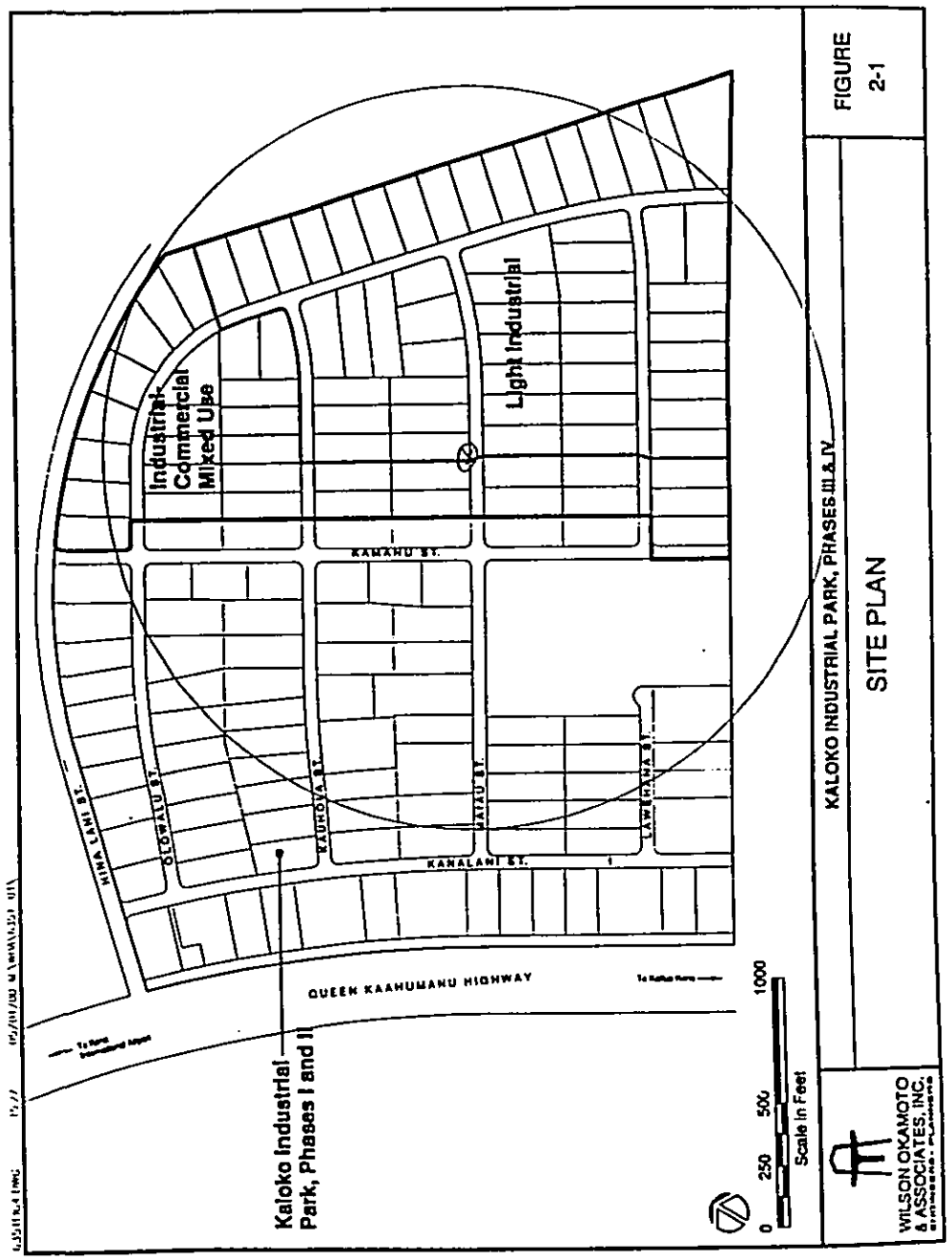
Thank you for the opportunity to comment on the Environmental Impact Statement Preparation Notice for the Kaloko Industrial Park, Phases III and IV, Kaloko, North Kona, island of Hawaii, TMK 7-3-51: 60.

Request that the developer add a siren using solar power with 115 Dbc omni directional speaker array. Suggest that the siren be installed in a central location adjacent to Maiau Street. At the present time, the closest siren to this project is located at Honokohau Harbor and offers no outdoor warning coverage to this project location.

Technicians and planners are available to assist and answer any questions you may have. If there are any questions, please have your staff call Mr. Norman Ogasawara, State Civil Defense, at 733-4300.

c: Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826
Attn: Mr. Rodney Funakoshi

Major Ron Swafford
HIARNG
Env. Section, Bldg. 306



WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH: (808) 946-2277
FAX: (808) 946-2253

6351-01
October 17, 2000

Mr. Edward T. Teixeira, Vice Director
State of Hawaii
Department of Defense
Office of the Director of Civil Defense
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Mr. Teixeira:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letters of August 28, 2000 and October 9, 2000, regarding the subject Draft EIS. We have apprised the project developer of your request for the installation of a siren as described in your letter. Further coordination on this matter will be conducted with the Office of the Director of Civil Defense during the project's design phase.

We appreciate your time and effort in reviewing the Draft EIS.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

BENJAMIN J. CAYETANO
GOVERNOR

PAUL G. LeMAHIEU, Ph.D.
SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

LAND USE COMMISSION
STATE OF HAWAII
2000 SEP 21 A 9:21

September 15, 2000

MEMO TO: Ms. Esther Ueda, Executive Officer
Land Use Commission, DBED&T

F R O M: Paul G. LeMahieu, Ph.D., Superintendent
Department of Education

SUBJECT: Kaloko Industrial Park
Phases III and IV Draft EIS

The Department of Education has no comment on the subject draft environmental impact statement.

Thank you for the opportunity to respond.

PLeM:SB:hy

cc: P. Yoshioka, DAS

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

GENEVIEVE SALMONSON
DIRECTOR

October 6, 2000

Esther Ueda
Land Use Commission
235 South Beretania St., 4th floor
Honolulu, HI 96813

Dear Ms. Ueda:

SUBJECT: Draft Environmental impact statement (EIS) for Kaloko Industrial Park, Phases III and IV, North Kona, TMK: 7-3-51:60

We have the following comments to offer:

1. Signature: An EIS must include a signed statement by the applicant attesting to the fact that the EIS and all ancillary documents were prepared under the signatory's direction. This is typically found on the title page. The copy of the final EIS that includes the original signature should be filed with the Land Use Commission.

2. Regional developments: In section 1:4.2.2 include a discussion of the University of Hawaii Center at West Hawaii (UHCWH), which is a pending EIS. It also needs to be factored into the cumulative impacts analyses. Enclosed is a description of UHCWH from the June 8th, 2000 *Environmental Notice*.

3. Native culture:
   In section 3.10.4, the discussion on *Changes to the Landscape and View Plane* states that, "Fishermen knowledgeable of traditional reference points used in locating fishing grounds, and National Park Service personnel, should be afforded the opportunity to consult on the development of building and landscaping design guidelines for the proposed project." The following paragraph notes that "... local ethnobotanical groups, and interested educational institutions should be afforded the opportunity to gather seeds and cuttings or to rescue the plants." [emphasis added]
   Will these "opportunities" be incorporated as definite mitigation measures? They seem to be very good measures to reduce the loss of cultural practices. If so, please list them as such in the final EIS. If not, explain why.

4. Unresolved issues: Coordination with Kaloko-Honokohau National Park interest groups will be undertaken. In the final EIS provide a description of the issues that remain unresolved regarding the Park.

5. Environmental setting: In the final EIS include a brief historic perspective of the region and the immediate locale. This includes short geological, economic and social descriptions. Also include a brief discussion of any environmental resources that are rare or unique, such as the fishponds or coastal resources at Kaloko-Honokohau National Historical Park.

If you have any questions call Nancy Heinrich at 586-418.

Sincerely,

GENEVIEVE SALMONSON
Director

Enc.

copy: Rodney Funakoshi
Nathan Natori, TSA International

Environmental Impact Statement Preparation Notices

(1) Kaloko-Honokohau Business Park

District: North Kona
TMK: 7-4-8:13 (por.) and 30
Applicant: Lanihau Partners, L.P.
c/o Tsukazaki, Yeh and Moore
100 Pauahi Street, Suite 204
Hilo, Hawaii 96720
Contact: Michael Moore (961-0055)
Approving Agency/Accepting Authority: State Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359
Contact: Esther Ueda (587-3822)
Consultant: GeoMetrician Associates
HC 2 Box 9575
Keaau, Hawaii 96749
Contact: Ron Terry (982-5831)
Public Comment Deadline: July 10, 2000
Status: EISPN First Notice pending public comment. Address comments to the applicant with copies to the approving agency or accepting authority, the consultant and OEQC.
Permits Required: LUD boundary amendment, UIC, Chapter 6E, grading, building

Lanihau Partners seeks to reclassify to the Urban District 336.984 acres that are currently within the State Land Use Conservation District in North Kona. A Conservation District Use Permit issued in 1967 allows quarrying uses over most of the area. Another portion is used for cattle grazing on an intermittent basis, while some of the land supports no current land uses. The Kaloko-Honokohau National Historic Park is makai of the area. The purpose of the reclassification and subsequent rezoning is to allow the development of the Petition Area for mixed light industrial and commercial uses and the continuation of the existing quarry and related uses. The Petition Area is located halfway between the Kona International Airport at Keahole and Kailua-Kona along Queen Kaahumanu Highway. It is an infill property between the Kaloko and Honokohau Mauka Industrial Parks. The proposed land uses will be consistent with the uses on those adjacent properties. The EIS will include an evaluation of potential impacts to groundwater, native biota, viewplanes and archaeological features in order to formulate measures that will reliably avoid or minimize impacts to these resources.

Draft Environmental Impact Statements

(2) University of Hawaii Center at West Hawaii

District: North Kona
TMK: 7-3-10:33 (portion)
Applicant: University of Hawaii
Facilities Planning Office for Community Colleges
4303 Diamond Head Road
Manele Bldg., Room 103
Honolulu, Hawaii 96816
Contact: Maynard Young (734-9771)
Approving Agency/Accepting Authority: Governor, State of Hawaii
c/o Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813
Consultant: Wil Chee Planning, Inc.
1400 Rycroft Street, Suite 928
Honolulu, Hawaii 96814
Contact: Richard McGerrow (955-6088)
Public Comment Deadline: July 24, 2000
Status: DEIS First Notice pending public comment. Address comments to the applicant with copies to the approving agency or accepting authority and the consultant.
Permits Required: Use, grading, construction, UIC

The action or subject of this EIS is the creation of a permanent physical facility for higher education in the western part of the island of Hawai'i. The facility is known as the University of Hawai'i Center at West Hawai'i (UHCWH). The proposed action discussed in this document is based on the Long Range Development Plan (LRDP) for UHCWH.

The University of Hawai'i's presence in West Hawai'i began in 1971 when courses were offered through the University of Hawai'i at Hilo. The rapid growth of the region and continuing demand for higher education resulted in the establishment of UHCWH in 1996. Since July 1, 1998, UHCWH has become the responsibility of Hawai'i Community College in Hilo (HawCC) and is temporarily housed in a shopping center in Kealakekua. Since the present location allows no room for growth, the University's Board of Regents (BOR), after a detailed site selection study, chose the 500-acre State owned parcel at Kalaoa as the site of a permanent facility for higher education. UHCWH will be situated in the southwestern corner of this 500-acre parcel and will cover approximately 30 acres of land. The site is located approximately 3 miles east of Kona International Airport and is accessible via Queen Kaahumanu Highway and Kaimi Nani Drive. This location consists of lava lands never before developed for modern use.

West Hawai'i is the only remaining major geographic area and population center in the Hawaiian Islands that does not have a permanent facility for higher education. Thus, the University of Hawai'i Community Colleges has made the planning, design and construction of the new University Center at Kalaoa a priority. UHCWH differs from other campuses in the UH system, in that it serves as a vehicle for delivering programs and services from all parts of the University system. Degrees are conferred by other campuses (UH Hilo, HawCC, UH Manoa, etc.) which provide educational programs and courses to the center. This multi-program approach from distant sources is made possible by the use of distance education technology such as the internet and the Hawai'i Interactive Television System (HITS). UHCWH is intended to be a commuter school and will not contain dormitories, faculty housing, or athletic facilities. UHCWH is planned for an ultimate student population of 1500.

Acceptance Notices

Puainako Street Extension and Widening

Applicant: County of Hawaii
Department of Public Works
25 Aupuni Street
Hilo, Hawaii 96720
Contact: Casey Yanagihara (961-8327)
Approving Agency/Accepting Authority: Governor, State of Hawaii
c/o Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813
Public Comment Status: FEIS accepted by the Governor of Hawaii on May 18, 2000.

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Ms. Genevieve Salmonson, Director
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of October 6, 2000, regarding the subject Draft EIS. We offer the following responses to your comments:

1. Signature: The title page of the Final EIS will include a signed statement by the Petitioner/Applicant indicating that the Final EIS document was prepared under the signatory's direction. The copy of the Final EIS that includes the original signature will be filed with the State Land Use Commission.

2. Regional developments: The following discussion on the University of Hawaii Center at West Hawaii will be added to **Section 1.4.2.2 Proposed Developments Within the Project Vicinity**, paragraph 5, in the Final EIS (added text is shaded):

> "Further north of the Petition Area, approximately 2,640 acres of State-owned land were reclassified from the State Conservation and Agricultural Districts to the Urban District in 1993. Possible development scenarios include residential, neighborhood commercial, civic, employment center, light industrial, parks, golf courses, and a university. Currently, a facility for higher education identified as the University of Hawaii Center at West Hawaii (UHCWH) is proposed on an approximately 33-acre site within the State-owned land. The new facility will be used to transition existing programs currently operating in leased facilities at the Kealakekua Business Plaza and provide sufficient expansion capability for projected future growth characterized by a head count enrollment of 1,500 students. In addition to the UHCWH, n[N]o other further development plans have been undertaken since the Urban District reclassification."

A discussion of the cumulative impacts of the proposed project and other developments in the vicinity, including the proposed UHCWH, will be included in the Final EIS as follows:

> "3. DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES
>
> This chapter describes the existing environment, anticipated project impacts resulting from the proposed project, and the associated mitigative measures. As appropriate, cumulative impacts resulting from the proposed project and other developments in the project vicinity are also addressed in this chapter.
>
> The evaluation of the cumulative impacts considers the proposed project with other major proposed projects in the nearby region. These projects include the following and are also described in **Section 1.4.2.2 Proposed Developments Within the Project Vicinity** in the EIS:
>
> - Kaloko-Honokohau Business Park: A light industrial/commercial development on approximately 337 acres to be developed by Lanihau Partners L.P. Located adjacent to and south of the Petition Area.
> - Liliuokalani Trust (Keahuolu Lands of Kailua-Kona): A mixed-use development by Liliuokalani Trust Estate on approximately 1,135 acres. Proposed uses include retail, commercial, office, residential, civic and cultural center, a regional hospital, and park space. Located approximately 1.6 miles south of the Petition Area.
> - Urban Expansion State Lands: Approximately 2,640 acres of State-owned land with possible uses to include residential, neighborhood commercial, civic, employment center, light industrial, parks, golf courses, and a university. Located approximately 1.2 miles north of the Petition Area.
> - University of Hawaii Center at West Hawaii: A facility for higher education located on an approximately 33-acre site within the aforementioned Urban Expansion State Lands.

With the exception of the Kaloko-Honokohau Business Park, the potential environmental impacts and mitigation measures for the other projects were obtained from the environmental impact statements prepared for the respective projects. Information on Kaloko-Honokohau Business Park was obtained from preliminary reports prepared in conjunction with the project's EIS.

It should be noted that predicting the cumulative future of the nearby region is highly speculative in light of the development phasing of the projects being dependent on favorable market conditions.

Two other projects previously proposed for the area, the Kaloko Town Center and Kohanaiki Resort, are not included in the assessment of cumulative impacts since the projects' respective land use requests were withdrawn from the State Land Use Commission and County of Hawaii Planning Commission."

The following discussion of the cumulative impacts and mitigation measures will be included in the respective sections in the Final EIS:

3.2 Geology and Topography – Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts on the geology or topography are anticipated as a result of the proposed projects in the nearby region. Development of the proposed projects will require site work, including localized alteration of the existing lava terrain for roadways and buildings sites. For the Urban Expansion State Lands, it is recommended that the master plan site land uses, including roadways, to minimize grading and reduce the need to large-scale reshaping of the underlying landform (*Urban Expansion State Lands FEIS*, July 1993).

3.3 Soils – Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts on soils are anticipated as a result of the proposed projects in the nearby region. Following construction, exposed soils will have been graded, built over, paved over, or landscaped. Currently, there is very little soil cover throughout the region. It is likely that soils would be imported for landscaping purposes which, over time, would cumulatively change the soil characteristics of the nearby region.

3.4 Surface Water – Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts to the natural drainage system in the nearby vicinity, including the nearshore marine and pond systems at the Kaloko-Honokohau National Historical Park, are anticipated as a result of the proposed projects in the nearby region. Due to the undeveloped nature of the project sites, development of the proposed projects will increase the impervious areas of the sites. The proposed drainage system improvements for the respective projects will minimize any potential impacts to surface waters in the project vicinity.

3.5 Ground Water – Cumulative Impacts and Mitigation Measures: The Kaloko Industrial Park, Phases III and IV, is one of several existing and planned commercial-industrial developments upgradient of the Kaloko-Honokohau National Historical Park. Entitlements are currently being pursued for the Kaloko-Honokohau Business Park to the south and build-out of the Honokohau Business Park will continue. Beyond these near-term projects, other urbanization in the area from Kailua Town to Kona International Airport at Keahole will ultimately occur, some of which will impact ground water flowing through the National Park. Using a series of conservative assumptions regarding these developments, the cumulative impact of these projects on ground water flowing through the entire width of the National Park was computed.

These calculations indicate a 7 percent decrease in ground-water flow rate, with a 10 percent increase in salinity. Both changes are within the range of the natural variability of ground water. Nitrogen levels would be expected to increase by 45 to 50 percent, which is a large increase over the present levels which are already relatively high. Similarly, phosphate would be expected to increase by 30 to 45 percent.

3.6 Marine and Pond Environments – A discussion of the cumulative impacts and mitigation measures, including the adjacent Kaloko-Honokohau Business Park, is included in **Section 3.6.6 Cumulative Impacts and Mitigation Measures** in the Draft EIS. To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed development and Kaloko-Honokohau Business Park. A discussion of the pollution prevention plan will be included in this section in the Final EIS as follows:

"To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project. A similar pollution prevention plan with recommended Best Management Practices is also being considered for the adjacent proposed Kaloko-Honokohau Business Park."

3.7 Flood Hazard – Cumulative Impacts and Mitigation Measures: Due to the highly porous lava terrain, development of the proposed projects in the nearby region is not anticipated to result in flooding of lower elevation properties. Proposed drainage improvements for the respective projects will minimize any potential flood hazard.

3.8 Earthquake/Seismic Hazards – Cumulative Impacts and Mitigation Measures: In accordance with the Hawaii County Building Code, the proposed structures for the respective proposed projects in the nearby region would be designed and built to resist forces to seismic Zone 4 standards.

3.9 Lava Flow Hazards – Cumulative Impacts and Mitigation Measures: In the remote event of lava flow occurrence, any potential property damage within the proposed projects in the nearby region would be succumbed by the forces of nature. It would be incumbent upon the individual developments to devise emergency evacuation procedures for such a situation.

3.10.1 Flora – Cumulative Impacts and Mitigation Measures: No significant cumulative impacts on botanical resources are anticipated from the development of the proposed projects in the nearby region. The vegetation within the proposed project sites is predominantly of mixed shrubland vegetation types. The transformation of flora in the nearby region would likely result in an increased amount of introduced plant species commonly used for landscaping. The use of native plants found in the region for landscaping of the proposed developments would contribute toward mitigating the loss of native flora through site

clearing activities. For the Urban Expansion State Lands, more intensive botanical surveys are recommended to be conducted; and, if areas with endangered or rare plants are found, it may be necessary and/or desirable to establish a nature study park (or parks) around these areas (*Urban Expansion State Lands FEIS, July 1993*).

According to a botanical survey of the Kaloko-Honokohau Business Park site, there are no threatened and endangered species or species of concern within the site. The site is predominantly vegetated with introduced or alien species such as koa haole, fountain grass, Christmas berry, and kiawe. (Char, April 2000). The native plants found on both the Petition Area and adjacent Business Park site can also be found in similar lowland, dry environments in the West Hawaii region and on most of the main Hawaiian Islands. Figure 3-4 depicts the botanical resources within the Petition Area and adjacent Business Park site.

Similar to the establishment of a buffer zone with a minimum width of 30 feet in the immediate vicinity of the *Bidens* #1 plant along the Petition Area's eastern boundary, the botanical survey for the adjacent Business Park recommends the establishment of a buffer zone at least 50 feet wide along the site's eastern (mauka) boundary and northeast corner.

Development of the two projects would likely result in an increased amount of native species used for landscaping purposes as compared to the current proliferation of introduced species within the sites.

3.10.2 Fauna – Cumulative Impacts and Mitigation Measures: No significant cumulative impacts on faunal resources are anticipated from the development of the proposed projects in the nearby region. No federally listed endangered or threatened avian or mammalian species were detected during the faunal surveys conducted of the respective project sites.

In the interest of reducing the potential for unwanted interactions between nocturnally flying Dark-rumped Petrels with external lights and man-made structures, the shielding of lights planned for the various developments would mitigate this potential occurrence.

Following construction, the incorporation of landscaping within the proposed developments will likely attract many of the common alien avian species currently found in the Kona area.

3.10.2 Archaeological/Historic Resources – Cumulative Impacts and Mitigation Measures: In general, the proposed projects in the nearby region would retain some of the more significant archaeological resources found within the respective sites. For the Liliuokalani Trust project, specific sites (primarily those containing human remains) would be preserved, subject to a mitigation plan. The creation of an Historic Reserve to protect the concentration of sites at the northern end of the Kuakini Wall near Palani Road would be an additional mitigation measure. (*Liliuokalani Trust Final EIS*, October 1990).

The University of Hawaii Center at West Hawaii proposes the establishment of five preserve areas to include various archaeological sites with interpretive venues to educate current and future residents and visitors of West Hawaii (*University of Hawaii Center at West Hawaii Final EIS*, May 2000).

The Urban Expansion of State Lands recommends completion of an archaeological inventory survey for the entire petition area prior to initiation of any future development. Some of the sites previously identified are burials or potential burials, which would be subject to a burial treatment plan in coordination with the State Department of Land and Natural Resources Historic Preservation Division and the Hawaii Island Burial Council. (*Urban Expansion State Lands Final EIS*, July 1993).

An archaeological inventory survey with limited subsurface testing was conducted of the Kaloko-Honokohau Business Park site. Approximately 64 sites were identified within the site, varying in context from traditional Hawaiian use to historic-era ranching. Figure 3-4 depicts the archaeological resources within the Petition Area and adjacent Business Park site. The traditional Hawaiian sites contain a variety of formal site and feature types, including: intensive dryland agricultural complexes; simple agricultural features and sites; temporary, recurrent and permanent habitation sites; a refuge cave; human burials; animal containment features; an ahupuaa wall and various boundary walls; petroglyphs; a network of trails; and ahu. Sites

associated with historic cattle ranching were also identified within the site.

All sites were evaluated as having some level of archaeological significance. The survey recommended that 28 of the 65 sites in the property be subjected to a program of further data recovery. Eight (8) sites are recommended for preservation. For the remaining 29 sites, no further research is recommended as they are deemed no longer significant. (*Environmental Impact Statement Preparation Notice for the Kaloko-Honokohau Business Park*, March 2000).

3.10.4 Native Culture – Cumulative Impacts and Mitigation Measures: The assessment of cumulative impacts on native culture focuses on the ahupua'a of Kaloko, Honokōhau and Kohanaiki and in general on proposed developments just mauka of Queen Kaahumanu Highway. As a result of existing and proposed developments, the intensification of buildings will change the landscape of the ahupua'a of Kaloko, Honokōhau and Kohanaiki. When considered individually, each of the developments does not pose a significant cultural impact, especially when concentrated mauka of Queen Ka'ahumanu Highway. Eventually, however, the transformation of the Kona plain and the lava fields will result in the loss of this traditional landscape.

Developments on the slopes of Hualalai may alter the terrain and obstruct or destroy landmarks used by fishermen whereby 'ōpelu ko'a or fishing grounds are located by aligning known reference points. Existing developments on the slopes of Hualalai, and the potential intensification of built structures by proposed developments will continue to affect experiential activities at the Kaloko-Honokōhau National Historical Park. Developments should be designed to mitigate such visual impacts, with consideration to building profiles, appropriate building materials, and suitable landscaping.

Future developments in the nearby region also have the potential to affect traditional burial sites should any be present. The treatment of any remains should be in accordance with procedures approved by the Hawaii Island Burial Council and State Department of Land and Natural Resources Historic Preservation Division.

Wastewater and storm water which may be discharged from surrounding businesses and industrial activities into individual wastewater systems and drywells have the potential to affect ground-water resources and ultimately the fishponds and anchialine ponds in the Kaloko-Honokōhau National Historical Park. Storm water drainage and wastewater disposal systems should be designed to remove contaminants prior to entering the ground water system. The County's plan to extend sewer service north of its Kealakehe Wastewater Treatment Plant, allowing for eventual connection by future developments to municipal sewer lines, will reduce the long-term impact on ground-water resources. The implementation of a pollution prevention plan and recommended Best Management Practices for developments mauka of the Kaloko-Honokōhau National Historical Park will also serve to mitigate the effects of pollutants from storm water runoff.

Future developments in the nearby region also have the potential to affect traditional gathering practices of native plants including ko'oko'olau, 'ulaloa, noni, 'ala'ala wai nui, alahe'e, māmaki, 'ūlei, and 'ōhi'a. With the exception of ko'oko'olau, these plants are locally abundant.

3.11 Socio-Economic Characteristics – Cumulative Impacts and Mitigation Measures: The urbanization and development of the proposed projects in the nearby region will create long-term direct and in-direct employment opportunities and generate increased property, sales and income taxes. To support the cumulative increase in population, the State and County would need to provide public and County services, respectively. Given the anticipated revenues that could potentially be generated by such projects, the cumulative impacts to public facilities and services should be positive.

Although the visitor industry is expected to continue as the primary economic activity for the area, the increased population would generate a demand for more diverse goods and services. With more employment in the region, out migration to Honolulu and other areas of the State by job-seeking individuals would potentially decrease.

The social impacts associated with development of the proposed projects in the nearby region will be determined by a number of factors, including: the rate of growth in the region; the ability of infrastructure

construction to keep pace with growth; and demographic characteristics of new in-migrants. Accelerated growth rates could heighten social impacts as residents' perceptions of urban problems such as overcrowding, traffic congestion, and competition for recreational resources increase. In turn, these factors are related to the ability of State and County government to provide necessary public services and infrastructure to keep pace with population increases.

3.12 Air Quality – Cumulative Impacts and Mitigation Measures: No significant long-term cumulative impacts on air quality are anticipated from the development of the proposed projects in the nearby region. In conjunction with the projected increase of vehicular traffic to be generated by the proposed projects, it is anticipated that ambient air quality levels would be most affected by increased vehicular emissions in the form of CO. Traffic and roadway improvements to be implemented in conjunction with development of the respective projects would improve traffic flow and help in reducing the CO concentration levels. Transportation management alternatives as a means to reduce traffic levels and, consequently, air quality impacts have been proposed for two of the proposed projects. Consideration is given to parking and loading provisions for shuttles and vans, as well as utilizing carpools and public transportation at the proposed University of Hawaii Center at West Hawaii (*University of Hawaii Center at West Hawaii Draft EIS*, May 2000). Liliuokalani Trust considers the use of staggered hours for school/businesses and carpooling (*Liliuokalani Trust Final EIS*, October 1990).

Another cumulative impact is the potential electrical demand on the Keahole Generating Station resulting from regional development, and subsequent air quality impacts. However, any expansion of the station will be subject to rigorous review by the State Department of Health and must meet Federal and State clean air requirements.

3.13 Noise – Cumulative Impacts and Mitigation Measures: No significant long-term cumulative impacts on noise are anticipated from the development of the proposed projects in the nearby region. Ambient noise levels in the vicinity will increase as a result of the associated increase in vehicular traffic generated by the proposed developments. The increased noise levels as a result of the proposed Kaloko Industrial Park, Phases III and IV, and adjacent Kaloko-Honokohau Business Park are not anticipated to adversely affect any

nearby noise sensitive uses since the surrounding areas are comprised of light industrial uses and undeveloped lands.

For the Liliuokalani Trust project, existing and planned uses along Queen Kaahumanu Highway are primarily commercial and light industrial. Roadway traffic noise levels at the proposed residential areas of the project are not expected to exceed current FHA/HUD noise standards. (*Liliuokalani Trust Final EIS*, October 1990).

The University of Hawaii Center at West Hawaii considers parking and loading provisions for vans and shuttles to address potential increased vehicular noise (*University of Hawaii Center at West Hawaii Draft EIS*, May 2000).

For the Urban Expansion State Lands, the future developer would be responsible for implementing appropriate sound attenuation measures, as may be necessary, to reduce noise levels to acceptable standards (*Urban Expansion State Lands Final EIS*, July 1993).

3.14 Visual Resources – Cumulative Impacts and Mitigation Measures: The proposed developments would contribute to an overall change in the region as the physical environment would be altered from largely open lava fields to a developed landscape of urban uses consisting of low-rise residences, retail/offices, light industrial, medical facilities, public facilities such as schools and civic centers, and a variety of recreational facilities and natural open space reserves.

Existing public views along the major roadways in the region, especially Queen Kaahumanu Highway, will be altered to more of an urban, built-up landscape. Adverse visual impacts can be mitigated by adopting prudent site planning criteria (low building profiles/building bulk standards, appropriate building and roof materials and color, and adequate setbacks) and landscape design standards to provide adequate buffers and screening.

The cumulative visual impact of the proposed Kaloko Industrial Park, Phases III and IV and Kaloko-Honokohau Business Park developments will be of a more intensified landscape since the Business Park fronts Queen Kaahumanu Highway and Phases III and IV of the Industrial Park are located mauka of the existing industrial park development. A buffer area is proposed between Queen Kaahumanu Highway and the

Business Park development. Impacts of the visual character of both projects will be mitigated through appropriate architectural design and landscape criteria.

3.15 Solid Waste – Cumulative Impacts and Mitigation Measures: Solid waste generated in the region 20 plus years hence would range from approximately 160.7 to 203.7 tons per day. The County's Puu Anahulu landfill is expected to have the capacity to accommodate solid waste generated by existing uses and proposed projects in the region. The promotion of instituting recycling and resource conservation measures by the proposed developments should help in reducing solid waste to be generated in the future.

3.16.1 Police – Cumulative Impacts and Mitigation Measures: The increase in population attributable to the proposed projects in the nearby region, primarily the Liliuokalani Trust and Urban Expansion State Lands, will increase demand on existing police services within the region. The Liliuokalani Trust would work with the County in determining the extent of expansion required and how to best meet future requirements (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands recommends coordination with the County of Hawaii Police Department to set aside land, if required, to accommodate additional stations or substations for police services (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.2 Fire Protection – Cumulative Impacts and Mitigation Measures: The increase in population attributable to the proposed projects in the nearby region, primarily the Liliuokalani Trust and Urban Expansion State Lands, will increase demand on existing fire protection services within the region. The Liliuokalani Trust would work with the County in determining the extent of expansion required and how to best meet future requirements (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands recommends coordination with the County of Hawaii Fire Department to set aside land, if required, to accommodate additional stations for fire protection services (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.3 Health Care Services – Cumulative Impacts and Mitigation Measures: The increase in resident population primarily as a result of the Urban Expansion State Lands will place additional demands on health care services in the region. The Urban Expansion State Lands

recommends that the developer and/or landowner coordinate development activities with the State Department of Health to provide it with lead time to plan for expanded health care facilities in the region (*Urban Expansion State Lands Final EIS*, July 1993). The Liliuokalani Trust development proposes a new regional hospital containing up to 120 beds that would service the West Hawaii area (Liliuokalani Trust Final EIS, October 1990).

3.16.4 Schools – Cumulative Impacts and Mitigation Measures: Proposed development in the region, especially those with residential uses, would place a demand on existing school facilities in the region. The Liliuokalani Trust would continue to work with the State Department of Education to assure that adequate public school services are provided (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands indicate the difficulty in predicting the level of additional school facilities that would be required at this time as the land uses for the site have not yet been determined. A recommendation is for the landowner and/or developer of the site to contribute to the development, funding and/or construction of school facilities on a pro-rata basis. (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.5 Recreational Facilities – Cumulative Impacts and Mitigation Measures: An increase in population will likely place a demand on the existing recreational facilities in the region. The Urban Expansion State Lands recommends that the developer and/or landowner coordinate the provision of adequate recreational facilities with the County of Hawaii Department of Parks and Recreation (*Urban Expansion State Lands Final EIS*, July 1993). The Liliuokalani Trust proposes the establishment of a historic preserve and a new park which would add to the recreational opportunities of the area (*Liliuokalani Trust Final EIS*, October 1990).

3.17.1 Water System – Cumulative Impacts and Mitigation Measures: The County of Hawaii Department of Water Supply has prepared the *Hawaii County Water Use and Development Plan* (1991) which identifies the long-range water facility improvements that will be required to service the region.

According to the County of Hawaii's *Keahole to Kailua Development Plan*, estimated 2010 water demand for the proposed developments in the region is 14.8 mgd, with a maximum daily demand of 22.2 mgd. A

series of wells are proposed to be drilled about 2.5 to 3.5 miles inland in the 1,500- to 1,800-foot water resource development zone. In addition to new sources, significant improvements to the existing County transmission system will be required to support the various projects planned in the region. Ancillary water storage and distribution system improvements are also proposed for the region.

Proposed water system improvements will be developed in coordination with the County Department of Water Supply for the proposed projects in the nearby region.

3.17.2 Wastewater System – Cumulative Impacts and Mitigation Measures: The County of Hawaii Department of Public Work's plan to extend sewer service north and ultimately to Kona International Airport at Keahole would allow for future developments in currently unsewered areas to eventually connect to the municipal sewer system. This will also eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

Like the Kaloko Industrial Park, Phases III and IV, the individual businesses within the Kaloko-Honokohau Business Park would be required to install individual wastewater systems until such time that the County's sewer system is extended to the project site. The Business Park will provide for sewer lines within the development which will allow for eventual connection to the County's sewer system.

The cumulative amount of wastewater generated in the region 20 plus years hence would range from 8.3 to 8.8 mgd. The Kealakehe Wastewater Treatment Plant can be expanded to accommodate up to 7.5 mgd, resulting in a potential shortfall of .8 to 1.3 mgd in the 20 plus year development timeframe. According to the County of Hawaii's *Keahole to Kailua Development Plan*, the plant could be expanded to 8 mgd average flow for a 40-year design period. If further increases beyond 8 mgd are required, the plant capacity can be further expanded by conversion of the treatment process from aerated lagoons. (*Kaloko Town Center Final EIS*, September 1996).

In regard to the County of Hawaii Department of Public Work's plan to proceed with its Kealakehe Wastewater Treatment Plant water reuse plan, the County recognizes that the treatment and transmission system should be planned, designed, and installed with the intent of providing

for immediate reuse, yet allow for expansion as influent flows increase (*Kealakehe Wastewater Treatment Plant Effluent Reuse Master Plan*, February 1999).

3.17.3 Drainage System – Cumulative Impacts and Mitigation Measures: Drainage system improvements will be developed for the respective proposed projects in the nearby region. For the Kaloko Industrial Park, Phases III and IV, and Kaloko-Honokohau Business Park projects, appropriate Best Management Practices would be implemented by the respective businesses to mitigate the impacts of storm water runoff discharging pollutants into the ground-water system. To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, separate pollution prevention plans as described under Impacts and Mitigation Measures above will be prepared for use by the individual lot owners and tenants/operators of the two developments.

3.17.4 Roadway System and Traffic – The cumulative impacts of the proposed project and the adjacent Kaloko-Honokohau Business Park, along with other developments and general projected growth in the region, have been accounted for in the traffic impact assessment prepared for the subject project. A discussion of the cumulative impacts is included in **Section 3.17.4 Roadway System and Traffic** – Long-Term Impacts and Mitigation Measures in the Draft EIS.

3.17.5 Electrical and Communications Systems – Cumulative Impacts and Mitigation Measures: Electrical, telephone and cable services are provided by privately-owned utility companies who plan for and provide services as the demand arises. As demand increases with development in the region, the respective utility companies would develop facilities to meet that demand. Specific requirements for associated electrical, telephone and cable services for the proposed projects in the nearby region would be respectively determined in consultation with the respective utility companies.

3. Native culture: To incorporate the noted "opportunities" as definite mitigation measures, **Section 3.10.4 Native Culture** - Impacts and Mitigation Measures - Changes to the Landscape and View Plane, Paragraphs 2 and 3, will be revised as follows in the Final EIS:

"Although none of these features or landmarks are within the Petition Area, the proposed development should be designed to mitigate the visual impacts to the existing terrain and landscape, as well as the obstruction of natural features or landmarks. This may include ensuring a low building profile, appropriate building materials, and suitable plantings and landscaping. Fishermen knowledgeable of traditional reference points used in locating fishing grounds, and National Park Service personnel, will be consulted to provide input ~~should be afforded the opportunity to consult~~ on the development of building and landscaping design guidelines for the proposed project.

If native plants on the Petition Area cannot be incorporated into the landscaping plan for the proposed development, local native Hawaiians, the Amy B.H. Greenwell Botanical Garden, other local ethnobotanical groups, and interested educational institutions will ~~should~~ be afforded the opportunity to gather seeds and cuttings or to rescue the plants."

4. Unresolved issues: The following discussion will be added to the **Project Summary – Unresolved Issues** – Coordination with National Park Interests and **Chapter 9. Summary of Unresolved Issues** – Coordination with National Park Interests in the Final EIS:

> "A pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots to control the potential transport of pollutants which could adversely impact the ground-water system. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project."

5. Environmental setting: A discussion of the historic perspective of the region and immediate locale, along with the unique environmental resources at the Kaloko-Honokohau National Historical Park, will be added as a new section to **Chapter 1. INTRODUCTION** of the Final EIS as follows: :

"Section 1.6 Historic Perspective

The Petition Area is situated in the ahupua'a of Kaloko, an area of lava-covered land north of Kailua. Kaloko is well-known for its large fishpond for which the ahupua'a is named.

In the periods between pre-contact to 1800, the Kaloko ahupua'a was in the southern end of an area known as Kekaha. Prior to the ascendancy of Kamehameha, the lands were apportioned by the ali'i and Kekaha was held by the kahuna class of Kauahi and Nahulu. During the 1770s, Kekaha and the lands of the section were held by descendants of the Nahulu line, Kame'elamoku and Kamanawa, the twin half brothers of Ke'eaumoku, the Hawai'i Island chief (Ibid.:310). In the last decades of the 18th century, following western contact, Kaloko, as a portion of the larger Kekaha area, remained under the control of Kame'elamoku (Kamakau, 1992).

In the 1800s to 1850s, western contact became a major influence in changing the traditional Hawaiian social structure and government. The Mahele of 1848 indicates that Kaloko was claimed by and awarded (LCA 7715) to Lot Kamehameha (Kamehameha V). Houses were built on lava along the coast,

along with small cultivated plots (Haun & Associates, May 2000). Kaloko continued to be held by the ali'i throughout the remainder of the 19th century, passing after the death of Lot Kamehameha successively to Bernice Pauahi Bishop, Kalākaua and Kapi'olani.

Missionary and later census data document a decline in the population of North Kona in the 1800s (Kelly, 1971). In 1906, Kaloko was sold to John A. Maguire and subsequently became part of Huehue Ranch (Cordy et al. 1991). The Kaloko fishpond was leased from the Ranch and used as a commercial fishing operation until the 1950s. Over the years, the lands between Queen Ka'ahumanu Highway and Māmalahoa Highway were subdivided and purchased by various parties. On the mauka lands, residential subdivisions were developed.

Regionally, 40 years ago West Hawai'i was a stable agrarian culture, with scattered villages, a resident population of about 14,000, little tourism, and limited commercial and industrial development. Over the past 40 years, the trend towards an urban economy has been exceptional, though cyclical. The region boomed in the mid- to late-1980s, with major development of all types, particularly those associated with resort and commercial uses, along with industrial and residential uses. In the early to mid-1990s, the deep recession resulted in a stagnation of virtually all economic activity. In recent years, several factors have contributed to growth in the region, notably a resurgence of tourism, an increase in construction activity, and a general strengthening (though limited) of the Statewide economy. (The Hallstrom Group, Inc., May 2000).

Unique Environmental Resources of the Kaloko-Honokōhau National Park: The Kaloko-Honokōhau National Historical Park contains extensive natural and cultural resources and nearly all of the land has been designated a national historical landmark. Along with archaeological sites, the Park contains wetlands and fishponds, with the two prominent ponds being Kaloko and 'Aimakapā Ponds. The wetlands and ponds are nesting and feeding habitat for two species of waterbirds, the Hawaiian coot (*Fulica americana alai*) and the Hawaiian stilt (*Himantopus mexicanus knedseni*) which are on the Federal list of endangered species. Anchialine ponds in the Park provide a habitat for native species. The freshwater component of ground-water flow in the Park through the anchialine ponds are considered important in sustaining wetland and pond ecosystems. (U.S. Geological Survey, 1999). Further discussion of the marine and pond environments at the Park is included in **Section 3.6 Marine and Pond Environments.**"

We appreciate your time and effort in reviewing the Draft EIS.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Esther Ueda, State Land Use Commission

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

September 5, 2000

RECEIVED
OCT 0 2000
WILSON OKAMOTO & ASSOC. INC.

State of Hawai'i
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawai'i 96804-2359
Attn: Ms. Esther Ueda

EIS# 414

Subject: Kaloko Industrial Park, Phases III and IV, Draft Environmental Impact Statement; Kaloko, North Kona, Island of Hawai'i
TMK: 7-3-51:60

Dear Ms. Ueda,

Thank you for the opportunity to review and respond to the above-referenced document. As indicated in our April 10, 2000 letter, the Office of Hawaiian Affairs suggested both archaeological and cultural resource studies to be done for the project area. We have reviewed both studies and we have no further comments to offer.

If you have any questions, please contact Ken R. Salva Cruz, Policy Analyst, at 594-1847.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

cc: Board of Trustees
Kona CRS
Wilson Okamoto & Associates
OEQC
File

BENJAMIN J CAYETANO
GOVERNOR

STATE OF HAWAII

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

LEADING HAWAII INTO THE NEW MILLENNIUM
1959 2000

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
HWY-PS
2.9645

TO: ESTHER UEDA, EXECUTIVE OFFICER
LAND USE COMMISSION
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

FROM: KAZU HAYASHIDA, DIRECTOR OF TRANSPORTATION

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
KALOKO INDUSTRIAL PARK, PHASES III AND IV, KALOKO,
NORTH KONA, TMK: 7-3-51: 60

The requested preparation and submittal of a traffic study assessing the impacts and mitigation measures for the full build out of the proposed industrial park (reference: STP 8.9486, dated April 7, 2000, on the Draft Environmental Assessment) remains applicable and valid.

Since Hina Lani Street connects to Mamalahoa Highway, the traffic study should also analyze that intersection. The report should evaluate the impact of industrial vehicles on traffic operation and safety and mention appropriate improvements.

We recommend that the developer ensure that adequate sight distances are maintained at Kamanu and Hina Lani Streets, taking into account that downhill traffic may be traveling at higher than posted speeds with consequential longer stopping distances.

If there are any questions regarding these comments, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

bc: STP, HWY-PS (00-221)

6351-01
October 17, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 15, 2000 (Ref: HWY-PS 2.9645), regarding the subject project.

The traffic impact assessment included in the subject Draft EIS assesses the cumulative impact of the full build-out of the proposed project on the affected roadways in the vicinity, and identifies recommended measures to mitigate the project-generated traffic.

Regarding an assessment of Hina Lani Street at Mamalahoa Highway, this intersection was not included in the analysis due to its remoteness from the project site, a distance of over three miles, and the expected low percentage of contribution of project traffic to this intersection.

To address the issue of industrial vehicles on traffic operations, the following will be included in **Section 3.17.4: Roadway System and Traffic – Long-Term Impacts and Mitigation Measures** in the Final EIS:

> "The impact of industrial vehicles on traffic operations and safety will be addressed in the design of the project roadways. Roadway intersections will be designed to provide adequate turning radii to avoid or minimize vehicle encroachments to oncoming traffic lanes. Adequate sight distances will also be maintained for all project roadways."

We concur and will pay particular attention to the intersection at Kamanu and Hina Lani Streets. A specific recommendation of the traffic impact assessment also calls for maintaining adequate sight distances for motorists to safely enter and exit all project driveways and roadways.

We appreciate your interest and participation in the environmental review process.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

Stephen K. Yamashiro
Mayor

Jiro A. Sumada
Deputy Chief Engineer

County of Hawaii

DEPARTMENT OF PUBLIC WORKS

25 Aupuni Street, Room 202 • Hilo, Hawaii 96720-4252
(808) 961-8321 • Fax (808) 961-8630

September 19, 2000

RECEIVED
SEP 2 0 2000
WILSON OKAMOTO & ASSOC., INC.

State of Hawaii
Department of Business, Economic Development and Tourism
Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359
ATTEN: Ms. Esther Ueda

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (DEIS)
Tax Map Key: 7-3-51: 60

We reviewed the subject notice and have the following comments:

The Keahole to Kailua Development Plan, dated April 19, 1991, shows the 80-foot wide collector, "Main Street," traversing the subject property in a north-south direction. Main Street will be an important traffic facility for the growth and circulation between developments in the area. We defer to the Planning Director regarding the specific location of this facility, but urge its inclusion and discussion in the final EIS.

Roadway connections should be made to the eastern adjacent property for traffic circulation.

We appreciate the opportunity to comment. If you have any questions, please feel free to contact Kiran Emler of our Kona office.

Galen Kuba, Division Chief
Engineering Division

KE
c: Office of Environmental Quality Control, Atten: Ms. Genevieve Salmonson
Wilson Okamoto & Assoc., Atten.: Mr. Rodney Funakoshi
Engineering- Hilo
Engineering- Kona
Planning Director

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU HI 96826
PH (808)946-2277
FAX (808)946-2253

Mr. Galen Kuba, Division Chief
County of Hawaii
Department of Public Works
Engineering Division
25 Aupuni Street, Room 202
Hilo, Hawaii 96720-4252

Dear Mr. Kuba:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of September 19, 2000, regarding the subject Draft EIS.

A discussion of the proposed collector roadway identified as "Main Street" is included in **Section 4.7 Keahole to Kailua Development Plan** of the Draft EIS. **Section 4.7**, paragraph 5, in the Final EIS will be clarified as follows (added text is shaded):

> "The *Keahole to Kailua Development Plan* also includes a network of major arterial and collector roads that will form the overall framework for the future development of the area. The Development Plan proposes a collector roadway identified as "Main Street" with an 80-foot wide right-of-way running parallel to Queen Kaahumanu Highway from Kealakehe Drive to Hina Lani Street through the Limited Industrial area, including the Petition Area. The Development Plan, however, acknowledges the potential shifting and changing of roadway alignments as actual development occurs in the future."

At this time, we do not envision the need to provide roadway connections to the eastern adjacent property. Future land uses in this area are uncertain and could result in incompatibilities with the planned industrial uses. Roadway connection to the southern project boundary is being provided along Kamanu Street.

We appreciate your time and effort in reviewing the Draft EIS.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

Stephen K. Yamashiro
Mayor

Wayne G. Carvalho
Police Chief

James S. Correa
Deputy Police Chief

County of Hawaii
POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-2702

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AUG 30 2000
WILSON OKAMOTO & ASSOC., INC.

August 28, 2000

Ms. Esther Ueda
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Dear Ms. Ueda:

SUBJECT: KALOKO INDUSTRIAL PARK, PHASES III AND IV
DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)
TAX MAP KEY: 7-3-51: 60
KALOKO, NORTH KONA, ISLAND OF HAWAII

This acknowledges Mr. Rodney Funakoshi's letter of August 17, 2000, requesting our comments on the above-referenced project.

Staff has reviewed your request and has no comments or objections to offer at this time.

Thank you for the opportunity to comment.

Sincerely,

WAYNE G. CARVALHO
POLICE CHIEF

THOMAS J. HICKCOX
ASSISTANT POLICE CHIEF
FIELD OPERATIONS BUREAU

DAF:lk

cc: Office of Environmental Quality Control
Wilson Okamoto & Associates, Inc.

RECEIVED
SEP [illegible]
WILSON OKAMOTO & ASSOC, INC

verizon
Verizon Hawaii Inc.
P.O. Box 2200
Honolulu, HI 96841

August 24, 2000

Ms. Esther Ueda
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

Subject: Kaloko Industrial Park, Phases III and IV
Environmental Impact Statement (EIS) Preparation Notice
Tax Map Key: 7-3-51:60
Kaloko, North Kona, Island of Hawaii

Dear Ms. Ueda:

We have reviewed the EIS for Kaloko Industrial Park, Phases III and IV dated August 2000 and would like to make a revision to Section 3.17.5, Electrical and Communications Systems, Impacts and Mitigation Measures, Communications System.

As stated in the paragraph regarding the communications system, Verizon Hawaii will provide service to the proposed development utilizing HELCO power poles, however, Verizon Hawaii does not have any "direct burial cables" in the area. Service will be provided using a combination of fiber and copper cable and electronic equipment. Verizon Hawaii will require an easement from the developer for electronic equipment. Please revise the draft EIS with wording to reflect that the developer will be required to set aside an area dedicated for Verizon's electronic equipment. Desired easement locations have been sent to the developer's consultant, Wilson Okamoto & Associates, Inc.

Thank you for the opportunity to provide input to the EIS Preparation Notice.
If you have any questions, please contact Julie Sakasegawa at 546-5445.

Sincerely,

Matthew Yung
Access Design Supervisor

my/js

c: Gordon Yadao (Verizon Hawaii)
Michael Chang (Verizon Hawaii)
Julie Sakasegawa (Verizon Hawaii)
Rodney Funakoshi (Wilson Okamoto & Assoc.)

WILSON
OKAMOTO
& ASSOCIATES, INC
ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU HI 96826
PH: (808) 946-2277
FAX: (808) 946-2253

6351-01
October 17, 2000

Mr. Matthew Yung, Access Design Supervisor
Verizon Hawaii Inc.
P.O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Yung:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of August 24, 2000, regarding the subject Draft EIS.

In response to your comments, **Section 3.17.5 Electrical and Communications Systems** – Impacts and Mitigation Measures – Communications Systems will be revised as follows:

> "According to preliminary consultation with Verizon Hawaii Inc. (formerly GTE Hawaiian Telephone Company), telephone service for the proposed development can be provided utilizing HELCO power poles and a combination of fiber and copper cable and electronic equipment ~~direct burial cables~~. Fiber optic cables are available at the existing Kaloko Industrial Park and could be extended to the proposed project. The developer will be required to set aside an area dedicated for Verizon Hawaii Inc.'s electronic equipment. Further coordination will be conducted with Verizon Hawaii Inc. regarding requirements for telephone service, including an easement location for electronic equipment, during the project's design phase."

We appreciate your time and effort in reviewing the Draft EIS.

Sincerely,

Rodney Funakoshi, Project Manager

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

SIERRA CLUB, HAWAI'I CHAPTER
P.O. Box 2577
Honolulu, HI 96803
tel: 538.6616

Director: Jeffrey Mikulina
mikulina@lava.net
fax: 537.9019

October 6, 2000

Russell Kumabe
Hawaii State Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Genevieve Salmonson
Office of Environmental Quality Control
235 S. Beretania St. #702
Honolulu, HI 96813

Rodney Funakoshi
Wilson Okamoto & Associates, Inc.
1907 South Beretania #400
Honolulu, HI 96826

Nathan Natori
TSA International
1441 Kapiolani Boulevard #1905
Honolulu, HI 96814

RE: KALOKO INDUSTRIAL PARK, PHASES III & IV DEIS

The Draft EIS fails to address the concerns we articulated in July on the EISPN. Failure to adequately address these issues subjects TSA International to a lawsuit over the adequacy of the EIS. We incorporate, by reference, all the comments we submitted on the EISPN, as well as those of the National Park Service.

This project will clearly have substantial adverse impacts on the National Park, scenic views, water quality, and botanical and cultural resources.

Despite promises in Rodney Funakoshi's August 7 letter, there is no substantive discussion of the cumulative impact of the two developments; there is no map showing the cultural and natural resources of both this site and the adjacent Kaloko-Honokohau business park; there is no discussion of the long-term visual impact with a discussion of what has taken place on Nimitz Highway; and there is insufficient discussion of the enforceable mitigation measures to protect water quality in and adjacent to the National Park.

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Finally, the refusal of the consultant to include a serious examination of the possibility of incorporating photovoltaic cells into the project violates the requirements and the spirit of chapter 343.

What do we need to do to get these issues treated properly -- sue?

Sincerely,

David Kimo Frankel
Chapter Chair

SIERRA CLUB, HAWAI'I CHAPTER
P.O. Box 2577
Honolulu, HI 96803
tel: 538.6616

Director: Jeffrey Mikulina
mikulina@lava.net
fax: 537-9019

July 20, 2000

Russell Kumabe
Hawaii State Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Genevieve Salmonson
Office of Environmental Quality Control
235 S. Beretania St. #702
Honolulu, HI 96813

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JUL 26 2000
WILSON OKAMOTO & ASSOC, INC.

Rodney Funakoshi
Wilson Okamoto & Associates, Inc.
1907 South Beretania #400
Honolulu, HI 96826

Nathan Natori
TSA International
1441 Kapiolani Boulevard #1905
Honolulu, HI 96814

RE: KALOKO INDUSTRIAL PARK, PHASES III & IV

The Sierra Club, Moku Loa Group recently submitted extensive comments on the Kaloko-Honokohau Business Park to the LUC, OEQC and others. As a preliminary matter, we wish to point out:

• Our comments were based, in part, on the physical appearance of the Kaloko Industrial Park. We should not repeat the mistakes of the past.

• Hawaii Administrative Rules 11-200-2 defines "cumulative impact" as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." It is imperative that the LUC and the OEQC ensure that these two adjacent projects are planned in conjunction with one another and that the cumulative impacts of both projects are fully addressed.

• Any consideration to urbanize an area strategically located halfway between the Kona International Airport at Keahole and Kailua-Kona along Queen Kaahumanu Highway should start with an examination of Nimitz Highway by the Honolulu Airport. Do we want to repeat the same mistakes Honolulu has made? Commentators lament the ugly, industrial strip of car lots and warehouses that greet tourists upon their arrival. Hawaii County has already taken the first step at replicating the Honolulu experience with the existing Kaoloko Industrial Area. Should we continue on that path?

• The petition area adjoins the stunningly beautiful Kaloko-Honokohau National Historic Park. The wilderness quality – including the scenic beauty – must be preserved. Views of warehouses, neon lights, and other tall structures are simply inappropriate.

Because of these concerns, the Land Use Commission should adopt strict standards to protect viewplanes. The LUC should not defer adoption of these standards to the county because (1) these are legitimate state interests; and (2) the county has demonstrated its inability and unwillingness to protect scenic viewplanes (See e.g. Yuen v. Board of Appeals, in which a state circuit court found that the Planning Commission and Planning Department improperly failed to consider the impact of a cellular tower on the scenic beauty of Maulua Gulch; and the Friends of Red Road, in which a circuit court found that the county simply relied on the representations of the private consultants instead of independently reviewing the environmental impacts).

Therefore, the Sierra Club recommends that if the LUC is inclined to approve this petition, it do so with the following conditions:

1) A no build (except for roads and sidewalks) buffer be created from Queen Kaahumanu Highway mauka 300 feet.

2) Heights be limited to 25 feet. Walls on the makai side shall be restricted to no more than 12 feet of uninterrupted wall height.

3) Use of mirrored glass, reflective sun screens or other highly reflective materials for exterior windows shall be prohibited. Except for any flat roof, roof coverings shall be of non-reflective material and of a color and tone compatible with the area surroundings. No illuminated signs shall be allowed.

4) Landscaping shall be used to help all structures blend in with the surrounding environment and to mitigate the visual impacts of development on public views. Native plants and trees instead of exotic plants shall be used unless impractical.

In addition to these conditions intended to preserve the character of the national park and the visitor experience, the Sierra Club Moku Loa Group recommends these additional conditions:

5) All significant pre-contact archaeological sites shall be preserved in their entirety (including a buffer area). At a minimum, these should include burials, petroglyphs, the entire network of trails, agricultural complexes, habitation sites, boundary walls and ahu. With the exception of any burial sites, other archaeological sites should be identified with interpretative

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signs. Until more complete information is provided in the DEIS, we will reserve judgment as to how best to protect all the historic resources.

6) All native trees shall be preserved. Given the rareness of native dryland forest, it makes sense to preserve as much of our biological heritage as possible. The DEIS should include a map that identifies where the various native trees are located. It may be possible to identify an archaeological/botanical preserve in the project area. It is imperative that the analysis of cultural and biological resources be done in conjunction with the adjacent Kaloko-Honokohau Business Park EIS. Trees and archaeological sites know no property lines.

7) It is essential that the outstanding water quality off of the National Park be protected. This project is likely to produce polluted runoff (including oil, heavy metals from the industrial area, and sediments). Moreover, given the porous nature of the volcanic rock, polluted water is likely to drain through the lava down into the ocean. It is insufficient for the DEIS to claim that the project shall comply with all pollution laws. The fact is, there are no enforceable laws to prevent polluted runoff from contaminating coastal waters. Nor, does the Department of Health have the regulatory authority to ensure that underground injection wells do not contaminate coastal waters. Finally, experience in Kaka'ako on O'ahu and other industrial areas demonstrates that compliance with the few DOH standards that do exist is far from universal.

The only way to protect water quality from a development like this is to incorporate clear standards in any LUC approval. These standards must include precise technology requirements. For example, all runoff -- instead of simply draining into an underground injection hole -- should be treated on site. Underground injection should be prohibited. The use of hazardous substances (except for those used by automobiles driving in the area) in the area should be prohibited. It is essential that conditions such as this be required now since DOH does not have the authority to require them.

Finally, we would like to request that the DEIS carefully examine the issue of energy. The expansion of the Keahole powerplant (down the road) has been an extremely divisive issue for the community. How much more energy will this project consume? More importantly, the DEIS should study whether it would be economical to include photovoltaic cells on the top of all flat roofs. By incorporating photovoltaic cells into building design early in the planning process, we believe that the developer could make money, while reducing Hawaii's dependence on fossil fuels. Electricity from solar energy could be used to power the entire business park, with surplus being sold to HELCO.

We look forward to a full discussion of these issues in the DEIS.

Sincerely,

David Kimo Frankel
Chapter Chair

United States Department of the Interior

NATIONAL PARK SERVICE
KALOKO-HONOKOHAU NATIONAL HISTORICAL PARK
73-4786 Kanalani St., #14
Kailua-Kona, Hawaii 96740

August 7, 2000

RECEIVED
AUG 08 2000
WILSON OKAMOTO & ASSOC., INC.

State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, HI 96804-2359

Dear Land Use Commission:

Kaloko-Honokohau is responding to the Environmental Impact Statement Preparation Notice for Kaloko Industrial Park, Phases III and IV. The park is located directly makai of this project and this development may adversely affect resources in the park. The purpose of the park is the perpetuation of native Hawaiian culture therefore the park is also concerned with maintaining Hawaiian plants and animals. These natural resources include two endangered water birds, threatened Green Sea turtles and a number of plant species of concern. Other park species may soon be added to the endangered species list.

On of the park's major concerns is that of changes to water quality. Our primary concerns are with your proposed sewer and storm water drainage systems. Studies completed by the US Geological Survey in Kaloko-Honokohau NHP (Ground Water Resources in Kaloko-Honckohau National Historical Park, Island of Hawaii, and Numerical Simulation of the Effects of Ground-Water Withdrawals, U.S. Geological Survey Water-Resources Investigation Report 99-4070) indicate that water resources in the park are vulnerable to groundwater contamination upgradient of the park. These resources include fishponds, anchialine ponds, and marine waters. The current systems in place for Phases I and II are inadequate for removing contaminants from wastewater or storm water prior to it's entry into the groundwater system and national park biological resources are being adversely affected. A simple walk around the current complex shows a number of locations where contaminates are being carried into the groundwater system from storm water runoff. Along with problems of storm water runoff the park is concerned that the proposed sewer and leach field method of wastewater disposal is not adequate for removing ground water contaminates. The park contains significant water resources with unique ecosystems. Waters in the park are home to a number of threatened or endangered species and species of concern. These include the endemic Hawaiian stilt and coot. Contamination of these ecosystems by water entering the park is a threat to these federally protected species. Sewer and storm water drainage systems need to be addressed in detail in the Environmental Impact Statement (EIS). The EIS should also address future monitoring to assure that no impacts are occurring, and measures for remediating impacts if they do occur.

Water quality affects the cultural components of many sites in the park. Appropriate cultural use of the fishponds requires that they remain unpolluted. Ultimately the park plans to manage the fishponds in a traditional Hawaiian style and in order to do so the fish must remain edible. A number of sacred Hawaiian sites are also can be affected by water quality. The most prominent of these is Kahinahinaula, known locally as the Queen's Bath. Park visitors use this modified anchialine pond. The pollution of marine waters would also have an effect on the perpetuation of traditional Hawaiian maritime cultural practices.

The above mentioned Kaloko-Honokohau NHP groundwater study as well as one for the entire Kona area (Geohydrology and Numerical Simulation of the Ground-Water Flow System of Kona, Island of Hawaii; U.S. Geological Survey Water-Resources Investigations Report 99-4073) addresses the potential for decreases in ground water levels due to increased water withdrawal. Decreasing ground water levels could change salinity levels in the fishponds and anchialine ponds, adversely affecting the species that inhabit these areas. How Phase III and IV developments would alter ground water levels also needs to be addressed in the EIS.

The 82 additional units will undoubtedly increase traffic into the Kaloko Industrial Park complex and increase traffic on Queen Kaahumanu Highway. We would like to see information in the EIS on the estimated increase in traffic and measures planned to alleviate traffic congestion.

Finally, changes in the landscape can adversely affect the viewscape of a cultural park. We do recognize that development will occur mauka of Kaloko-Honokohau National Historical Park, and that visual elements of the park have been and will continue to be affected by this development. Appropriate plantings would reduce these impacts. The park has developed a Vegetation Management Plan that addresses landscaping. We have offered to act as a resource in helping the developer choose appropriate plants for this project.

On page 1-1, 1.2 Background, paragraph 1 the statement is made: "The Kaloko Industrial Park was conceived to provide appropriately located industrial fee simple lands...(emphasis by the park)". Many of the questions above deal with the need for adequate infrastructure, such as central sewer hookup and adequate roads, prior to industrial development. Without such infrastructure in place, whether provided by the county or the developer, it may not be appropriate to put an industrial area near such sensitive natural and cultural resource areas. We look forward to further communications on this project that might benefit all residents of the Kona area. In that regard the park wishes to be a "consulting party" during the EIS process.

Mahalo,

For
Geraldine Bell
Superintendent

Cc: Wilson Okamoto & Associates, Inc.

6351-01
October 17, 2000

WILSON
OKAMOTO
& ASSOCIATES, INC

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH: (808) 946 2277
FAX: (808) 946 2253

Mr. David Kimo Frankel, Chapter Chair
Sierra Club, Hawaii Chapter
P.O. Box 2577
Honolulu, Hawaii 96803

Dear Mr. Frankel:

Subject: Kaloko Industrial Park, Phases III and IV
Draft Environmental Impact Statement (EIS)
Kaloko, North Kona, Island of Hawaii
Tax Map Key: 7-3-51: 60

Thank you for your letter of October 6, 2000, regarding the subject Draft EIS. We offer the following responses to your comments:

Sierra Club, Hawaii Chapter Letter of October 6, 2000:

1. In response to the reference in your letter, we separately address herein the Sierra Club, Hawaii Chapter's comments of July 20, 2000 and the National Park Service – Kaloko-Honokohau National Historical Park's comments of August 7, 2000 on the project's EIS Preparation Notice. We previously responded to these comments by letters of August 7, 2000 and August 9, 2000, respectively.

2. The studies conducted on ground-water quality, botanical and cultural resources for the Draft EIS indicate that the proposed project will not have substantial adverse impacts on these resources and the National Park. As indicated in the Draft EIS, the proposed project will not result in significant adverse impacts on scenic views.

   Ground-Water Quality: According to the assessment of ground-water resources and impacts conducted for the Draft EIS, no significant impacts on groundwater are anticipated as a result of the proposed project, with the incorporation of proposed mitigation measures. The analysis of the project's potential impact on water resources considers four aspects: potable water supply, wastewater disposal, surface water drainage, and irrigation and wash water.

   The assessment of impacts on the marine and pond environments in the vicinity of the Petition Area, including the Kaloko-Honokohau National Historical Park, also concludes that the potential for impact to the marine and pond communities as a result of the proposed development would be minimal. Thick sediment lining the floors of the Kaloko and Aimakapa Ponds within the National Historical Park effectively plugs the ponds from the free exchange of ground water. As a result, the major flow of ground water appears to be around the ponds rather than through them. The assessment also concludes that it is unlikely there would be any effect to the nearshore marine environment as a result of the increase in nutrient concentrations in ground water.

   In addition to the on-site individual wastewater systems that will initially service the project's commercial-industrial uses, provisions will be made in the development to provide sewer lines to enable such connection to the municipal system once it becomes available. This will eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

   To mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, the use of appropriate Best Management Practices (BMPs) will be employed, including on-site polluting mitigating measures to control the transport of sediments and other pollutants which could adversely impact ground water, ponds or nearshore waters.

   At this time, it is uncertain what types of light industrial and commercial businesses will actually locate in the development. As such, the Draft EIS identifies Best Management Practices (BMPs) which *could* be used to mitigate the impacts of storm water runoff discharging pollutants into the ground-water system, such as flow-through-based water quality control measures.

   To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed development. The plan will address potential pollutants, handling procedures mandated by Federal, State and local regulations, and recommended best management practices and controls. A discussion of the pollution prevention plan will be included in the Final EIS as follows:

   "To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot

owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project."

The above discussion will be included in the following sections of the Final EIS:

- **Project Summary - Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures - Ground Water and Marine and Pond Environments**
- **3.5 Ground Water – Impacts and Mitigation Measures**
- **3.6 Marine and Pond Environments – 3.6.4 Effects of Toxic Materials and Mitigation Measures and 3.6.6 Cumulative Impacts and Mitigation Measures**
- **3.17.3 Drainage System – Impacts and Mitigation Measures**
- **4.1 Hawaii State Plan**

  SEC. 226-11 Objectives and policies for the physical environment – land-based, shoreline, and marine resources.

  SEC. 226-13 Objectives and policies for the physical environment – land, air and water quality.

- **4.4 Hawaii Coastal Zone Management Program**

  3. Recreational Resources

  7. Coastal Ecosystems

  6. Coastal Hazards

- **4.6 County of Hawaii General Plan**

D. Flood Control and Drainage

G. Natural Resources and Shoreline

- **4.6.2 County of Hawaii General Plan Revision Program**

  Environmental Quality Element

  Flood Control and Drainage Element

  Natural Resources and Shoreline Element

Botanical Resources: According to the botanical survey conducted for the subject EIS, none of the plants found within the Petition Area during the survey is a listed threatened or endangered species protected by Federal and State Endangered Species Laws. The Petition Area is predominantly vegetated with koa haole and fountain grass scrub vegetation.

One candidate endangered species plant identified as the ko'oko'olau (*Bidens micrantha* subspecies *ctenophylla*), was found within the Petition Area. A candidate species is one which is being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service and is not subject to the Federal and State Endangered Species Laws. A buffer zone will be established in the immediate vicinity of the *Bidens* plant located along the Petition Area's eastern boundary. Seeds and cuttings will be propagated from the other three *Bidens* plants located within the Petition Area to preserve its genetic material.

There are at least two dozen maiapilo or native caper plants (*Capparis sandwichiana*) within the Petition Area which is considered a species of concern by the U.S. Fish and Wildlife Service (1999). Species of concern are plants for which there is a need for more biological and/or taxonomic information regarding whether a species might require conservation actions in the future. According to the botanical survey, the *Capparis* is not considered a high priority item as the plants are widespread throughout the Hawaiian Islands.

Cultural Resources: Based on an assessment of the impacts of the proposed project on resources, beliefs and practices identified in the

cultural impact assessment conducted for the Draft EIS, the proposed development will have a minimal negative cultural impact upon native Hawaiian cultural resources, beliefs and practices.

No cultural resources, practices and beliefs specific to the Petition Area were identified. Although interviewees of the cultural impact assessment cited possibilities that burial caves are present on the Petition Area, none were found during the archaeological inventory survey conducted for the EIS.

Based on a literature review, the coastal and mauka (between the 900- to 1,500-foot elevations) portions of the ahupua'a of Kaloko are the zones where cultural resources, including habitation and agricultural areas, dominate. In comparison, the Petition Area is located *between* the coastal and mauka zones at the 170- to 300-foot elevations.

According to formal interviews conducted with kama'āina who are well informed on the history and documented literature of the Kaloko ahupua'a, as well as informal consultation with the State Office of Hawaiian Affairs, Kona Hawaiian Civic Club, and the Nā-Kōkua Kaloko Honokohau, Inc., an advisory committee to the Kaloko-Honokohau National Historical Park, the only continuing cultural practice that involves the mauka region is the use of landmarks by fishermen in a traditional fishing method whereby 'ōpelu ko'a or fishing grounds are located by aligning known reference points. Although none of these features or landmarks are within the Petition Area, fishermen knowledgeable of traditional reference points used in locating fishing grounds, and National Park Service personnel, will be consulted to provide input on the development of building and landscaping design guidelines for the proposed project.

The gathering of plants is a traditional mauka region practice; however, based on interviews conducted for the cultural impact assessment, there are no continuing gathering practices within the Petition Area.

Scenic Views: As indicated in the Draft EIS, there are no significant impacts affecting views or visual resources as a result of the proposed project. Existing industrial buildings in the Kaloko Industrial Park development are fronting Queen Kaahumanu Highway and most directly affect mauka scenic views. The Draft EIS acknowledges that buildings within the proposed development will be visible beyond the

existing Kaloko Industrial Park as viewed from makai areas, including the Kaloko-Honokohau National Historical Park, due to the elevated topography of the Petition Area. As such, the change in views from the various public vantage points, primarily the mauka-makai views, will be of an intensification of the existing uses.

To reduce the visual impacts of the proposed development from mauka-makai public vantage points, landscaping and architectural design criteria will be developed and implemented for the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with the landscaping criteria. Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as the use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

3. A discussion of the cumulative impacts of the proposed project and other developments in the vicinity, including the adjacent proposed Kaloko-Honokohau Business Park, will be included in the Final EIS as follows:

"3. **DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES**

This chapter describes the existing environment, anticipated project impacts resulting from the proposed project, and the associated mitigative measures. As appropriate, cumulative impacts resulting from the proposed project and other developments in the project vicinity are also addressed in this chapter.

The evaluation of the cumulative impacts considers the proposed project with other major proposed projects in the nearby region. These projects include the following and are also described in **Section 1.4.2.2 Proposed Developments Within the Project Vicinity** in the EIS:

- Kaloko-Honokohau Business Park: A light industrial/commercial development on approximately 337 acres to be developed by Lanihau Partners L.P. Located adjacent to and south of the Petition Area.

- Liliuokalani Trust (Keahuolu Lands of Kailua-Kona): A mixed-use development by Liliuokalani Trust Estate on approximately 1,135 acres. Proposed uses include retail, commercial, office, residential, civic and cultural center, a regional hospital, and park space. Located approximately 1.6 miles south of the Petition Area.

- Urban Expansion State Lands: Approximately 2,640 acres of State-owned land with possible uses to include residential, neighborhood commercial, civic, employment center, light industrial, parks, golf courses, and a university. Located approximately 1.2 miles north of the Petition Area.

- University of Hawaii Center at West Hawaii: A facility for higher education located on an approximately 33-acre site within the aforementioned Urban Expansion State Lands.

With the exception of the Kaloko-Honokohau Business Park, the potential environmental impacts and mitigation measures for the other projects were obtained from the environmental impact statements prepared for the respective projects. Information on Kaloko-Honokohau Business Park was obtained from preliminary reports prepared in conjunction with the project's EIS.

It should be noted that predicting the cumulative future of the nearby region is highly speculative in light of the development phasing of the projects being dependent on favorable market conditions.

Two other projects previously proposed for the area, the Kaloko Town Center and Kohanaiki Resort, are not included in the assessment of cumulative impacts since the projects' respective land use requests were withdrawn from the State Land Use Commission and County of Hawaii Planning Commission."

The following discussion of the cumulative impacts and mitigation measures will be included in the respective sections in the Final EIS:

3.2 Geology and Topography – Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts on the geology or topography are anticipated as a result of the proposed projects in the

nearby region. Development of the proposed projects will require site work, including localized alteration of the existing lava terrain for roadways and buildings sites. For the Urban Expansion State Lands, it is recommended that the master plan site land uses, including roadways, to minimize grading and reduce the need to large-scale reshaping of the underlying landform (*Urban Expansion State Lands FEIS*, July 1993).

3.3 Soils – Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts on soils are anticipated as a result of the proposed projects in the nearby region. Following construction, exposed soils will have been graded, built over, paved over, or landscaped. Currently, there is very little soil cover throughout the region. It is likely that soils would be imported for landscaping purposes which, over time, would cumulatively change the soil characteristics of the nearby region.

3.4 Surface Water – Cumulative Impacts and Mitigation Measures: No significant cumulative long-term impacts to the natural drainage system in the nearby vicinity, including the nearshore marine and pond systems at the Kaloko-Honokohau National Historical Park, are anticipated as a result of the proposed projects in the nearby region. Due to the undeveloped nature of the project sites, development of the proposed projects will increase the impervious areas of the sites. The proposed drainage system improvements for the respective projects will minimize any potential impacts to surface waters in the project vicinity.

3.5 Ground Water – Cumulative Impacts and Mitigation Measures: The Kaloko Industrial Park, Phases III and IV, is one of several existing and planned commercial-industrial developments upgradient of the Kaloko-Honokohau National Historical Park. Entitlements are currently being pursued for the Kaloko-Honokohau Business Park to the south and build-out of the Honokohau Business Park will continue. Beyond these near-term projects, other urbanization in the area from Kailua Town to Kona International Airport at Keahole will ultimately occur, some of which will impact ground water flowing through the National Park. Using a series of conservative assumptions regarding these developments, the cumulative impact of these projects on ground water flowing through the entire width of the National Park was computed.

These calculations indicate a 7 percent decrease in ground-water flow rate, with a 10 percent increase in salinity. Both changes are within the range of the natural variability of ground water. Nitrogen levels would be expected to increase by 45 to 50 percent, which is a large increase over the present levels which are already relatively high. Similarly, phosphate would be expected to increase by 30 to 45 percent.

3.6 Marine and Pond Environments – A discussion of the cumulative impacts and mitigation measures, including the adjacent Kaloko-Honokohau Business Park, is included in **Section 3.6.6 Cumulative Impacts and Mitigation Measures** in the Draft EIS. To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed development and Kaloko-Honokohau Business Park. A discussion of the pollution prevention plan will be included in this section in the Final EIS as follows:

> "To control the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed industrial-commercial lots. The plan will evaluate potential contaminants from industrial operations; address handling procedures mandated by applicable Federal, State and local regulations related to the project; and recommend Best Management Practices and controls appropriate for the project. A similar pollution prevention plan with recommended Best Management Practices is also being considered for the adjacent proposed Kaloko-Honokohau Business Park."

3.7 Flood Hazard – Cumulative Impacts and Mitigation Measures: Due to the highly porous lava terrain, development of the proposed projects in the nearby region is not anticipated to result in flooding of lower elevation properties. Proposed drainage improvements for the respective projects will minimize any potential flood hazard.

3.8 Earthquake/Seismic Hazards – Cumulative Impacts and Mitigation Measures: In accordance with the Hawaii County Building Code, the proposed structures for the respective proposed projects in the nearby region would be designed and built to resist forces to seismic Zone 4 standards.

3.9 Lava Flow Hazards – Cumulative Impacts and Mitigation Measures: In the remote event of lava flow occurrence, any potential property damage within the proposed projects in the nearby region would be succumbed by the forces of nature. It would be incumbent upon the individual developments to devise emergency evacuation procedures for such a situation.

3.10.3 Flora – Cumulative Impacts and Mitigation Measures: No significant cumulative impacts on botanical resources are anticipated from the development of the proposed projects in the nearby region. The vegetation within the proposed project sites is predominantly of mixed shrubland vegetation types. The transformation of flora in the nearby region would likely result in an increased amount of introduced plant species commonly used for landscaping. The use of native plants found in the region for landscaping of the proposed developments would contribute toward mitigating the loss of native flora through site clearing activities. For the Urban Expansion State Lands, more intensive botanical surveys are recommended to be conducted; and, if areas with endangered or rare plants are found, it may be necessary and/or desirable to establish a nature study park (or parks) around these areas (*Urban Expansion State Lands FEIS, July 1993*).

According to a botanical survey of the Kaloko-Honokohau Business Park site, there are no threatened and endangered species or species of concern within the site. The site is predominantly vegetated with introduced or alien species such as koa haole, fountain grass, Christmas berry, and kiawe. (Char, April 2000). The native plants found on both the Petition Area and adjacent Business Park site can also be found in similar lowland, dry environments in the West Hawaii region and on most of the main Hawaiian Islands. Figure 3-4 depicts the botanical resources within the Petition Area and adjacent Business Park site.

Similar to the establishment of a buffer zone with a minimum width of 30 feet in the immediate vicinity of the *Bidens* #1 plant along the Petition Area's eastern boundary, the botanical survey for the adjacent Business Park recommends the establishment of a buffer zone at least

50 feet wide along the site's eastern (mauka) boundary and northeast corner.

Development of the two projects would likely result in an increased amount of native species used for landscaping purposes as compared to the current proliferation of introduced species within the sites.

3.10.2 Fauna – Cumulative Impacts and Mitigation Measures: No significant cumulative impacts on faunal resources are anticipated from the development of the proposed projects in the nearby region. No federally listed endangered or threatened avian or mammalian species were detected during the faunal surveys conducted of the respective project sites.

In the interest of reducing the potential for unwanted interactions between nocturnally flying Dark-rumped Petrels with external lights and man-made structures, the shielding of lights planned for the various developments would mitigate this potential occurrence.

Following construction, the incorporation of landscaping within the proposed developments will likely attract many of the common alien avian species currently found in the Kona area.

3.10.4 Archaeological/Historic Resources – Cumulative Impacts and Mitigation Measures: In general, the proposed projects in the nearby region would retain some of the more significant archaeological resources found within the respective sites. For the Liliuokalani Trust project, specific sites (primarily those containing human remains) would be preserved, subject to a mitigation plan. The creation of an Historic Reserve to protect the concentration of sites at the northern end of the Kuakini Wall near Palani Road would be an additional mitigation measure. (*Liliuokalani Trust Final EIS*, October 1990).

The University of Hawaii Center at West Hawaii proposes the establishment of five preserve areas to include various archaeological sites with interpretive venues to educate current and future residents and visitors of West Hawaii (*University of Hawaii Center at West Hawaii Final EIS*, May 2000).

The Urban Expansion of State Lands recommends completion of an archaeological inventory survey for the entire petition area prior to

initiation of any future development. Some of the sites previously identified are burials or potential burials, which would be subject to a burial treatment plan in coordination with the State Department of Land and Natural Resources Historic Preservation Division and the Hawaii Island Burial Council. (*Urban Expansion State Lands Final EIS*, July 1993).

An archaeological inventory survey with limited subsurface testing was conducted of the Kaloko-Honokohau Business Park site. Approximately 64 sites were identified within the site, varying in context from traditional Hawaiian use to historic-era ranching. Figure 3-4 depicts the archaeological resources within the Petition Area and adjacent Business Park site. The traditional Hawaiian sites contain a variety of formal site and feature types, including: intensive dryland agricultural complexes; simple agricultural features and sites; temporary, recurrent and permanent habitation sites; a refuge cave; human burials; animal containment features; an ahupuaa wall and various boundary walls; petroglyphs; a network of trails; and ahu. Sites associated with historic cattle ranching were also identified within the site.

All sites were evaluated as having some level of archaeological significance. The survey recommended that 28 of the 65 sites in the property be subjected to a program of further data recovery. Eight (8) sites are recommended for preservation. For the remaining 29 sites, no further research is recommended as they are deemed no longer significant. (*Environmental Impact Statement Preparation Notice for the Kaloko-Honokohau Business Park*, March 2000).

3.10.4 Native Culture – Cumulative Impacts and Mitigation Measures: The assessment of cumulative impacts on native culture focuses on the ahupua'a of Kaloko, Honokōhau and Kohanaiki and in general on proposed developments just mauka of Queen Kaahumanu Highway. As a result of existing and proposed developments, the intensification of buildings will change the landscape of the ahupua'a of Kaloko, Honokōhau and Kohanaiki. When considered individually, each of the developments does not pose a significant cultural impact, especially when concentrated mauka of Queen Ka'ahumanu Highway. Eventually, however, the transformation of the Kona plain and the lava fields will result in the loss of this traditional landscape.

Developments on the slopes of Hualalai may alter the terrain and obstruct or destroy landmarks used by fishermen whereby ʻōpelu koʻa or fishing grounds are located by aligning known reference points. Existing developments on the slopes of Hualalai, and the potential intensification of built structures by proposed developments will continue to affect experiential activities at the Kaloko-Honokōhau National Historical Park. Developments should be designed to mitigate such visual impacts, with consideration to building profiles, appropriate building materials, and suitable landscaping.

Future developments in the nearby region also have the potential to affect traditional burial sites should any be present. The treatment of any remains should be in accordance with procedures approved by the Hawaii Island Burial Council and State Department of Land and Natural Resources Historic Preservation Division.

Wastewater and storm water which may be discharged from surrounding businesses and industrial activities into individual wastewater systems and drywells have the potential to affect ground-water resources and ultimately the fishponds and anchialine ponds in the Kaloko-Honokōhau National Historical Park. Storm water drainage and wastewater disposal systems should be designed to remove contaminants prior to entering the ground water system. The County's plan to extend sewer service north of its Kealakehe Wastewater Treatment Plant, allowing for eventual connection by future developments to municipal sewer lines, will reduce the long-term impact on ground-water resources. The implementation of a pollution prevention plan and recommended Best Management Practices for developments mauka of the Kaloko-Honokōhau National Historical Park will also serve to mitigate the effects of pollutants from storm water runoff.

Future developments in the nearby region also have the potential to affect traditional gathering practices of native plants including koʻokoʻolau, ʻulaloa, noni, ʻalaʻala wai nui, alaheʻe, māmaki, ʻōlei, and ʻōhiʻa. With the exception of koʻokoʻolau, these plants are locally abundant.

3.11 Socio-Economic Characteristics – Cumulative Impacts and Mitigation Measures: The urbanization and development of the

proposed projects in the nearby region will create long-term direct and in-direct employment opportunities and generate increased property, sales and income taxes. To support the cumulative increase in population, the State and County would need to provide public and County services, respectively. Given the anticipated revenues that could potentially be generated by such projects, the cumulative impacts to public facilities and services should be positive.

Although the visitor industry is expected to continue as the primary economic activity for the area, the increased population would generate a demand for more diverse goods and services. With more employment in the region, out migration to Honolulu and other areas of the State by job-seeking individuals would potentially decrease.

The social impacts associated with development of the proposed projects in the nearby region will be determined by a number of factors, including: the rate of growth in the region; the ability of infrastructure construction to keep pace with growth; and demographic characteristics of new in-migrants. Accelerated growth rates could heighten social impacts as residents' perceptions of urban problems such as overcrowding, traffic congestion, and competition for recreational resources increase. In turn, these factors are related to the ability of State and County government to provide necessary public services and infrastructure to keep pace with population increases.

3.12 Air Quality – Cumulative Impacts and Mitigation Measures: No significant long-term cumulative impacts on air quality are anticipated from the development of the proposed projects in the nearby region. In conjunction with the projected increase of vehicular traffic to be generated by the proposed projects, it is anticipated that ambient air quality levels would be most affected by increased vehicular emissions in the form of CO. Traffic and roadway improvements to be implemented in conjunction with development of the respective projects would improve traffic flow and help in reducing the CO concentration levels. Transportation management alternatives as a means to reduce traffic levels and, consequently, air quality impacts have been proposed for two of the proposed projects. Consideration is given to parking and loading provisions for shuttles and vans, as well as utilizing carpools and public transportation at the proposed University of Hawaii Center at West Hawaii (*University of Hawaii Center at West Hawaii Draft EIS*, May 2000). Liliuokalani Trust considers the use of staggered hours for

school/businesses and carpooling (*Liliuokalani Trust Final EIS*, October 1990).

Another cumulative impact is the potential electrical demand on the Keahole Generating Station resulting from regional development, and subsequent air quality impacts. However, any expansion of the station will be subject to rigorous review by the State Department of Health and must meet Federal and State clean air requirements.

3.13 Noise – Cumulative Impacts and Mitigation Measures: No significant long-term cumulative impacts on noise are anticipated from the development of the proposed projects in the nearby region. Ambient noise levels in the vicinity will increase as a result of the associated increase in vehicular traffic generated by the proposed developments. The increased noise levels as a result of the proposed Kaloko Industrial Park, Phases III and IV, and adjacent Kaloko-Honokohau Business Park are not anticipated to adversely affect any nearby noise sensitive uses since the surrounding areas are comprised of light industrial uses and undeveloped lands.

For the Liliuokalani Trust project, existing and planned uses along Queen Kaahumanu Highway are primarily commercial and light industrial. Roadway traffic noise levels at the proposed residential areas of the project are not expected to exceed current FHA/HUD noise standards. (*Liliuokalani Trust Final EIS*, October 1990).

The University of Hawaii Center at West Hawaii considers parking and loading provisions for vans and shuttles to address potential increased vehicular noise (*University of Hawaii Center at West Hawaii Draft EIS*, May 2000).

For the Urban Expansion State Lands, the future developer would be responsible for implementing appropriate sound attenuation measures, as may be necessary, to reduce noise levels to acceptable standards (*Urban Expansion State Lands Final EIS*, July 1993).

3.14 Visual Resources – Cumulative Impacts and Mitigation Measures: The proposed developments would contribute to an overall change in the region as the physical environment would be altered from largely open lava fields to a developed landscape of urban uses consisting of low-rise residences, retail/offices, light industrial, medical

facilities, public facilities such as schools and civic centers, and a variety of recreational facilities and natural open space reserves.

Existing public views along the major roadways in the region, especially Queen Kaahumanu Highway, will be altered to more of an urban, built-up landscape. Adverse visual impacts can be mitigated by adopting prudent site planning criteria (low building profiles/building bulk standards, appropriate building and roof materials and color, and adequate setbacks) and landscape design standards to provide adequate buffers and screening.

The cumulative visual impact of the proposed Kaloko Industrial Park, Phases III and IV and Kaloko-Honokohau Business Park developments will be of a more intensified landscape since the Business Park fronts Queen Kaahumanu Highway and Phases III and IV of the Industrial Park are located mauka of the existing industrial park development. A buffer area is proposed between Queen Kaahumanu Highway and the Business Park development. Impacts of the visual character of both projects will be mitigated through appropriate architectural design and landscape criteria.

3.15 Solid Waste – Cumulative Impacts and Mitigation Measures: Solid waste generated in the region 20 plus years hence would range from approximately 160.7 to 203.7 tons per day. The County's Puu Anahulu landfill is expected to have the capacity to accommodate solid waste generated by existing uses and proposed projects in the region. The promotion of instituting recycling and resource conservation measures by the proposed developments should help in reducing solid waste to be generated in the future.

3.16.1 Police – Cumulative Impacts and Mitigation Measures: The increase in population attributable to the proposed projects in the nearby region, primarily the Liliuokalani Trust and Urban Expansion State Lands, will increase demand on existing police services within the region. The Liliuokalani Trust would work with the County in determining the extent of expansion required and how to best meet future requirements (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands recommends coordination with the County of Hawaii Police Department to set aside land, if required, to accommodate additional stations or substations for police services (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.2 Fire Protection – Cumulative Impacts and Mitigation Measures: The increase in population attributable to the proposed projects in the nearby region, primarily the Liliuokalani Trust and Urban Expansion State Lands, will increase demand on existing fire protection services within the region. The Liliuokalani Trust would work with the County in determining the extent of expansion required and how to best meet future requirements (*Liliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands recommends coordination with the County of Hawaii Fire Department to set aside land, if required, to accommodate additional stations for fire protection services (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.3 Health Care Services – Cumulative Impacts and Mitigation Measures: The increase in resident population primarily as a result of the Urban Expansion State Lands will place additional demands on health care services in the region. The Urban Expansion State Lands recommends that the developer and/or landowner coordinate development activities with the State Department of Health to provide it with lead time to plan for expanded health care facilities in the region (*Urban Expansion State Lands Final EIS*, July 1993). The Liliuokalani Trust development proposes a new regional hospital containing up to 120 beds that would service the West Hawaii area (Liliuokalani Trust Final EIS, October 1990).

3.16.4 Schools – Cumulative Impacts and Mitigation Measures: Proposed development in the region, especially those with residential uses, would place a demand on existing school facilities in the region. The Liliuokalani Trust would continue to work with the State Department of Education to assure that adequate public school services are provided (*Lliuokalani Trust Final EIS*, October 1990). The Urban Expansion State Lands indicate the difficulty in predicting the level of additional school facilities that would be required at this time as the land uses for the site have not yet been determined. A recommendation is for the landowner and/or developer of the site to contribute to the development, funding and/or construction of school facilities on a pro-rata basis. (*Urban Expansion State Lands Final EIS*, July 1993).

3.16.5 Recreational Facilities – Cumulative Impacts and Mitigation Measures: An increase in population will likely place a demand on the existing recreational facilities in the region. The Urban Expansion State

Lands recommends that the developer and/or landowner coordinate the provision of adequate recreational facilities with the County of Hawaii Department of Parks and Recreation (*Urban Expansion State Lands Final EIS*, July 1993). The Liliuokalani Trust proposes the establishment of a historic preserve and a new park which would add to the recreational opportunities of the area (*Liliuokalani Trust Final EIS*, October 1990).

3.17.1 Water System – Cumulative Impacts and Mitigation Measures: The County of Hawaii Department of Water Supply has prepared the *Hawaii County Water Use and Development Plan* (1991) which identifies the long-range water facility improvements that will be required to service the region.

According to the County of Hawaii's *Keahole to Kailua Development Plan*, estimated 2010 water demand for the proposed developments in the region is 14.8 mgd, with a maximum daily demand of 22.2 mgd. A series of wells are proposed to be drilled about 2.5 to 3.5 miles inland in the 1,500- to 1,800-foot water resource development zone. In addition to new sources, significant improvements to the existing County transmission system will be required to support the various projects planned in the region. Ancillary water storage and distribution system improvements are also proposed for the region.

Proposed water system improvements will be developed in coordination with the County Department of Water Supply for the proposed projects in the nearby region.

3.17.2 Wastewater System – Cumulative Impacts and Mitigation Measures: The County of Hawaii Department of Public Work's plan to extend sewer service north and ultimately to Kona International Airport at Keahole would allow for future developments in currently unsewered areas to eventually connect to the municipal sewer system. This will also eliminate any long-term impacts to ground water from on-site wastewater disposal systems.

Like the Kaloko Industrial Park, Phases III and IV, the individual businesses within the Kaloko-Honokohau Business Park would be required to install individual wastewater systems until such time that the County's sewer system is extended to the project site. The Business

Park will provide for sewer lines within the development which will allow for eventual connection to the County's sewer system.

The cumulative amount of wastewater generated in the region 20 plus years hence would range from 6.3 to 8.8 mgd. The Kealakehe Wastewater Treatment Plant can be expanded to accommodate up to 7.5 mgd, resulting in a potential shortfall of .8 to 1.3 mgd in the 20 plus year development timeframe. According to the County of Hawaii's *Keahole to Kailua Development Plan*, the plant could be expanded to 8 mgd average flow for a 40-year design period. If further increases beyond 8 mgd are required, the plant capacity can be further expanded by conversion of the treatment process from aerated lagoons. (*Kaloko Town Center Final EIS*, September 1996).

In regard to the County of Hawaii Department of Public Work's plan to proceed with its Kealakehe Wastewater Treatment Plant water reuse plan, the County recognizes that the treatment and transmission system should be planned, designed, and installed with the intent of providing for immediate reuse, yet allow for expansion as influent flows increase (*Kealakehe Wastewater Treatment Plant Effluent Reuse Master Plan*, February 1999).

3.17.3 Drainage System – Cumulative Impacts and Mitigation Measures: Drainage system improvements will be developed for the respective proposed projects in the nearby region. For the Kaloko Industrial Park, Phases III and IV, and Kaloko-Honokohau Business Park projects, appropriate Best Management Practices would be implemented by the respective businesses to mitigate the impacts of storm water runoff discharging pollutants into the ground-water system. To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, separate pollution prevention plans as described under Impacts and Mitigation Measures above will be prepared for use by the individual lot owners and tenants/operators of the two developments.

3.17.4 Roadway System and Traffic – The cumulative impacts of the proposed project and the adjacent Kaloko-Honokohau Business Park, along with other developments and general projected growth in the region, have been accounted for in the traffic impact assessment prepared for the subject project. A discussion of the cumulative

impacts is included in **Section 3.17.4 Roadway System and Traffic** – Long-Term Impacts and Mitigation Measures in the Draft EIS.

3.17.5 Electrical and Communications Systems – Cumulative Impacts and Mitigation Measures: Electrical, telephone and cable services are provided by privately-owned utility companies who plan for and provide services as the demand arises. As demand increases with development in the region, the respective utility companies would develop facilities to meet that demand. Specific requirements for associated electrical, telephone and cable services for the proposed projects in the nearby region would be respectively determined in consultation with the respective utility companies.

4. A map depicting the flora and archaeological resources of the subject Petition Area and the adjacent Kaloko-Honokohau Business Park site will be included as **Figure 3-4 in Section 3.10.1 Flora** of the Final EIS. A copy of the map is attached hereto.

5. Your prior comment that "[A]ny consideration to urbanize an area strategically located halfway between the Kona International Airport at Keahole and Kailua-Kona along Queen Kaahumanu Highway should start with an examination of Nimitz Highway by the Honolulu Airport" was responded to in our letter of August 7, 2000. We reiterate our response herein and include discussion in response to your concern regarding the visual impact relative to that which has occurred along Nimitz Highway.

   Urbanization of the area between the Kona International Airport at Keahole and Kailua-Kona is consistent with the designation of new urban concentrations and urban growth areas as shown on State and County of Hawaii land use plans. The 1992 State Office of Planning's *Five-Year Boundary Review* recommends that the region extending from Keahole to Kailua, which includes the Petition Area, be reclassified to the Urban District. This recommendation is made within the context of other existing State and County land use policies for the region as a whole. The State Office of Planning's *West Hawaii Regional Plan* directs future urbanization to the Kailua-Kona to Keahole Subregional Planning Area. The County of Hawaii's current and proposed revised *General Plan Land Use Pattern Allocation Guide* (LUPAG) *Map* and *Keahole to Kailua Development Plan* designate the Petition Area as Industrial, and for Limited Industrial and Urban Expansion, respectively.

The provisions for protection or preservation of scenic view planes and resources are established in various State and County of Hawaii plans, policies and controls, including the Hawaii State Plan (Chapter 226, HRS), Hawaii Coastal Zone Management (CZM) Program (Chapter 205A, HRS, as amended), County of Hawaii General Plan, and the County's Keahole to Kailua Development Plan. For example, in the County's current General Plan, one of the policies established for the *Industrial* land use element sets forth that "*The County shall attempt to improve the aesthetic quality of industrial sites and protect amenities of adjacent areas by requiring landscaping, open spaces, buffer zones, and design guidelines.*" A discussion of the conformance and consistency of the proposed project to the applicable State and County plans, policies and controls is included in **Chapter 4. CONFORMANCE TO PLANS, POLICIES AND CONTROLS** in the Draft EIS.

The visual resources along Queen Kaahumanu Highway between the Kona International Airport at Keahole and Kailua-Kona are more specifically set forth in the County's *Keahole to Kailua Development Plan*. Acknowledging that urbanization will inevitably impact visual quality, the Development Plan recognizes that important views, vistas and visual resources must therefore be identified and preserved to the fullest extent possible. The Plan graphically depicts "highway views" and "views from points of interest" between Kona International Airport at Keahole and Kailua-Kona, which do not specifically include the Petition Area. A discussion of the mitigation measures to reduce the visual impacts of the proposed project, including landscaping and architectural design criteria, is included in Section **3.14 Visual Resources** – Impacts and Mitigation Measures in the Draft EIS.

By comparison, the area adjacent to and makai of Nimitz Highway in the vicinity of the Honolulu International Airport is designated for Commercial-Industrial Emphasis Mixed-Use, with Industrial designation further makai, on the City and County of Honolulu's Primary Urban Center (PUC) Development Plan (DP) Land Use Map. The PUC DP's Special Provisions set forth principles and controls for Special Areas, including the Nimitz/Ala Moana Corridor. The Special Provisions recognize that "*[T]he corridor deserves special consideration because of its function as the major ingress and egress route of visitors and as a major thoroughfare for residents.*" It further specifies the following control for the area: "*(B) Appropriate measures to enhance the attractiveness of this corridor and the public and private*

responsibilities to implement and maintain such improvements shall be adopted." (emphasis added).

6. Please refer to our response no. 2 – Ground-Water Quality above regarding mitigation measures to protect water quality in and adjacent to the Kaloko-Honokohau National Historical Park.

7. With regard to the possibility of incorporating photovoltaic cells within the proposed project, we incorporate by reference our earlier response provided in our letter of August 7, 2000. We reiterate the infeasibility of incorporating a photovoltaic system for the proposed project as such a system is more appropriate for locations where accessing electrical power is either not feasible or more expensive, such as in remote areas. Also, the amount of photovoltaic cells which would be necessary to generate the required power demand for the intended uses would place excess loads on the development's structures, which most likely would be of modular construction typical of light industrial structures. Furthermore, the size of the cells and the angle of tilt required on the building rooftops may contribute to visual concerns. Alternatively, installation of photovoltaic cells on the ground would also not be feasible as it would require a sizeable amount of land area.

Sierra Club, Hawaii Chapter Letter of July 20, 2000:

1. It is acknowledged that your comments are based, in part, on the physical appearance of the existing Kaloko Industrial Park.

2. Please refer to our response no. 3 to your letter of October 6, 2000 for discussion of the cumulative impacts of the proposed project and adjacent Kaloko-Honokohau Business Park.

3. Please refer to our response no. 5 to your letter of October 6, 2000 regarding discussion of the long-term visual impact relative to that which has occurred along Nimitz Highway in Honolulu.

4. Although it appears that your comments concerning view planes are directed at the Land Use Commission, it may be more appropriate that they be addressed under the County's jurisdiction.

The following are in response to the conditions as recommended by the Sierra Club and Sierra Club Moku Loa Group in regard to the State Land Use District Boundary Amendment Petition for the subject project:

1) At its closest point, the project site is located approximately 1,800 feet mauka of Queen Kaahumanu Highway, thus lies beyond the suggested 300-foot buffer.

2) A zone change will be requested from the County of Hawaii Planning Department to rezone the project site from Open District to ML, Limited Industrial District (approximately 66 acres) and MCX, Industrial-Commercial Mixed District (approximately 36 acres). The height limit in both of these zoning districts is 45 feet as established in the Hawaii County Zoning Code (Chapter 25 of the Hawaii County Code).

   The required wall heights within the proposed development will be largely determined by topographic conditions of the individual lots; however, as deemed appropriate, wall heights from an aesthetic standpoint will also be considered.

3) Architectural design criteria to reduce visual impacts of the proposed structures would include consideration of building profiles and design, exterior color and surface treatment such as use of non-reflective building materials and colors to blend with the surrounding environment, and exterior lighting and sign standards.

4) Landscaping will be implemented within the proposed development, as deemed appropriate, to minimize or screen the visual impact of the project. The landowners and/or tenants of the individual lots will be required to provide and maintain on-site landscaping to further enhance the visual environment in accordance with landscaping criteria developed for the project. Appropriate plant material and variety will be established for the proposed development. Toward promoting the use of native plants, the following will be added to **Section 3.10.1 Flora – Impacts and Mitigation Measures** in the Final EIS:

> "The individual landowners/tenants of the proposed development will be encouraged to use native plants in the landscaping of their respective lots."

5) During the archaeological inventory survey conducted of the Petition Area for the subject EIS, 40 sites were identified which yielded information important for understanding late prehistoric and historic land use. The feature types include modified outcrops, terraces, caves, mounds, pahoehoe excavations, cairns, walls, trails, enclosures, concentrations of marine shell, a cupboard, and a series of grinding slicks. Five additional lava tube caves were also identified within the Petition Area, but upon examination, were determined to contain no cultural remains.

   All of the sites identified within the Petition Area were evaluated for significance in accordance with criteria established pursuant to Chapter 275-6 (d), State Department of Land and Natural Resources (DLNR), Rules Governing Procedures for Historic Preservation Review. According to these rules, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of five established criteria.

   Based on the criteria, all of the sites identified within the Petition Area are assessed as solely significant under Criterion "d": "*Have yielded, or is likely to yield, information important for research on prehistory or history.*" These sites have yielded information important for understanding late prehistoric to historic land use in the Petition Area. The mapping, written descriptions, photography, and test excavation at 32 of the 40 sites adequately documents them and no further work or preservation is recommended.

   The remaining eight sites retain the potential to yield information important for understanding prehistoric and historic land use. If these sites are not preserved, then limited data recovery is recommended. Data recovery at these sites would entail surface collection and excavation where deposits are present. The data recovery work would be guided by a Data Recovery Plan prepared for review and approval by the State DLNR Historic Preservation Division

6) According to the botanical survey prepared for the subject EIS, the Petition Area is predominantly vegetated with koa haole and fountain grass scrub vegetation. Most of the native vegetation within the Petition Area is located within the sparsely vegetated aa lava flow within the southern portion of the site, with most of the plants occurring along the margins of the flow where it abuts the older pahoehoe flow.

The lowland native dryland forest with four listed endangered species occurs further upslope (mauka) of the Petition Area. A 30-foot wide buffer zone will be established in the immediate vicinity of the *Bidens #1* plant along the Petition Area's eastern boundary.

Toward promoting the use of native plants, the following will be added to **Section 3.10.1 Flora** – Impacts and Mitigation Measures in the Final EIS:

> "The individual landowners/tenants of the proposed development will be encouraged to use native plants in the landscaping of their respective lots."

Please refer to our response no. 3 to your letter of October 6, 2000 for a discussion of the cumulative impacts of the cultural and biological resources resulting from the proposed project and adjacent Kaloko-Honokohau Business Park.

7) Your concern over the potential for pollutants contaminating water resources and the measures which may be undertaken by the proposed development to protect these resources is acknowledged. To further assist in controlling the potential transport of pollutants which could adversely impact the ground-water system, a pollution prevention plan will be prepared for use by the individual lot owners and tenants/operators of the proposed development. Please refer to our response no. 2 – Ground-Water Quality to your letter of October 6, 2000 for further discussion.

The proposed drainage system improvements will include asphaltic roadside swales, drain inlets and dry wells within the

project's roadways. The use of underground injection wells for the project is not proposed.

The drainage system improvements and Best Management Practices to be implemented in the proposed development will be in accordance with the applicable Federal, State and local rules and regulations.

5. Please refer to our response no. 7 to your letter of October 6, 2000 regarding photovoltaic cells.

National Park Service – Kaloko-Honokohau National Historical Park Letter of August 7, 2000:

1. Please refer to our response no. 2 – Ground-Water Quality to your letter of October 6, 2000 regarding mitigation measures to protect water quality in and adjacent to the Kaloko-Honokohau National Historical Park. The proposed wastewater and drainage system improvements for the project are addressed in **Section 3.17.2 Wastewater System** and **Section 3.17.3 Drainage System** in the Final EIS.

   We note that in the referenced 1999 study entitled *Ground Water Resources in Kaloko-Honokohau National Historical Park* (U.S.G.S. Report 99-4070), testing for 151 trace metals and organic contaminates detected chromium, copper, and one semi-volatile organic compound (phenol) in the three monitoring wells within the Park. Chromium and copper were also detected in a well up gradient of the commercial area mauka of the Park. As a result, phenol was the only compound that could be assumed to be delivered to ground water from human activities at the existing commercial developments.

   Regarding future monitoring and remediation, we believe that preventive measures to be addressed through a pollution prevention plan and recommended Best Management Practices would be far more effective for the protection of ground-water quality. Remediation following monitoring would be very difficult in terms of identifying the pollutant source.

2. As indicated in the Draft EIS, the assessment of impacts on the marine and pond environments in the vicinity of the Petition Area, including the Kaloko-Honokohau National Historical Park, concludes that the

potential for impact to the marine and pond communities as a result of the proposed development would be minimal. Thick sediment lining the floors of the Kaloko and Aimakapa Ponds within the National Historical Park effectively plugs the ponds from the free exchange of ground water. As a result, the major flow of ground water appears to be around the ponds rather than through them. Also, the anchialine ponds in the National Historical Park have good flows and the nutrient levels are relatively high. As such, increased nutrients will likely not have any effect on the ponds. The assessment also concludes that it is unlikely that there would be any effect to the nearshore marine environment as a result of the increase in nutrient concentrations in ground water.

The cultural impact assessment conducted for the EIS also includes an assessment of the potential impacts of the proposed project on the water quality in the ponds at the National Historical Park.

3. The assessment of ground-water resources and impacts conducted for the EIS includes an assessment of the impact of ground water withdrawals for potable use, as well as the resulting potential reduction of recharge for the basal lens in the coastal area, as a result of the proposed project and other developments in the area. Within the northern half of the National Historical Park, the ground-water flow rate would be increased in the range of 7 to 10 percent as a result of the proposed project. Such a change is within the seasonal and year-to-year variability of ground water and is unlikely to result in observable changes in the water level in the anchialine pools or Kaloko Pond. Salinity of the ground water in this same area would be decreased by 6 to 8 percent. Cumulatively with other developments in the area, there would be a 7 percent decrease in ground-water flow rate, with a 10 percent increase in salinity. Both changes are within the range of the natural variability of ground water.

4. The traffic impact assessment conducted for the EIS includes an analysis of the potential traffic impacts within the project vicinity resulting from the proposed development, including Queen Kaahumanu Highway, and identifies mitigation measures.

5. Please refer to our response no. 2 – Scenic Views to your letter of October 6, 2000 regarding discussion of the visual impacts of the proposed project and mitigation measures to reduce such impacts. We have apprised the developer of the National Park Service's offer as a resource in selecting appropriate plants for the project.

6. **Section 3.17 Infrastructure and Utilities** in the EIS includes discussion of the infrastructure improvements required for the proposed development, and mitigation measures for averting or minimizing potential adverse effects, as appropriate.

   The National Park Service has been a consulted party throughout the EIS process for the subject project.

We appreciate your time and effort in reviewing the Draft EIS.

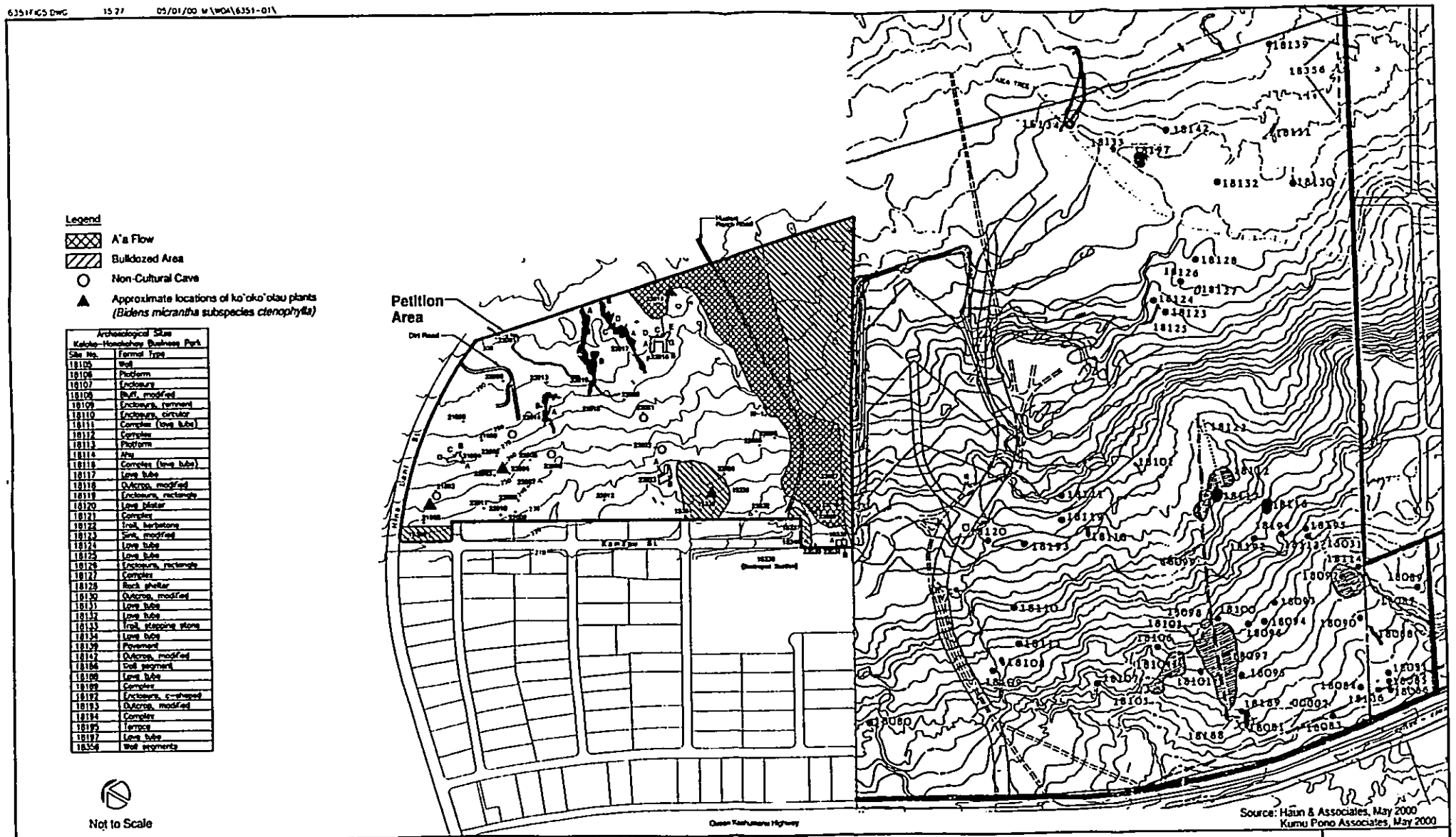
Sincerely,

Rodney Funakoshi, Project Manager

Attachment

cc: Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Ms. Esther Ueda, State Land Use Commission

DOCUMENT CAPTURED AS RECEIVED



KALOKO LIGHT INDUSTRIAL SUBDIVISION PHASES III & IV

Flora & Archaeological Resources of
Petition Area & Kaloko - Honokohau Business Park

FIGURE
3-4

WILSON OKAMOTO & ASSOCIATES, INC.

Appendix A

Assessment of Ground-Water Resources

Tom Nance Water Resource Engineering

Potential Impact on Water Resources of Phases III and IV of the Kaloko Industrial Park in North Kona, Hawaii

Prepared for:

Marine Research Consultants
4467 Sierra Drive
Honolulu, Hawaii 96816

Prepared by:

Tom Nance Water Resource Engineering
680 Ala Moana Boulevard - Suite 406
Honolulu, Hawaii 96813

July 2000

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Introduction

This report presents the basis and results of an assessment of the potential impact on water resources of Phases III and IV of the Kaloko Industrial Park in North Kona, Hawaii. The project site consists of approximately 102 acres adjacent to and directly upgradient of Phases I and II of the Park (refer to Figure 1). The northern half of the Kaloko-Honokohau National Historical Park is located directly across Queen Kaahumanu Highway.

Data on which this assessment is primarily based were collected in May-June 2000 and during previous assessments for other projects in 1994 and 1996. An adjacent project, the proposed Kaloko-Honokohau Business Park, is currently seeking approval from the State Land Use Commission. Although separate reports assessing impacts on water resources for both of these projects have been prepared by Tom Nance Water Resource Engineering (TNWRE), all of the field data and most of the analytical methods are essentially the same for both assessments. The report format and description of existing conditions are also identical.

Description of the Project

Phases I and II of the Kaloko Industrial Park consist of 92 lots on 130 acres. Its development began in 1981 and was recently completed. Tenants include light manufacturing, offices, warehouses, and Costco. Phases III and IV would add 82 lots on 102 acres, with uses anticipated to be similar to the first two phases. Of the site's 102 acres, 66 acres would be designated for light industrial use and 36 acres would be for mixed industrial and commercial use.

For the analysis of the project's potential impact on water resources, the following aspects of the development need to be assessed: (i) the use of groundwater for potable supply; (ii) the manner and location of wastewater disposal; (iii) the manner of stormwater disposal; and (iv) the potential for excess irrigation and wash water reaching the underlying groundwater. Each of these is briefly discussed below.

Potable Water Supply. Potable water supply would be provided from the Department of Water Supply's (DWS) North Kona system. Based on actual average water consumption of 1500 GPD per acre in Phases I and II of Kaloko Industrial Park, water use for Phases III and IV is anticipated to be 0.153 million gallons per day (MGD). Although the specific DWS wells that would provide this supply have not been identified, they will undoubtedly be one or more of the recently developed high level wells located above Mamalahoa Highway and inland from the project site. Since leakage from this high level aquifer is an important source of recharge for the basal lens in the coastal area, the potential reduction of this source of recharge must be addressed.

Wastewater Disposal. At present, all wastewater from the commercial and industrial development in the Kaloko-Honokohau area and from the residential development in the mauka areas is disposed of in cesspools or other individual wastewater disposal systems. All of this percolating wastewater ultimately reaches the underlying groundwater, providing a significant source of local recharge with higher nutrient levels than the receiving water body.

Because sewer service is not yet available, wastewater for Phases III and IV will be disposed of onsite in individual systems acceptable to the Department of Health. This may include a few individual treatment systems, but septic tanks and leach fields are likely to be the most common means

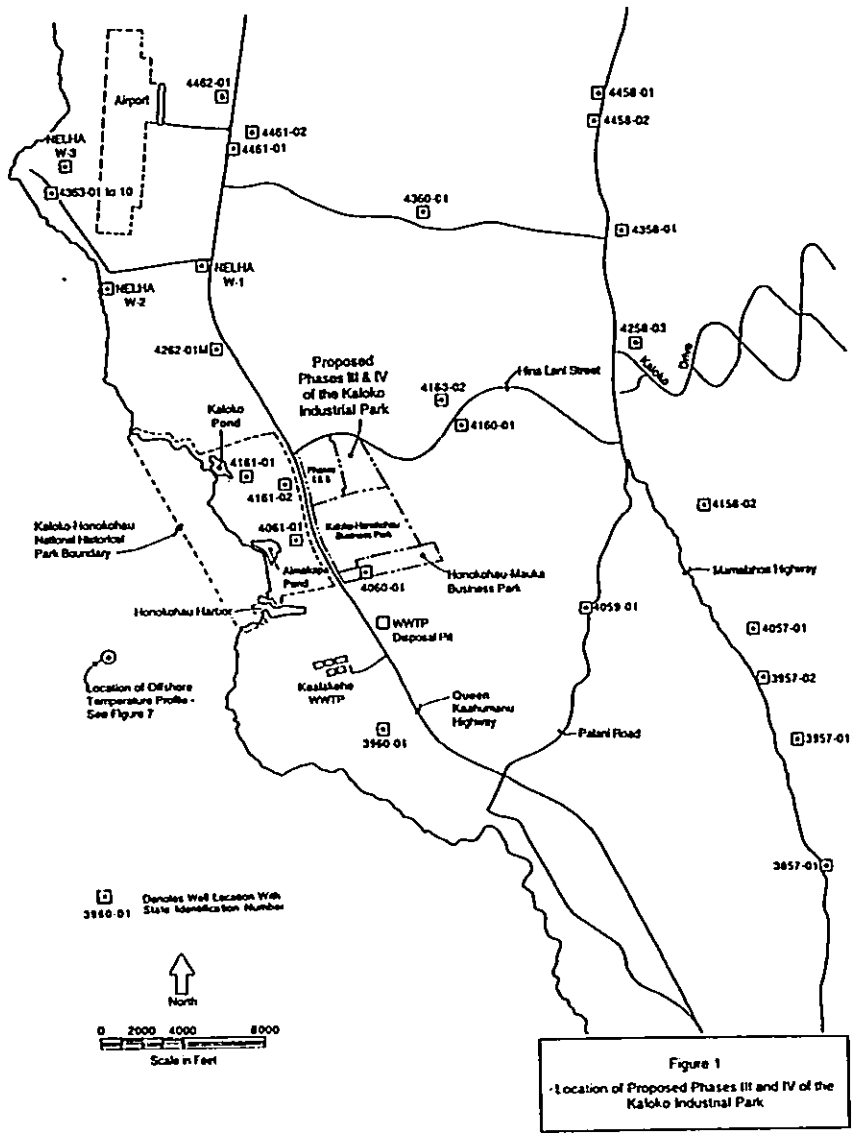


Figure 1
Location of Proposed Phases III and IV of the Kaloko Industrial Park

of wastewater disposal. The impact of this nutrient-rich wastewater mixing with basal groundwater flowing beneath the site needs to be assessed.

Surface Water Drainage. Stormwater disposal will occur entirely onsite in disposal wells and seepage pits. This will include some disposal systems within the lots as well as the system that will be installed within the project's roadways. Essentially all surface runoff would percolate to the underlying groundwater with potential water quality consequences which need to be assessed.

Irrigation and Wash Water. On the order of 10 to 20 percent of water used for landscape irrigation and other miscellaneous uses will percolate to the underlying groundwater as a source of local recharge with possible water quality impacts.

Description of Water Resources Between Kailua Town and Keahole Point

General Overview. Due to high permeabilities of the natural ground surface across the project site and on the upslope lands, surface runoff does not occur during even the most intense rainfalls. No natural gulches or waterways for surface runoff have been created. Queen Kaahumanu Highway in this general area has two culverts, a pipe arch at the north end of Phase I of the Kaloko Industrial Park and twin pipes just beyond the south end of the Industrial Park. However, it does not appear that either of these has ever conveyed more than a minimal amount of localized roadside runoff. This being the case, the discussion of the area's water resources and the project's potential impact on these resources focuses exclusively on groundwater.

Knowledge of groundwater conditions comes primarily from the wells shown on Figure 1 and listed in Table 1. These depict two distinctly different modes of groundwater occurrence. From the shoreline inland to Mamalahoa Highway, groundwater occurs in a thin and brackish basal lens in hydraulic contact with saltwater at depth and seawater at the shoreline. Somewhere in a generally linear alignment approximately coincident with Mamalahoa Highway, there is an abrupt transition from basal to high level groundwater of exceptionally low salinity. High level groundwater is a relatively recent (1990) discovery in North Kona. The geologic feature which causes groundwater to be impounded to high levels behind it is not yet known. In addition to it creating a substantial reservoir of potable quality water, this feature also controls the location and manner of groundwater movement into the basal lens downgradient. While the hydraulic relationship between the two groundwater bodies is not yet understood, it is undoubtedly the reason for the anomalous characteristics of basal groundwater in the area.

Attributes of Basal Groundwater in the Kaloko-Honokohau Area. Salinity, temperature, water level, and water quality data from basal wells in the area all indicate that the flow rate is low compared to areas to the north and south, that saltwater circulation at depth exerts considerable influence on temperature, that formation permeabilities are exceptionally high, and that development in the area has impacted groundwater quality. Each of these aspects is discussed more fully below.

- The basal lens between the Old Kona Airport and Keahole Point is relatively saline, preventing it from being a significant source of irrigation supply. Immediately downgradient of the project site, salinities in the three monitor wells within the National Park (Nos. 4061-01, 4161-01, and 4161-02 on Figure 1) are in the range of 5.3 to 9.4 parts per thousand (PPT), equivalent to chlorides in the range of 2500 to 5000 milligrams per liter (MG/L). Basal wells further inland have chlorides of 950 MG/L (Wells 4160-01 and 02) to 3475 MG/L (Well 4059-01). At the

Table 1

Available Data on Wells in the Kaloko-Honokohau Area

Well		Owner or Developer	Year Drilled	Ground Elevation (Feet MSL)	Groundwater Level		Chloride Value (MG/L)	Concentration Date Sampled	Water Temperature (° F)	Present Use
State No.	Name				(Ft. MSL)	Date Measured				
Basal Wells of Brackish Salinity										
3960-01	--	Queen Liliuokalani Trust	1982	40			3,400	1982	67.5	Irrigation
4058-01	Pajani	DWS	1958	800	1.72	1958	3,475	1958	66.7	None
4060-01	Quarry			120			2,214	Nov. 1985	66.6	Monitoring
4061-01	Kaloko-1	National Park Service	1986	38	1.20	May 2000	940	7-16-85	64.3	None
4160-01	Kaloko Irr. 1	TSA International	1985	566	2.59	3-31-93	955	11-25-86	64.6	Monitoring
4160-02	Kaloko Irr. 2	TSA International	1985	543	2.45	4-26-95			67.4	Monitoring
4161-01	Kaloko-3	National Park Service	1986	24	1.37	May 2000			66.6	Monitoring
4161-02	Kaloko-2	National Park Service	1986	57	2.37	May 2000	2,500	1993	66.0	Monitoring
4262-01M	Oma	Kahala Capital	1992	80	1.68	March 1998	740	9-27-88	69.2	None
4360-01	Kalaoa	DLNR-DOWALD	1988	863	2.54	4-26-95	16,000		65.0	Aquaculture
4363-01 to 10	--	Uwajima					2,500		71.6	Irrigation
4461-01	--	Alba Cooper	1990	185			5,000		69.5	Future Cooling Water Supply
4461-02	--	HELCO	1993	210			3,625	8-24-93		None
4462-02	W-1	State DOT-Airports	1993					11-28-93		Monitoring
--	W-2	NELHA	1988	105						Monitoring
--	W-3	NELHA	1988	8						Monitoring
Basal Wells of Potable Quality										
4458-01	Kau 1	Nansay	1991	21						None
4458-02	Kau 2	Nansay	1992	1799						None
Wells Tapping High Level Groundwater				1790			17	5-30-90	72.0	Pump stuck in well; to be Abandoned
3857-01	Waiaha	DWS	1993	1542	10.1	4-26-95	15	7-15-91	78.0 (?)	None
3957-01	Keopu Mauka	HASEKO	1993	1674	62	1993				Monitoring
3957-02	USGS-Keopu	USGS/DWS	1991	1600	47	1993	10	1-22-93	70.0	DWS Potable Use
4057-01	CLT-1	Queen Liliuokalani Trust	1994	1720	42.8	1-20-93				Monitoring
4158-02	Honokohau	DWS	1992	1676	189	1-19-94	6.6	5-26-00	69.4	DWS Potable Use
4258-03	Hualalai	DLNR-DOWALD	1993	1881	98.2	4-26-95	6.7	5-26-00	72.3	DWS Potable Use
4358-01	North Kaloko	DLNR-DOWALD	1991	1790	289.8	4-26-95	5.0	10-12-93		DWS Potable Use
					239	1991	6.6	6-26-00	73.8	

distances of 2.3 to 2.6 miles from the shoreline of these wells, their chloride levels are substantially higher than found in wells at similar inland distances elsewhere in North Kona and South Kohala.

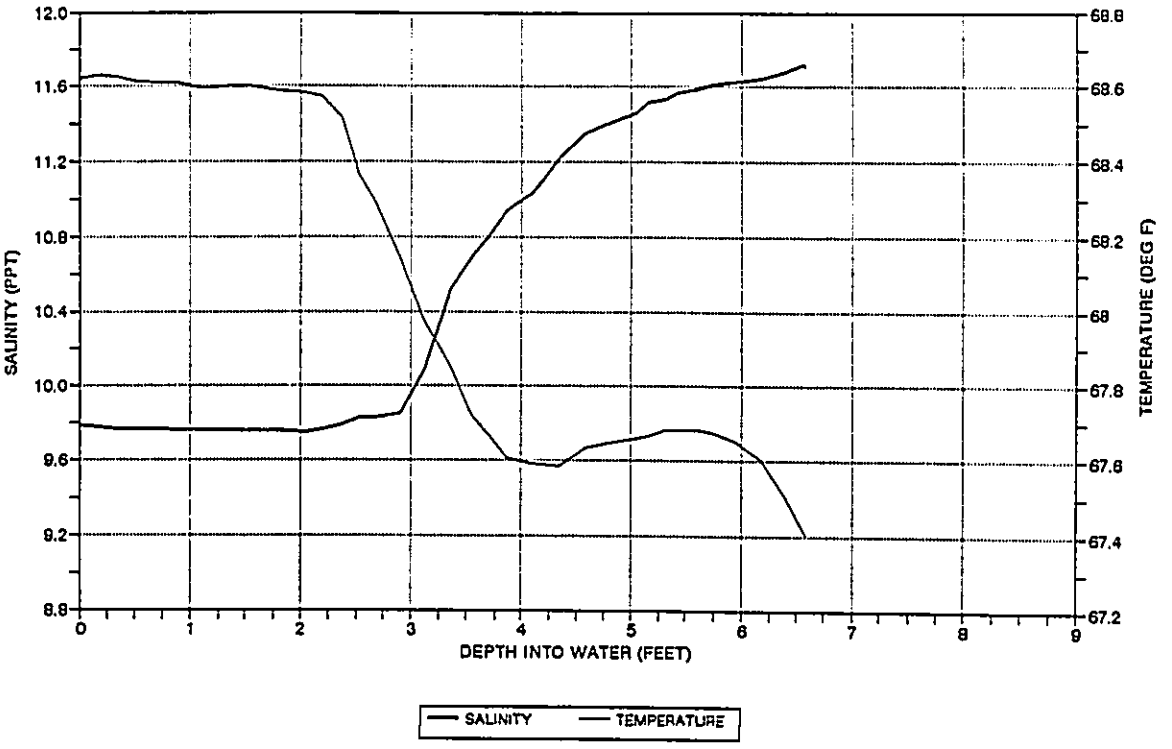
- The brackish basal lens is relatively thin and its transition zone is comparatively wide and gradual. This is illustrated by the profiles through the water column of Well 4262-01M on Figure 2. The thin lens and diffuse transition zone are indicative of a low flow rate and significant saltwater mixing.

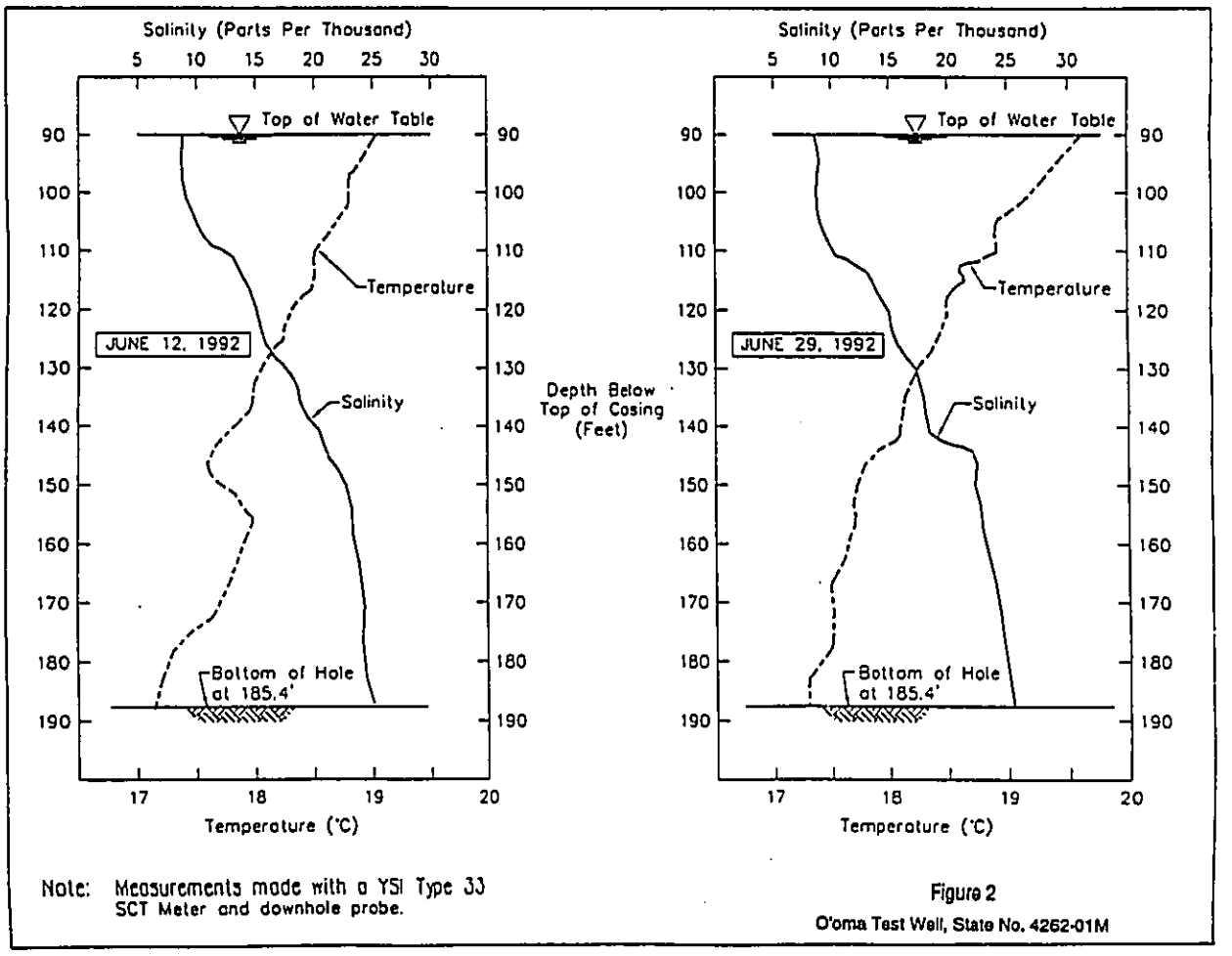
- Temperatures are anomalously cold and decrease progressively with depth into groundwater, a characteristic exhibited in all of the accessible basal wells (in addition to Figure 2, other examples are shown in Figures 3 to 6). Typical surface temperatures are 64° to 68° F. This is 6° to 10° colder than in the high level wells directly inland. This difference, along with the progressive decrease in temperature with depth, show that the source of the low temperature is the saline groundwater beneath the basal lens. However, equivalent ocean temperatures are found at a depth of more than 700 feet offshore (Figure 7). This means that cold seawater is drawn inland at depth and returns seaward at mid-depth, mixing with and cooling the basal groundwater enroute. Basal groundwater temperatures this low are unique along the West Hawaii coastline.

- Permeabilities of lavas in the nearshore area are very high, resulting in considerable tidal variation in wells at significant distances inland. Figure 8 illustrates recently collected water level recordings for the three wells in the National Park. Figure 9 illustrates previously recorded levels for other wells in the region. Tidal amplitudes and lags are summarized on Table 2. The magnitude of the tidal amplitudes at these inland distances is greater than most other areas along the West Hawaii coastline.

- Table 3 is a compilation of water quality data from basal wells as sampled for this assessment and for previous studies. The influence of man's activities on basal water quality is best demonstrated using a mixing line analysis. A conservative mixing line is created using two end points. At the inland end are the high level wells which are assumed to be upgradient of man's activities. At the other end point is ocean water at a sufficient distance offshore to be beyond man's influence. The quality of water from basal wells is plotted in comparison with a mixing line between these two end points. If concentrations of constituents are above the line, it indicates that an input of that constituent has occurred, a likely result of wastewater disposal, irrigation return flow, or other aspects of urban development or agricultural activity. Conversely, if constituent values plot below the line, uptake of that constituent by chemical or biologic processes is indicated. Figures 10A to 10E present such analyses for nitrate, total nitrogen, phosphate, total phosphorus, and silica in samples of basal groundwater from wells and at points of shoreline discharge. With several exceptions, the water samples plot above the conservative mixing lines for nitrogen and phosphorus, indicating that they are nutrient enriched. Silica should be a relatively conservative constituent, meaning that groundwater samples should plot closer to the conservative mixing line. Figure 10E shows that this is, again with a few anomalies, generally the case.

FIGURE 3. WELL 1 (NO. 4061-01) IN THE NATIONAL PARK ON MAY 19, 2000





Note: Measurements made with a YSI Type 33 SCT Meter and downhole probe.

Figure 2
O'oma Test Well, State No. 4262-01M

FIGURE 5. WELL 3 (NO. 4161-01) IN THE NATIONAL PARK ON MAY 19, 2000

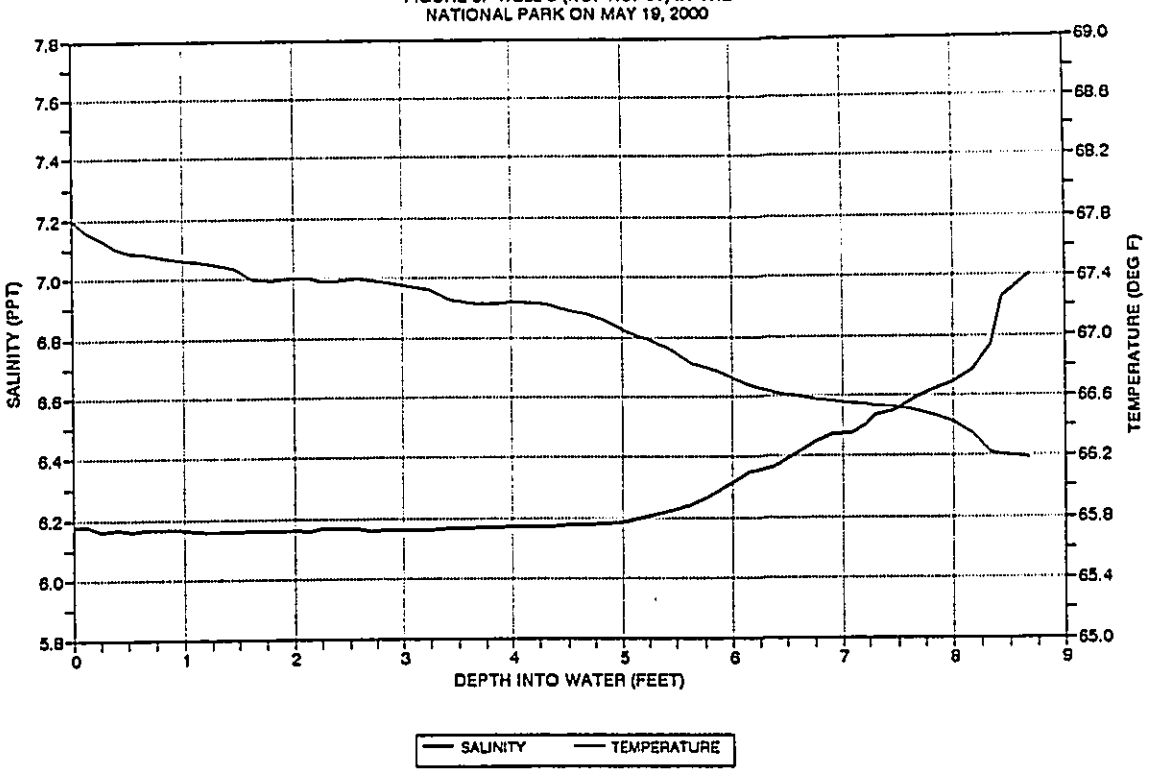
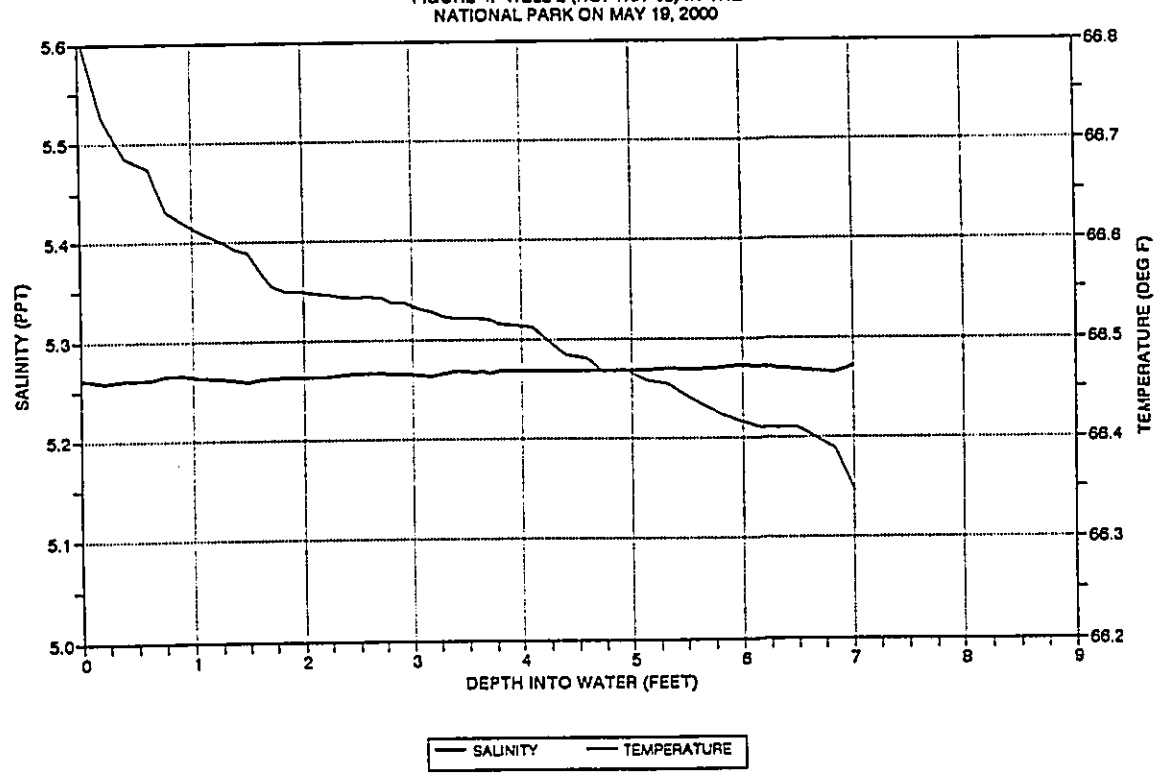
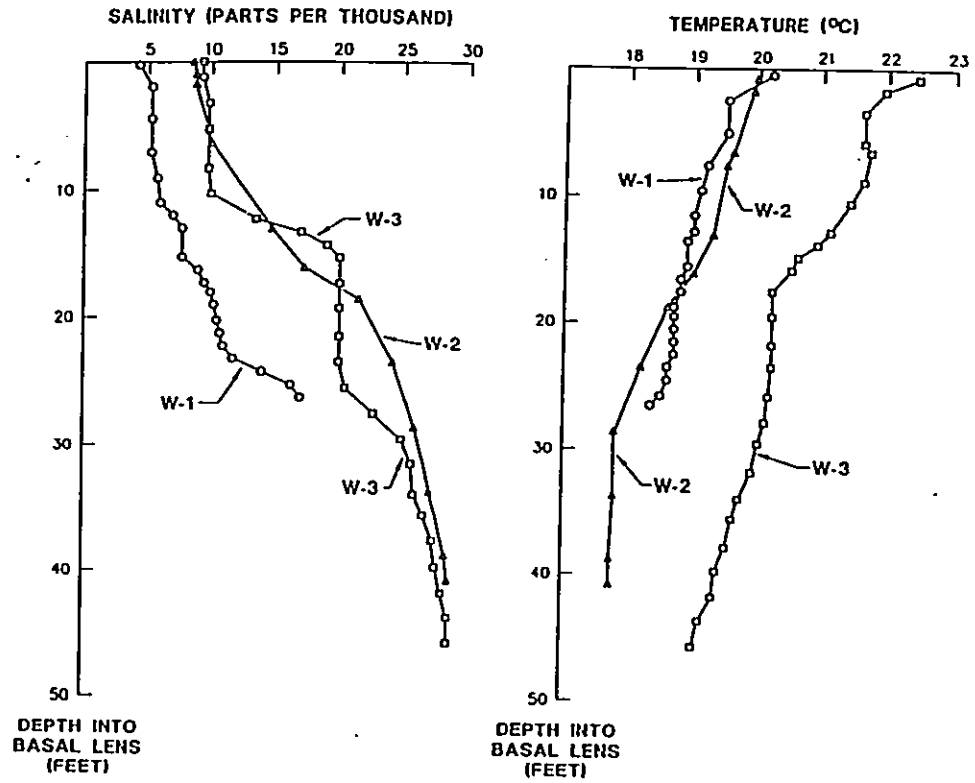


FIGURE 4. WELL 2 (NO. 4161-02) IN THE NATIONAL PARK ON MAY 19, 2000



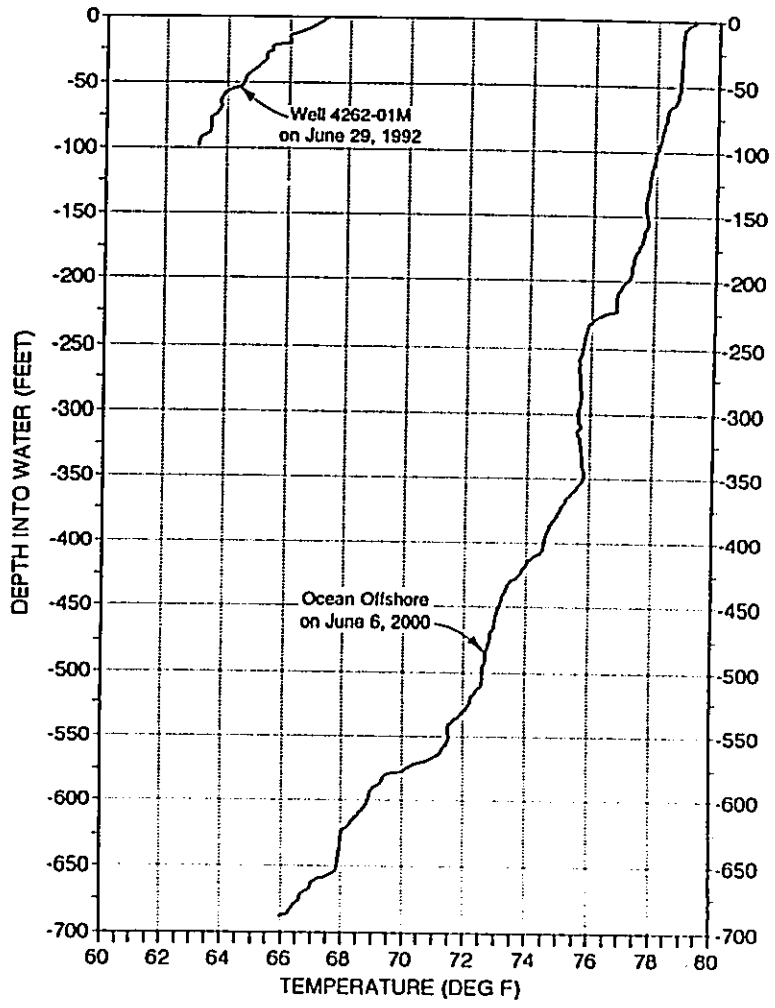


MEASUREMENTS WERE MADE ON JUNE 15 & 21, 1991 WITH A YSI MODEL 33 S-C-T METER AND DOWNHOLE PROBE.

Figure 6

Salinity and Temperature Profiles in the Selected NELHA Monitoring Wells

FIGURE 7. COMPARATIVE OCEAN AND GROUNDWATER TEMPERATURE PROFILES



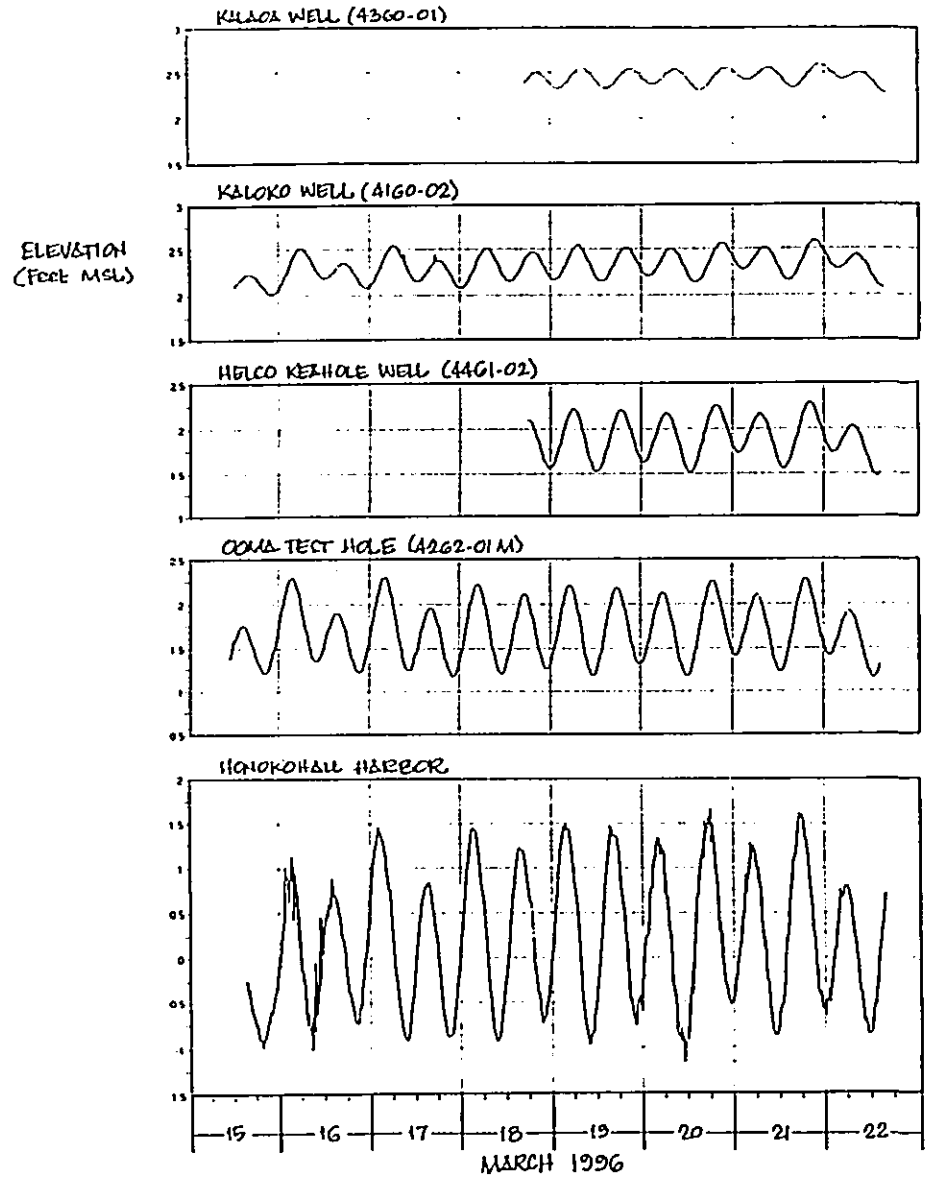


Figure 9

Recorded Water Levels in Wells Tapping the Basal Lens in the Kaloko Area

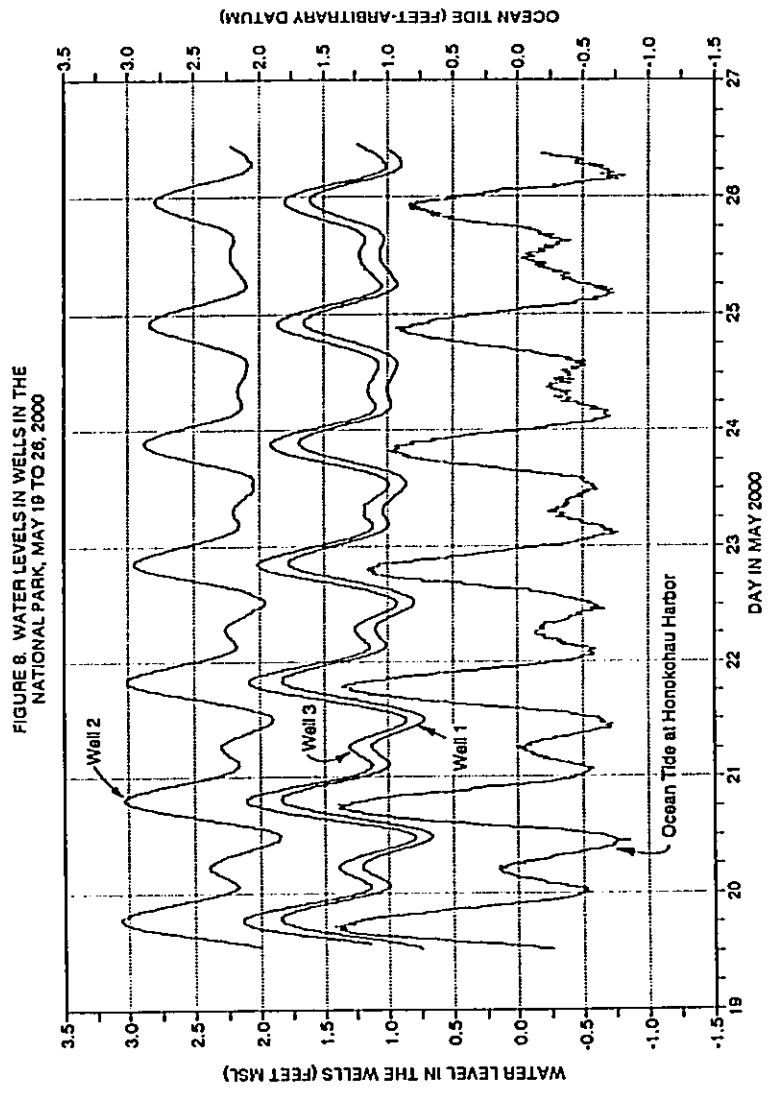


FIGURE 8. WATER LEVELS IN WELLS IN THE NATIONAL PARK, MAY 19 TO 26, 2000

Table 2

Tidal Amplitudes and Lags in Basal Aquifer Wells and Kaloko and Aimakapa Fishponds

Name	State No.	Measuring Point Elevation (Feet MSL)	Period of Recording	Average Water Level (Feet MSL)	Distance Inland (Feet)	Tidal Response	
						Amplitude (% of Ocean Tide)	Lag (Hours)
Kalo-3	4161-01	24.21	May 19-26, 2000	1.37	1,450	56	0.80
Kalo-1	4061-01	37.83	May 19-26, 2000	1.20	1,800	49	0.95
Kalo-2	4161-02	57.06	May 19-26, 2000	2.37	3,550	51	0.84
Ooma	4262-01M	90.50	Mar. 15-22, 1996	1.68	5,500	42	1.23
HELCO	4461-02	Not Available	Mar. 15-22, 1996	--	8,900	28	2.06
Kaloko Irr-2	4160-02	544.00	Mar. 15-22, 1996	2.34	11,600	16	3.25
Kalaoa	4360-01	680.80	Mar. 15-22, 1996	2.46	16,000	9	4.92
Aimakapa Fishpond		Not Available	May 19-26, 2000	--	150	31	3.40
Kaloko Fishpond		Not Available	May 19-26, 2000	--	Negligible	52	2.36

Notes:

1. Measuring point elevations for the three wells in the National Park provided by the U.S. Geological Survey.
2. Measuring point elevations for the other wells provided by Glenn Bauer of the Commission on Water Resource Management.
3. Tidal responses are based on comparison with the recorded water level in Honokohau Harbor.

Table 3

Representative Groundwater Quality From Wells and at Other Locations in the Kaloko-Honokohau Area

Sampling Site	Date Sampled	Salinity (PPT)	Silica (µM)	Forms of Nitrogen (µM)				Forms of Phosphorus (µM)		
				NO_3	NH_4	DON	Total N	PO_4	DOP	Total P
High Level Potable Quality Wells										
4057-01	5-26-00	0.109	801	86.0	0.0	14.7	100.7	3.76	0.08	3.84
4158-02	10-23-94	0.212	697	74.2	0.0	13.4	87.6	3.59	0.00	3.59
	5-26-00	0.144	844	80.1	0.0	14.5	94.6	3.64	0.20	3.84
4258-03	6-2-00	0.165	833	70.2	1.2	19.4	90.8	3.85	0.50	4.35
4358-01	3-22-96	0.256	856	75.2	0.1	3.6	78.9	3.50	0.08	3.58
	5-26-00	0.182	908	71.8	0.0	11.9	83.7	3.40	0.24	3.64
Basal Wells of Brackish Quality										
4061-01 : Top	5-26-00	9.464	334	55.0	0.3	24.8	80.2	1.84	0.20	2.04
: Top	6-10-00	9.463	304	56.2	3.5	32.1	91.8	1.44	2.96	4.40
: Bottom	5-26-00	12.298	490	21.3	1.3	65.9	88.5	1.92	4.44	6.36
: Bottom	6-10-00	10.655	477	54.4	1.4	38.2	94.0	2.64	3.36	6.00
4161-01 : Top	5-26-00	6.259	672	75.0	0.2	14.8	90.0	4.36	0.04	4.40
: Top	6-10-00	6.325	701	76.9	1.6	43.2	121.7	4.64	2.64	7.28
: Bottom	5-26-00	6.548	694	77.3	0.3	16.0	93.6	4.52	0.08	4.60
: Bottom	6-10-00	6.601	709	76.4	1.5	31.4	109.3	5.28	2.24	7.52
4161-02 : Top	5-26-00	5.399	653	87.2	0.5	22.8	110.4	4.08	0.56	4.64
: Top	6-10-00	5.361	691	104.3	5.1	42.2	151.6	9.04	2.88	11.92
: Bottom	5-26-00	5.522	671	89.0	0.2	17.7	106.9	4.32	0.24	4.56
: Bottom	6-10-00	5.883	696	89.7	0.6	32.5	122.8	5.20	2.32	7.52
4160-02	5-15-94	1.734	670	68.6	0.3	2.9	71.8	5.89	0.03	5.92
	3-22-96	1.773	671	78.1	0.3	8.2	86.6	4.42	0.70	5.12
4262-01M: Top	3-15-96	7.952	661	81.8	0.2	15.8	97.8	3.08	0.16	3.24
: Top	6-2-00	7.783	672	89.7	1.5	26.6	117.8	5.30	0.75	6.05
: Top	6-10-00	7.850	741	91.4	1.0	35.8	128.2	3.60	0.72	4.32
: Bottom	6-2-00	16.224	547	55.4	3.2	27.9	86.4	2.25	1.00	3.25
4461-02	3-15-96	4.946	752	79.4	0.3	12.3	92.0	3.84	0.04	3.88
Basal Wells of Saline Quality										
3960-01	10-23-94	25.543	318	28.1	0.3	4.9	33.3	1.49	0.02	1.15
	6-2-00	25.698	356	30.5	1.6	22.5	54.6	1.40	0.70	2.10
4363-04	6-2-00	26.695	291	65.6	0.9	21.6	88.1	3.80	0.50	4.30
	6-10-00	26.835	287	72.3	1.4	32.8	106.5	4.08	0.56	4.64
Groundwater Discharge at the Shoreline										
Honokohau Harbor	5-26-00	24.760	298	36.8	0.6	20.9	58.4	4.24	0.68	4.92
	6-3-00	20.987	373	39.7	0.0	4.2	43.9	2.30	0.07	2.37
Kaloko Fishpond	6-10-00	9.899	650	63.3	3.0	51.8	118.1	3.84	3.68	7.52
	6-10-00	8.566	665	64.0	1.3	38.4	103.7	3.76	3.44	7.20
South of Kaloko Pond	6-3-00	16.530	523	50.3	1.0	16.4	67.7	2.80	0.65	3.45
	6-10-00	14.254	601	57.0	1.8	25.8	84.6	3.20	2.64	5.84
South of Aimakapa Pond	6-10-00	17.373	472	49.6	2.7	32.6	85.0	2.48	2.96	5.44
	6-10-00	13.309	388	64.2	12.4	77.0	153.6	15.12	1.76	16.88
Kealakehe WWTP Effluent	5-26-00	1.701	643	271.0	7.6	139.7	418.2	101.92	3.24	105.16
	6-2-00	1.694	667	330.8	32.8	217.8	581.4	120.40	4.00	124.40
	6-10-00	1.680	771	296.5	10.1	134.8	441.4	116.88	6.24	123.12

Note: All samples collected by TNWRE (Tom Nance) and/or Marine Research Consultants (Steve Dollar) and analyzed by Marine Analytical Specialists (Ted Walsh).

FIGURE 10A. MIXING LINE ANALYSIS OF NITRATE IN GROUNDWATER

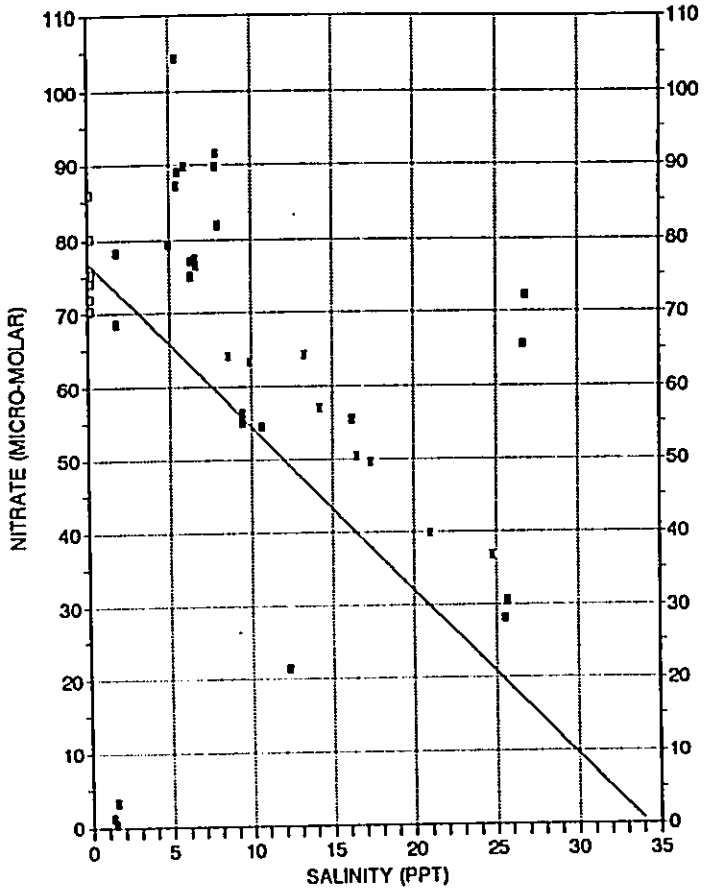


FIGURE 10B. MIXING LINE ANALYSIS OF TOTAL NITROGEN IN GROUNDWATER

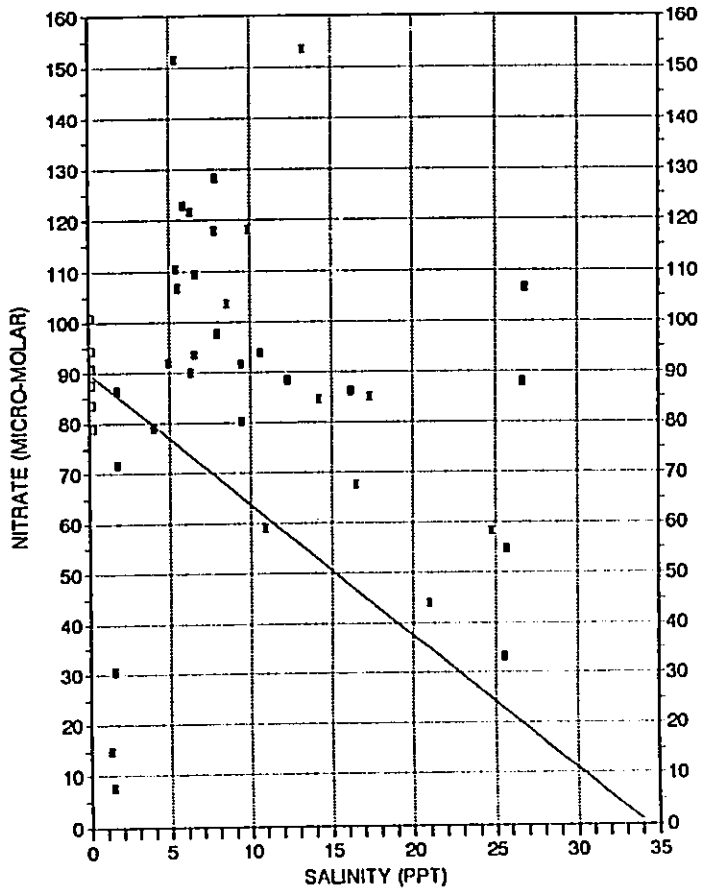


FIGURE 10C. MIXING LINE ANALYSIS OF PHOSPHATE IN GROUNDWATER

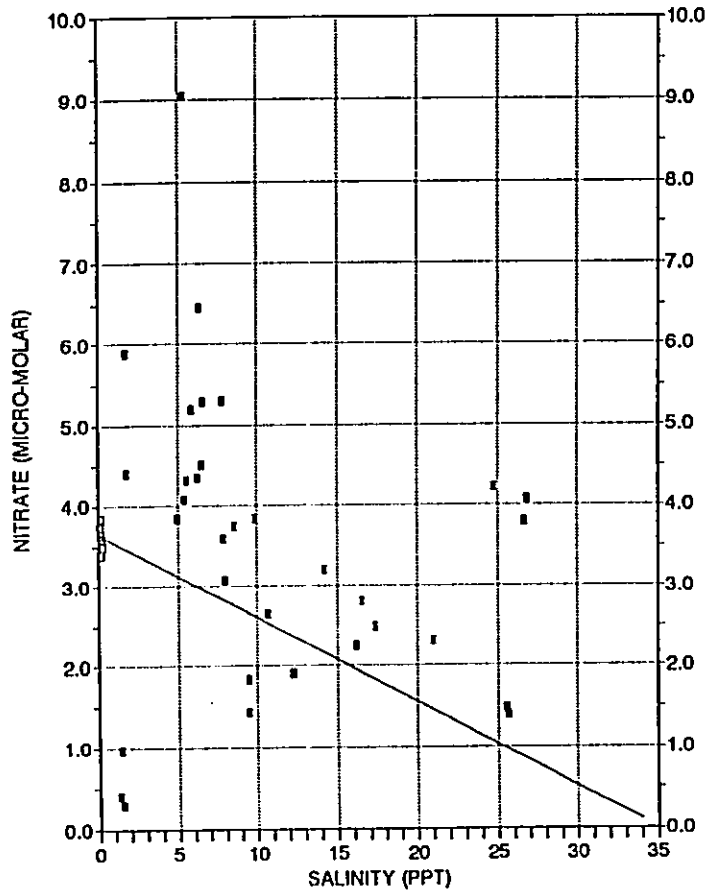


FIGURE 10D. MIXING LINE ANALYSIS OF TOTAL PHOSPHORUS IN GROUNDWATER

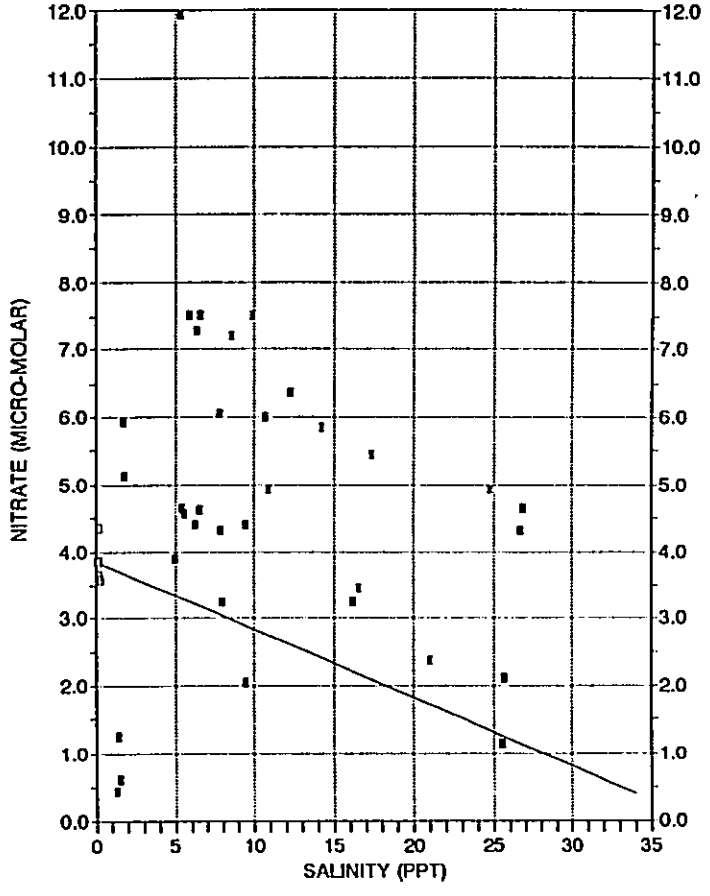
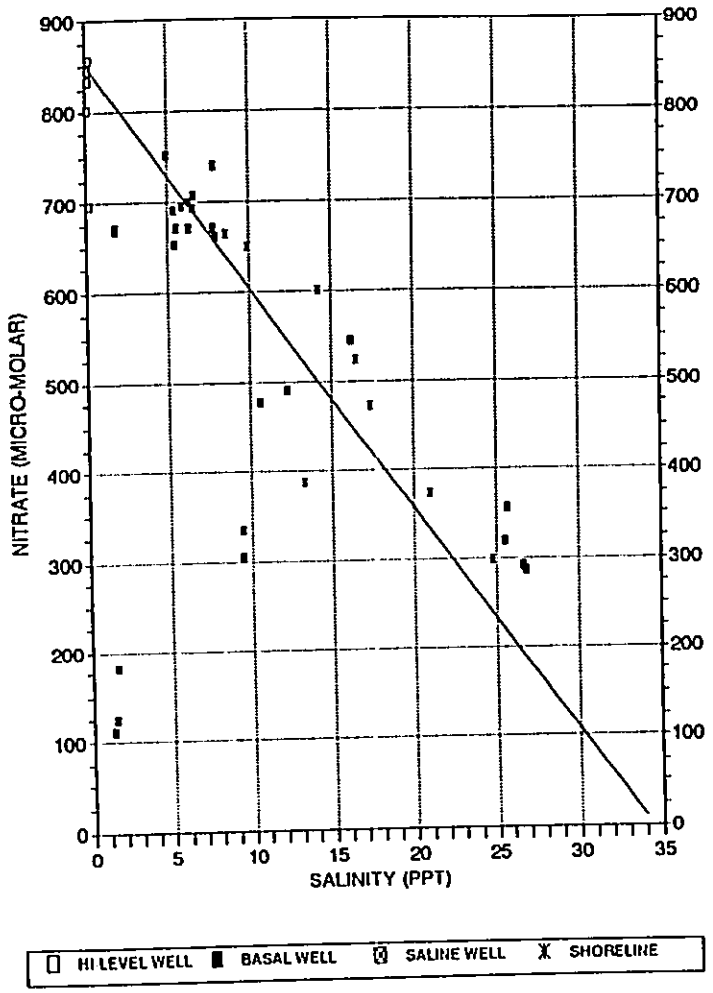


FIGURE 10E. MIXING LINE ANALYSIS OF SILICA IN GROUNDWATER



- In the nearshore area, there are numerous exposures of the basal lens in depressions of the lava known as anchialine ponds. Brock and Kam (1997) identifies and characterizes 82 of these within and just beyond the National Park. Depending on residence time in these ponds, groundwater chemistry can be similar to the basal wells (ie. nutrient enriched) or reflect uptake of nutrients by aquatic life. A more detailed discussion of this chemistry is presented in the marine assessment for this project by Marine Research Consultants.

- The largest of the anchialine pools are the Kaloko and Aimakapa Fishponds in the National Park. Because their outlets are plugged, their beach berms are poorly permeable, and their bottoms are covered by a silt blanket, circulation is relatively sluggish. Tidal responses in the fishponds are slower and of less amplitude than in wells further inland (Table 2 and Figure 11). Temperatures are significantly elevated compared to groundwater (79° to 82° F. versus 66° to 68° F in groundwater, a difference of 11° to 14° F.). Also, there is only minimal salinity and temperature stratification, even at low tide, as demonstrated by the series of vertical profiles through the water columns across both fishponds on Figures 12 and 13. In fact, there is greater groundwater-seawater stratification in Honokohau Harbor than in these fishponds, despite the harbor's open ocean connection (illustrated on Figure 14).

- Since 1993, most of the effluent from the Kealakeha WWTP has been disposed of in a pit on the mauka side of Queen Kaahumanu Highway (its location is shown on Figure 1). The rate of disposal at present is on the order of 1.0 million gallons per day (MGD). In the absence of unknown and unlikely geologic control, most of this percolating effluent ultimately enters Honokohau Harbor. Apparent changes to groundwater chemistry as a result of this disposal are used to assess the impacts of onsite wastewater disposal for Phases III and IV of the Kaloko Industrial Park.

Attributes of High Level Groundwater in the Kaloko Area. Since the discovery of high level groundwater inland of Keauhou Bay in 1990, 16 wells have been completed above Mamalahoa Highway in North and South Kona. All of these wells encountered groundwater standing between 40 and 1280 feet above sea level (Oki, 1999:29 provides a good summary of water level data). Seven of these high level wells are within the area depicted on Figure 1 and are generally upgradient of the project site. Four of the seven have been outfitted with permanent pumps and are connected to DWS' North Kona system. Their use to date has been limited by the transmission capacity of DWS' system along Mamalahoa Highway. However, when the mauka-makai transmission link is completed along Hina Lani Street, greater use of the high level wells will be possible. Attributes to high level groundwater inland of the project site, as demonstrated by these seven wells, are as follows:

- Water levels range from 40 to 292 feet above sea level, with no consistent pattern which might show a direction of high level flow to the north or to the south (refer to Table 1).

- Chloride levels are typically less than 10 MG/L, essentially the same as found in rainwater (also in Table 1).

- Compared to basal groundwater downgradient, temperatures are relatively warm, ranging from 69.4° to 73.8° F.

- Based on pump test results, permeabilities are less than found in the nearshore lavas but still sufficient to accommodate high capacity pumps of 350 to 1400 gallons per minute (GPM).

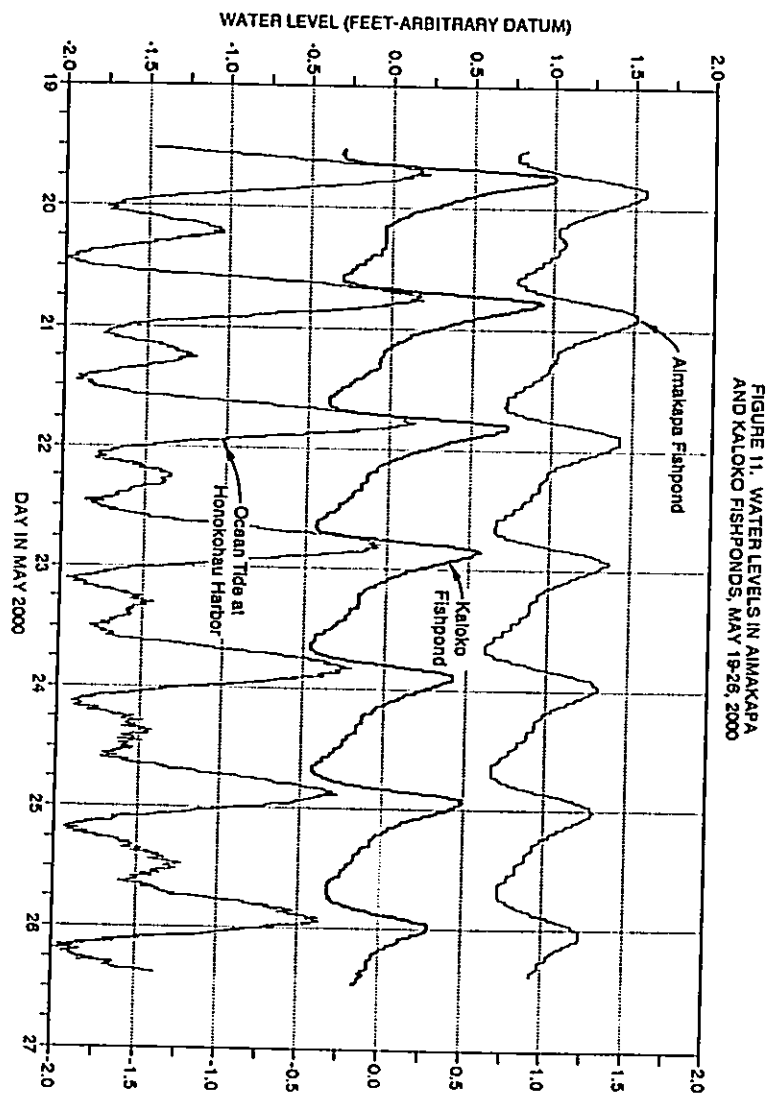


FIGURE 11. WATER LEVELS IN AIMAKAPA AND KALOKO FISHPONDS, MAY 19-26, 2000

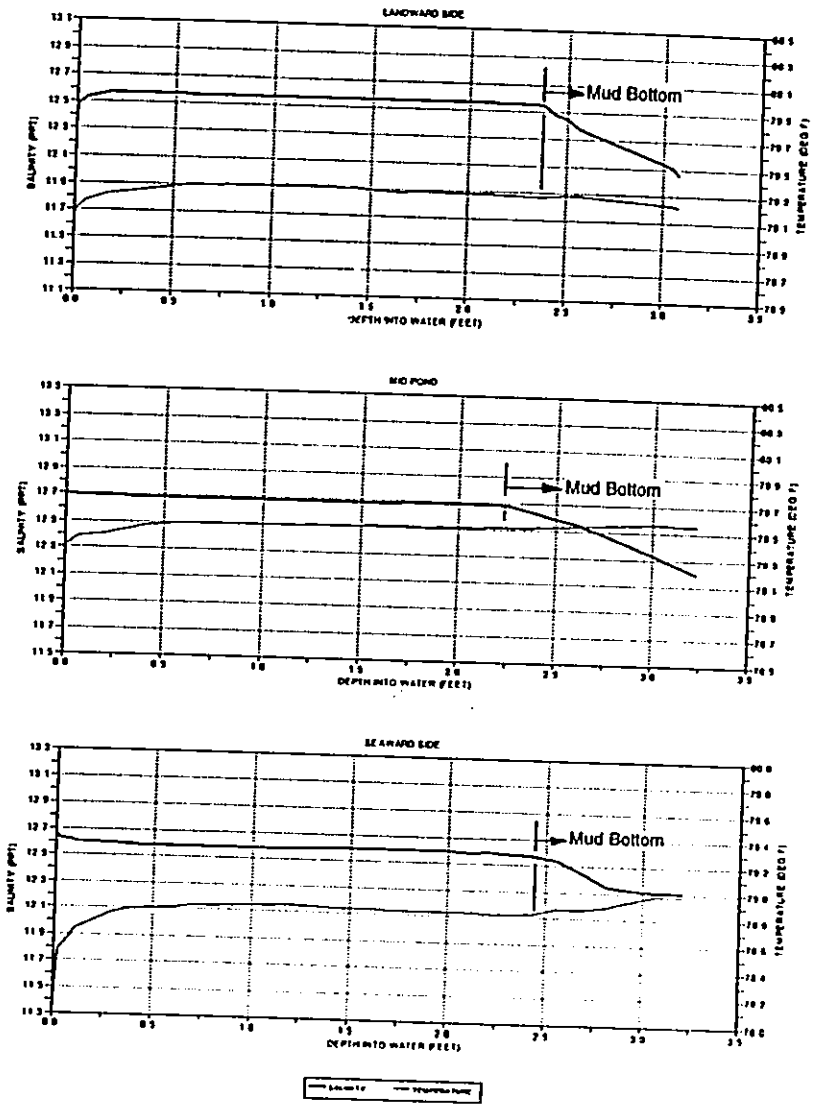


Figure 12

Salinity and Temperature Profiles Across Aimakapa Fishpond - May 19, 2000

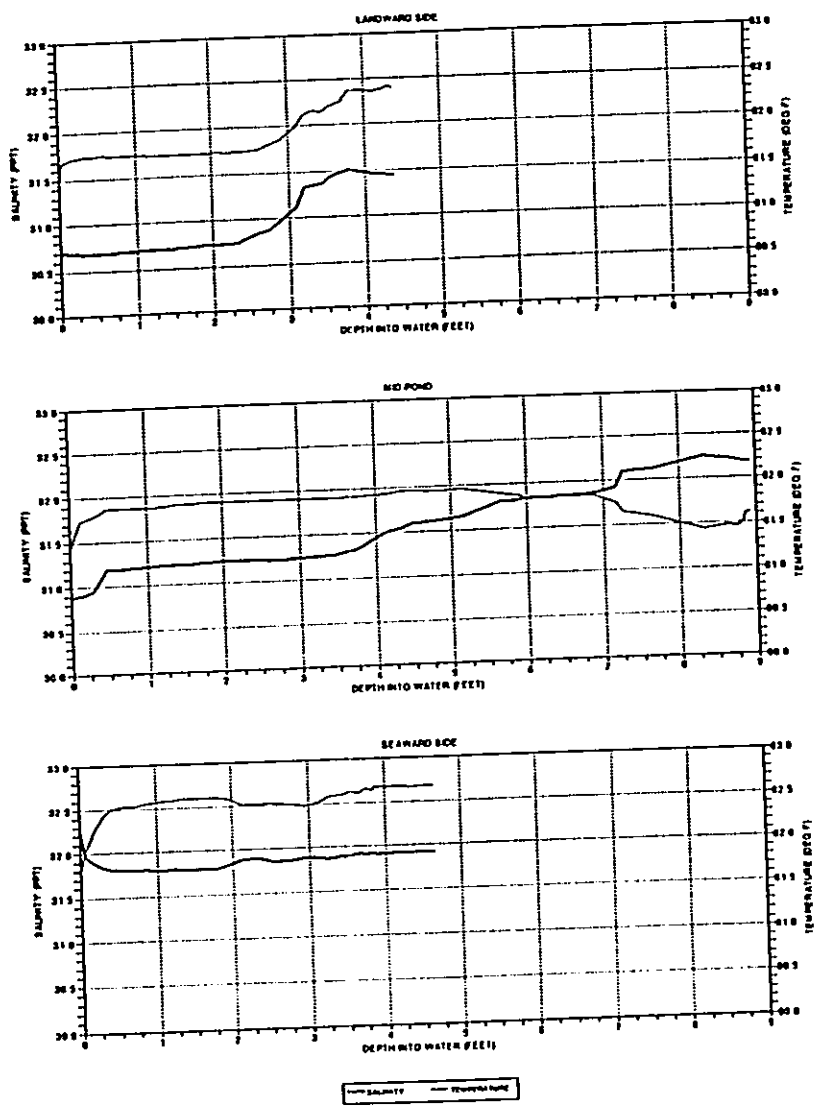


Figure 13
Salinity and Temperature Profiles Across
Kaloko Fishpond - May 19, 2000

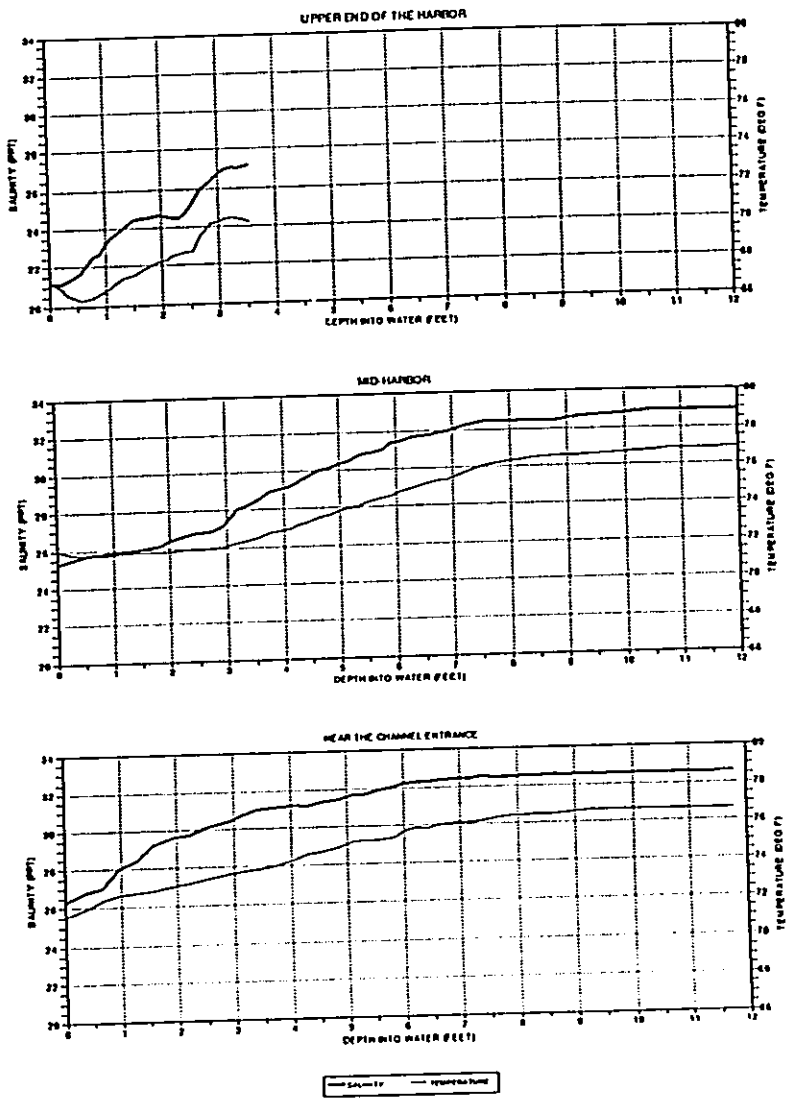


Figure 14
Salinity and Temperature Profiles
in Honokohau Harbor - May 26, 2000

DWS' use of high level wells in this area began in 1994 with the North Kalaoa Well (No. 4358-01). The Queen Liliuokalani Trust Well (No. 4057-01) was added in January 1997 and the two others (Nos. 4158-02 and 4258-03) in late 1998. DWS' use of these wells over this period is depicted on Figure 15. For the last several years, their use has averaged about 1.5 MGD. Groundwater responses when these wells are ultimately used to their full capacity may shed light on still unknown aspects of this groundwater occurrence, including: the geologic feature which creates the high level water; the hydraulic relationships among the differing high level groundwater compartments; and where and how high level groundwater drains into the basal lens.

Assessment of the Project's Potential Impact on Water Resources

As indicated in the description of the project at the start of this report, there are four aspects of the development which have the potential to impact water resources: (1) drawing potable supply from inland wells will diminish the rate of leakage from the high level aquifer into the basal lens; (2) the disposal of wastewater onsite will be a localized source of nutrient-rich recharge; (3) stormwater disposed of in dry wells will enter the basal lens as local recharge with potential water quality consequences; and (4) excess landscape irrigation and other miscellaneous water uses which percolate downward will also impact groundwater quality.

Due to types of land use and the high salinity of basal groundwater in the Kaloko area, there is very little direct use of this resource. These are limited to a small amount of irrigation water pumped from Well 4461-01 and larger amounts of saline groundwater pumped for aquaculture use from Wells 4363-01 to 10 in NELHA and Well 3960-01 in the Queen Liliuokalani Trust property. However, basal groundwater plays an important role in maintaining the ecosystem of the anchialine ponds within and outside the National Park. For this reason, the assessment of potential impacts on water resources focuses on potential changes to the flowrate and quality of basal groundwater moving beneath the project site, through the extensive pond system within the National Park, and discharging into the nearshore environment. Methods for assessing each of the four aspects of the project which will impact groundwater are discussed in the paragraphs following. Results are presented after this discussion of the analytical methods.

Assessing the Impact of Groundwater Withdrawals for Potable Use. For the purpose of this assessment, it is assumed that the project's 0.153 MGD potable supply will come from one or more DWS' four high level wells in the Kaloko-Honokohau area (these four are shown on Figure 1 and listed in Table 1). Withdrawals from any of these wells diminish leakage of high level groundwater into the downgradient basal lens. Results of the groundwater modeling in Oki (1999) for the entire Kona area and in Oki, Tribble, Souza, and Bolke (1999) focused more specifically on groundwater in the Kaloko-Honokohau National Historical Park provide the most accurate quantification available on the potential reduction of recharge to the basal lens. The following findings and conclusions from these two studies have been used for this assessment:

- The unknown geologic feature which creates the abrupt change from basal to high level groundwater in the vicinity of Mamalahoa Highway is modeled as a buried dike complex. This causes some of the high level water to flow to the south and around the geologic feature, reducing the rate of leakage through it into the basal lens directly downgradient.

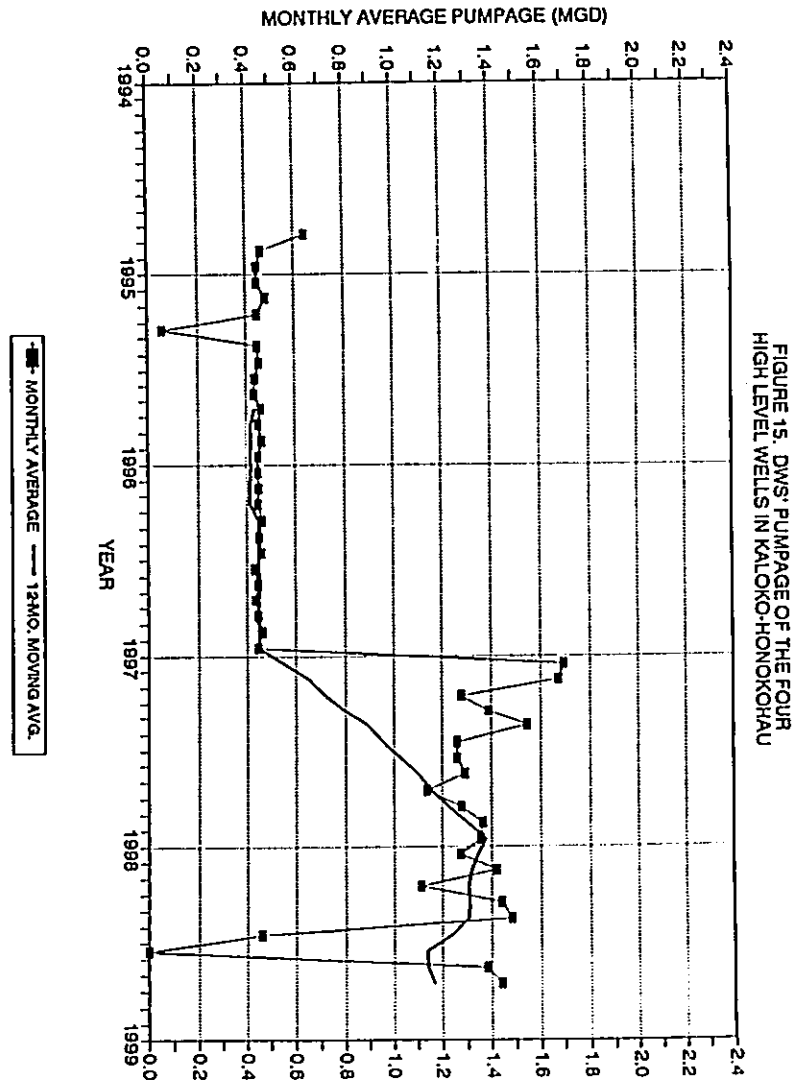


FIGURE 15. DWS' PUMPAGE OF THE FOUR HIGH LEVEL WELLS IN KALOKO-HONOKOHAU

- The basal groundwater flowrate in Kaloko-Honokohau is computed to be approximately 3 MGD per coastal mile as a combination of leakage from the high level aquifer and (natural) local recharge. For this average rate, 1.1 MGD would be flowing directly beneath the 2000-foot wide project site and 6.5 MGD would be discharging along the 2.1-mile long shoreline of the National Park property.

- Owing to the diversion of high level groundwater flow to the south by the buried dike complex, pumpage from upgradient high level wells does not cause a 1:1 reduction of leakage into the basal lens. Model results indicate that the flow of basal groundwater through the National Park is reduced by approximately 15 percent of the amount pumped by upgradient high level wells [derived from Table 7 and Figure 21 of Oki, Tribble, Souza, and Bolke (1999)]. This percentage can be applied to the 0.153 MGD of potable supply required for the Kaloko Industrial Park Phases III and IV at full build-out.

Assessing the Impact of Wastewater Disposal. Wastewater would be disposed of onsite in individual systems approved by the Department of Health (typically septic tanks and leach fields). To assess this impact, it is assumed that 60 percent of the potable water use is disposed of in these individual wastewater systems and that the nutrient concentrations in percolate from the leach fields will be similar to the current levels of the Kealakehe WWTP effluent (Table 3). Effluent from the leach fields will travel down through the vadose zone and then toward the shoreline in the underlying groundwater flow. Experience with the County's disposal of Kealakehe WWTP effluent in the sump on the mauka side of Queen Kaahumanu Highway provides the best way to assess changes in the effluent's nutrient levels as it percolates downward and then moves to the shoreline. The steps in computing the fate of nutrients along this flow path are as follows:

- Of the WWTP's 1.2 MGD average inflow, about 0.15 MGD is lost to evaporation from the WWTP's 18 acres of stabilization ponds and 0.05 MGD is reused for irrigation. The remaining 1.0 MGD is disposed of in the mauka sump.

- Water quality of the effluent delivered to the sump is the rounded average of the three recent samples given in Table 3: 1.7 PPT salinity; 300 µM nitrate, 480µM total nitrogen; 110 µM phosphate; 115 µM total phosphorus; and 695 µM silica.

- Based on a simple flow net analysis and in the absence of some unknown (and unlikely) geologic control, most of the effluent discharged into the sump enters the marine environment toward the inland end of Honokohau Harbor.

- Samples taken from the upper end of Honokohau Harbor (also in Table 3) are a mixture of WWTP effluent, the underlying groundwater, and seawater. Representative quality of the underlying groundwater, generally based on averages of upgradient Well 4160-02 and downgradient Well 4161-02 in the National Park, adjusted for salinity, is as follows: 4.0 PPT salinity; 85 µM nitrate; 110 µM total nitrogen; 5.8 µM phosphate; 6.9 µM total phosphorus; and 720 µM silica. Seawater has a salinity of 34 PPT, 0.5 µM nitrate, 0.7 µM total nitrogen, 0.1 µM phosphate, 0.4 µM total phosphorus, and 10 µM silica (Steven Dollar, personal communication).

- Using salinity and silica as conservative constituents, the ratio of effluent, groundwater, and seawater in surface samples collected at the inland end of Honokohau Harbor is calculated to be approximately 1:5:8. Using this ratio, the amount of nitrogen and phosphorus in the effluent which can be accounted for in discharge into the harbor is as follows:

  (I) approximately 55% of nitrate and total nitrogen in the effluent appears in the mixture in the harbor.

  (II) approximately 20% of phosphate and total phosphorus in the effluent appears in the mixture in the harbor.

  These percentages are applied to determine the amount of nutrients in wastewater disposed of onsite that reaches the underlying groundwater.

Assessing the Impact of Stormwater Disposal. The land surface of the 102-acre site is comprised of bare a'a lava with some areas of gravel and cinder soil with scrub growth. With no surface runoff, all rainfall which is not lost to the atmosphere via evaporation or plant evapotranspiration becomes groundwater recharge. This amount is estimated to be one-third to one-half of the 15 to 20 inches of rain each year, an amount consistent with the recharge calculations in Oki (1999:44 to 46). Over the 102-acre site, this is equivalent to approximately 0.05 MGD. Its quality is assumed to be similar to that in the high level wells (Table 4), which are presumed to be far enough inland to be beyond significant contamination by agriculture, residences, or commercial development.

Development of the site will convert much of the permeable land surface to impermeable roadways, roof tops, parking areas, and other asphalt and concrete surfaces. On a local scale, this will create surface runoff. However, it will be collected and disposed of in dry wells and/or seepage pits. None will leave the site as surface runoff; all will percolate to the basal lens. As a first order approximation, it is assumed that the amount of stormwater reaching basal groundwater after development will be essentially unchanged. However, an increase in nutrient levels and the potential addition of organics or petroleum products is expectable. Stormwater runoff qualities in Yim and Dugan (1975) and Christakos-Comack and Dugan (1982) are used as representative of the percolating stormwater onsite. Possible additions of organics and/or petroleum products could occur unless appropriate Best Management Practices (BMPs) are implemented. However, since such additions are not readily quantifiable, no calculations of their possible concentrations in groundwater have been made for this assessment.

Assessing the Impact of Landscape Irrigation and Other Miscellaneous External Water Uses. Most potable supply that does not become wastewater would be used for landscape irrigation. A lesser amount will also be used for washdowns of pavement areas and other miscellaneous external water uses. Most of this water would be lost to plant evapotranspiration or direct evaporation, but some amount would percolate to groundwater. Its impact can be approximated with the following assumptions: 40 percent of the potable supply is used outside of buildings; 20 percent of this water will reach groundwater; its salinity will be 0.5 PPT [elevated from the 0.15 to 0.25 MGD salinity of the drinking water supply]; and its nutrient levels will be approximately twice that of the potable water supply.

Computed Changes in Basal Groundwater Quantity and Quality. Using the assumptions and methods described above and simple mixing of the various inputs and withdrawals with underlying

Table 4

Potential Changes to Basal Groundwater Flowing Directly Beneath the Kaloko Industrial Park

Condition	Flowrate or Change in Flowrate (MGD)	Salinity (PPT)	Nitrogen		Phosphorus	
			NO_3-N (µM)	Total N (µM)	PO_4-P (µM)	Total P (µM)
Baseline Groundwater Conditions	1.1	4.0	85	115	5.8	6.9
Aspects of the Project Impacting Groundwater						
• Potable Water Use	-0.004	0.18	80	93	5.8	6.9
• Onsite Wastewater Disposal	+0.092	0.4	300	480	110	115
• Stormwater Disposal : Existing Rainfall-Recharge	-0.05	0.18	80	93	3.6	3.8
: Post-Development	+0.05	0.5	200	250	8	10
• Irrigation and Washwater Return Flow	+0.026	0.5	160	186	7.2	7.6
Computed Changes to Groundwater						
• Value	1.214	3.68	98	135	7.3	8.4
• % Change	+10%	-8%	+15%	+17%	+26%	+22%

groundwater, changes in the quantity and quality of the basal lens can be computed. These mixing calculations are made for two cases. For the first case, which is summarized on Table 4, the project's inputs and withdrawals are mixed with the 1.1 MGD of groundwater flowing directly beneath the site. For the second set of computations, which are presented on Table 5, these inputs and withdrawals are mixed with 3.0 MGD of groundwater flowing through the northern half of the National Park. Actual groundwater changes are likely to be less than the first case (because the effect of inputs and withdrawals will move laterally beyond boundaries of the project site) but more than the second (because the lateral movement of the various inputs will not extend for a full mile wide before discharging at the shoreline). In other words, the two sets of calculations are intended to represent the range of possible groundwater changes.

For the quality of the receiving groundwater beneath the National Park, average values from the top samples of onsite Monitoring Wells 4161-01 and 02 in Table 3 have been used. These wells are directly downgradient of the Industrial Park. For groundwater quality beneath the site, a salinity of 4.0 PPT has been used. Nutrient levels from the mixing line analyses on Figures 10A to 10D have been used for concentrations of nitrogen and phosphorus. Results of the computed changes to basal groundwater on Tables 4 and 5 can be summarized as follows:

- Change in Flowrate. Due primarily to onsite wastewater disposal, the increase to groundwater flow locally will be in the range of seven to ten percent.

- Change in Salinity. Also due primarily to onsite wastewater disposal, groundwater salinity would be reduced on the order of six to eight percent.

- Change in Nitrogen Levels. Nitrogen concentrations would be increased on the order of nine to 17 percent.

- Change in Phosphorus Levels. The largest changes in groundwater chemistry would be the concentrations of phosphorus. These would be increased by 18 to 26 percent.

The Need for Best Management Practices. For tenants of the Industrial Park involved in the handling and/or storage of petroleum products or potentially toxic chemicals, the need for BMPs to prevent leaks or spills of these materials from reaching basal groundwater is compelling. The site has essentially no soil and the underlying lava formation is highly permeable, making it easy for these products to reach groundwater and ultimately discharge into the anchialine pools and Kaloko Fishpond within the National Park. These BMPs should include storage and handling on impervious (paved) surfaces, containment of stormwater runoff, and appropriate treatment (such as oil-water separators and lined neutralization ponds) before discharge.

Potential Cumulative Impacts

Phases III and IV of the Kaloko Industrial Park is one of several existing and planned commercial-industrial developments upgradient of the Kaloko-Honokohau National Historical Park. Entitlements are currently being pursued for the Kaloko-Honokohau Business Park to the south and build-out of the Honokohau Business Park will continue. Beyond these near-term projects, other urbanization in the area from Kailua Town to Keahole Airport will ultimately occur, some of which will impact groundwater flowing through the National Park. Potential long-term cumulative impacts of these projects have been approximated with the following assumptions:

Table 5

Potential Changes to Basal Groundwater Averaged Over the
Northern Half of the Kaloko-Honokohau National Historical Park

Condition	Flowrate or Change in Flowrate (MGD)	Salinity (PPT)	Nitrogen		Phosphorus	
			NO_3-N (µM)	Total N (µM)	PO_4-P (µM)	Total P (µM)
Baseline Groundwater Conditions	3.0	5.8	85	120	6.0	7.0
Aspects of the Project Impacting Groundwater						
• Potable Water Use	-0.024	0.18	80	93	3.6	3.8
• Onsite Wastewater Disposal	+0.197	0.4	300	480	110	115
• Stormwater Disposal: Existing Rainfall-Recharge	-0.05	0.18	80	93	3.6	3.8
: Post-Development	+0.05	0.5	200	250	7	10
• Irrigation and Washwater Return Flow	+0.026	0.5	160	186	7.2	7.6
Computed Changes to Groundwater						
• Value	3.199	5.47	92	132	7.1	8.1
• % Change	+7%	-6%	+9%	+10%	+18%	+16%

1. Groundwater Use. The six high level production wells shown on Figure 1 and listed in Table 1 are ultimately utilized at an average of 16 pumping hours per day. The two basal wells of potable quality (Nos. 4458-01 and 02) are also developed and used to the same extent. All other groundwater pumpage is from nearshore, saline quality wells for aquaculture which will have essentially no impact on groundwater flowing through the National Park. Using results of the U.S. Geological Survey model, the assumption of 6.36 MGD of future potable groundwater use would reduce basal flow through the National Park by 0.83 MGD (Table 6).

2. Wastewater Disposal. It is assumed that County sewer service would ultimately be extended to all new development. Most of the effluent treated at the County's Kealakehe WWTP would be reused for irrigation and the unused remainder would still be discharged into the disposal pit. Disposal into the pit does not migrate far enough to the north to reach the National Park. As a result, the long-term impact of wastewater treatment and disposal is limited to excess irrigation percolating to groundwater. Arbitrarily, it is assumed that 1.0 MGD of this effluent reuse occurs upgradient of the National Park, that 20 percent of this becomes irrigation return flow, that its nutrient levels are similar to other landscape return flow (Tables 4 and 5), and that its salinity is increased by 20 percent.

3. Stormwater Collection and Disposal. The same assumptions used for the 102-acre project site are applied to the larger, 2-mile wide area for development between Queen Kaahumanu Highway and Mamalahoa Highway. The volume of rainfall recharge is essentially unchanged but there would be increases in nutrient levels due to development.

4. Landscape Irrigation Return Flow. As a first order approximation, it is assumed that one-third of the potable use listed in Table 6 occurs in areas upgradient of the National Park. Other assumptions regarding the portion used for landscape irrigation and its ultimate disposition are the same as applied for the 102-acre development site.

Baseline conditions for groundwater presently flowing through the National Park are: 6.5 MGD flowrate (from Oki, Tribble, Souza, & Bolke [1999]); and salinity and nutrient levels as the average of the top samples of Wells 4161-01 and 4161-02 within the National Park (Table 3). Using all of these assumptions, computed long-term prospects for changes in the quantity and quality of groundwater flowing through the National Park are presented on Table 7. The forecast changes are: a reduction of flowrate on the order of seven percent and corresponding salinity increase of 10 percent; substantial increases in nitrogen levels on the order of 40 to 50 percent; and increases in forms of phosphorus on the order of 30 to 45 percent.

Summary of Findings and Conclusions

1. The youthful surface lavas of the Hualalai volcano which cover the Kaloko area are highly permeable and have no naturally eroded waterways. Surface runoff does not occur, except on a local scale, during even severe rainfall events. Because of this, the assessment of the project's potential impact on water resources focuses exclusively on groundwater.

Table 7

Potential Long-Term Changes to Basal Groundwater Flowing
Beneath the 2.1-Mile Wide Kaloko-Honokohau National Historical Park

Parameter	Flowrate or Change in Flowrate (MGD)	Salinity (PPT)	Nitrogen		Phosphorus	
			NO_3-N (µM)	Total N (µM)	PO_4-P (µM)	Total P (µM)
Baseline Conditions	6.5	5.8	85	110	4.2	4.6
Changes Due to Development						
• Potable Water Use	-0.83	0.18	80	93	3.6	3.8
• Wastewater Effluent Reuse	+0.20	2.0	160	186	7.2	7.6
• Rainfall-Recharge : Existing	-1.7	0.18	80	93	3.6	3.8
: Post-Dev't	+1.7	0.5	200	250	7	10
• Landscape Irrigation Return Flow	+0.17	0.5	160	186	7.2	7.6
Post-Development Condition : Value	6.04	6.4	124	161	5.4	6.6
: % Change	-7%	+10%	+46%	+46%	+29%	+43%

Table 6

Potential Reductions in Groundwater Through
Kaloko-Honokohau National Historical Park Due to Pumpage From Wells

Wells	Pump Capacity (GPM)	Average Withdrawal (MGD)	Reduction of Basal Flow Through the National Park (MGD)
High Level			
3857-03	1,000	0.96	0.14
3957-01	500	0.48	0.07
4057-01	1,050	1.01	0.15
4158-02	1,400	1.34	0.20
4258-03	1,000	0.96	0.14
4358-01	175	0.17	0.03
Basal			
4458-01	750	0.72	0.05
4458-02	750	0.72	0.05
Total	6,625	6.36	0.83

Notes: Reductions of groundwater flow through the National Park derived from Table 7 and Figure 21 of Oki, Tribble, Souza, and Bolke (1999).

2. Groundwater beneath the project site occurs as a brackish basal lens in hydraulic contact with saline water at depth and seawater at the shoreline. The top of the lens stands one to two feet above sea level and fluctuates in response to ocean tides. Its sources of recharge are: (i) leakage from the high level aquifer which exists further inland; (ii) local rainfall-recharge; and (iii) inputs from residential and commercial development such as seepage from cesspools and landscape irrigation return flow.

3. The brackish basal lens is too saline and does not have sufficient flux to sustain significant irrigation use. However, it has an important role in supporting the biological communities in the anchialine pools and fishponds in the Kaloko-Honokohau National Historical Park which are directly downgradient of the project site. Since changes in groundwater flowrate and/or chemistry could impact these biological communities, an assessment of these changes as a result of the project's development is appropriate.

4. Four aspect's of the project's development have the potential to change the groundwater flowrate and/or chemistry:

   - Supplying potable water to the project from wells located in the high level aquifer directly inland will decrease the recharge to the basal lens.

   - Disposal of wastewater in individual onsite systems such as septic tanks and leach fields will create a nutrient-rich source of local recharge to the basal lens.

   - Collection of surface runoff from impervious surfaces and its disposal in dry wells and seepage pits will create a source of local recharge with potential water quality consequences.

   - Percolation of excess landscape irrigation and other miscellaneous outdoor uses of water are another source of local recharge with the potential to impact groundwater chemistry.

5. The potential impact of the project on groundwater flowrate and chemistry was determined using results of numerical modeling of groundwater done by the U.S. Geological Survey, an analysis of the County's disposal of treated effluent from the Kealakehe WWTP in a pit upgradient of Honokohau Harbor, and laboratory analyses of groundwater chemistry in samples from accessible wells in the general vicinity. These impacts are quantified in Tables 4 and 5 and can be summarized as follows:

   a) Within the northern half of the National Park, the groundwater flowrate would be increased in the range of seven to 10 percent. Such a change is within the seasonal and year-to-year variability of groundwater. It is unlikely to result in observable changes of water level in the anchialine pools or Kaloko Fishpond.

   b) Salinity of the groundwater in this same area would be decreased by six to eight percent. This change is also within the range of natural variability and therefore not likely to be observable.

   c) Levels of nitrogen (as nitrate and total nitrogen) would be increased in the range of nine to 17 percent. The higher end of this range is greater than the seasonal and year-to-year variability in groundwater.

   d) Phosphorus (as phosphate and total phosphorus) would be increased by the greatest amount, in the range of 16 to 26 percent. This change would also be greater than the natural variability of groundwater.

6. Phases III and IV of the Kaloko Industrial Park is one of several projects which will be developed upgradient of the National Park. Using a series of conservative assumptions regarding these developments and the same analytical methods as applied to the 102-acre Industrial Park, the cumulative impact of these projects on groundwater flowing through the entire width of the National Park was computed. Results are presented on Table 7 and can be summarized as follows:

   a) There would be a seven percent decrease in groundwater flowrate and an accompanying 10 percent increase in salinity. Both changes are within the range of the natural variability of groundwater.

   b) Nitrogen levels, computed for nitrate and total nitrogen, would increase on the order of 45 to 50 percent. This would be a large increase over present levels which are already relatively high.

   c) Phosphate and total phosphorus would be increased on the order of 30 and 45 percent, respectively. This also would be a substantial increase over present levels.

7. Using these computed changes to basal groundwater, the potential biological responses in anchialine pools, fishponds, and in the marine environment are addressed in a companion assessment by Marine Research Consultants.

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Appendix B

Assessment of Marine and Pond Environments

Marine Research Consultants

AN ASSESSMENT OF POTENTIAL EFFECTS TO THE MARINE AND POND ENVIRONMENTS IN THE VICINITY OF THE KALOKO INDUSTRIAL PARK, PHASES III AND IV, NORTH KONA, HAWAII

Prepared for

Wilson Okamoto & Associates
1907 S. Beretania St.
Honolulu, HI 96826

By

MARINE RESEARCH CONSULTANTS
4467 Sierra Dr.
Honolulu, Hawaii 96816

July 2000

1.0 PURPOSE

Planning is underway to prepare an Environmental Impact Statement (EIS) to reclassify approximately 102.3 acres of land currently in the State Conservation District into the Urban District in order to develop Phases III and IV of the existing Kaloko Industrial Park. The parcel of land is located mauka of the Queen Kaahumanu Highway between Honokohau Harbor and the Kona International Airport at Keahole in North Kona on the Island of Hawaii. The proposed project includes a mix of light industrial and industrial-commercial mixed use activities. None of the proposed land uses includes any alteration of the coastal areas or nearshore waters.

A somewhat unique characteristic of the project is the location relative to the Kaloko-Honokohau National Historical Park, which lies directly to the west of the project site on the makai side of Queen Kaahumanu Highway. The National Parks and Recreation Act of 1978 provided for the establishment of the Kaloko-Honokohau National Historical Park to preserve the integrity of the many archaeological features and fishponds found in the area. Kaloko Pond and Aimakapa Pond are large brackish bodies of water separated from the ocean by a basaltic rock wall (Kaloko) and a sand beach berm (Aimakapa). At the present time, the rock wall at Kaloko Pond is being reconstructed, and the new wall incorporates channels which afford a direct connection between the pond and ocean.

Water in the ponds is a mixture of seaward-flowing, low salinity groundwater, and landward-flowing seawater. As a result, water chemistry in the ponds can potentially be influenced by changes in groundwater composition and runoff of surface water. Leaching of materials such as fertilizer nutrients and pest control agents to groundwater could alter pond water chemistry. In addition, as pond water exchanges with ocean water in the nearshore area, there is also potential for alteration of marine water chemistry. Such alterations in water chemistry can, in turn, provide the potential to affect the structure of marine biotic communities in the nearshore area.

In addition, the Natural Energy Laboratory of Hawaii (NELH) and Hawaii Ocean Science and Technology (HOST) Park (together administered as the Natural Energy Laboratory of Hawaii Authority [NELHA]) lies approximately 3.5 miles north of the project site. The primary activities at NELHA revolve around the use of cold, nutrient-rich seawater pumped from below the vertically stratified surface layer to support various forms of mariculture. Concerns

have also been stated on the potential effects to NELHA from the proposed Kaloko Industrial Park and other neighboring projects on water quality at NELHA.

In the interest of addressing these concerns and assuring maintenance of environmental quality, it has been deemed appropriate to conduct an assessment of the pond and marine environments that are downslope from the proposed Kaloko Industrial Park. The rationale of this assessment is to determine the contribution of groundwater to the pond and marine environments, and the effects of such input on marine community structure at the present time before the commencement of any new construction activities. The resulting data provides a characterization of the effects of the existing phases of Kaloko Industrial Park. Combining this information with estimates of changes in groundwater flow rates and chemical composition of groundwater that will enter the ponds that will likely result from construction of the project, it will be possible to evaluate the potential effects to the marine and pond environments. Predicted changes in groundwater flow rates and groundwater chemistry have been supplied by Tom Nance Water Resource Engineering (TNWRE) in a report under separate cover entitled "Potential Impact on Water Resources of Phases III and IV of the Kaloko Industrial Park in North Kona Hawaii" dated July 2000. Results of the combined evaluation will indicate if, and to what degree, there is the potential for negative effects to the aquatic environments from the proposed project.

It is also important to note that another Environmental Impact Statement is currently in preparation for a similar project (Kaloko-Honokohau Business Park) located on 337 acres adjacent to, and directly to the south of Kaloko Industrial Park. A similar report to this document is also in preparation by the same investigators (Marine Research Consultants and TNWRE), using the same methods. Combining the effort to evaluate both planned projects simultaneously is advantageous in that it will allow for an evaluation of cumulative effects of both projects.

2.0. METHODS

2.1. WATER CHEMISTRY

2.11. Sampling Sites

The Kaloko-Honokohau National Historical Park is located seaward of the existing Kaloko Industrial Park, as well as the planned increment. Over half of this 1,160-acre park is comprised of ocean waters. Contained within its boundaries are also two large fishponds

(Kaloko and Aimakapa), tidal areas and wetlands (Figure 1). Water samples were collected on transects that bisected each pond to obtain baseline information on the composition and stratification of pond waters. Transects extended from the most landward shoreline of the ponds, through the approximate center of the ponds to the seaward shorelines, and then continued into the ocean for a distance deemed to reach open coastal ocean (Figure 1).
In addition, groundwater and other water samples were collected from a variety of sources. These included: 1) high level potable quality wells that are part of the Department of Water Supply (DWS) North Kona system; 2) Basal wells of brackish water quality, primarily three monitoring wells located on Kaloko-Honokohau National Historical Park property (Figure 1); 3) basal wells of saline quality, primarily located on the property of NELHA; and 4) springs where groundwater discharge was evident along the periphery of Kaloko and Aimakapa Ponds. In addition to the water samples collected in May-June 2000 specifically for this report, data collected as part of the Comprehensive Environmental Monitoring Program (CEMP) at NELHA was also utilized. The locations of all well water samples and well designations are shown in TNWRE (2000).

2.12. Sampling Protocol

All field work was conducted on May 26, and June 2, 5, and 10, 2000 by divers swimming from shore. Environmental conditions during all sample collection was similar, and consisted of light wind, and moderate seas with a surf break of approximately 2-3 feet. Water samples were collected at seven equally spaced stations in Aimakapa Pond and eight stations in Kaloko Pond along two transects. Each of the transects continued from the ocean shoreline a distance of approximately 150 meters (m) where water was collected at an additional seven stations. Such a sampling scheme was designed to span the greatest range of salinity with respect to freshwater efflux at the shorelines of the ponds and the ocean. Sampling was more concentrated in the nearshore oceanic zone because this area is most likely to show the effects of alteration in groundwater composition. With the exception of the two ocean stations closest to the shoreline, samples were collected at two depths; a surface sample was collected within approximately 20 centimeters (cm) of the pond or sea surface, and a bottom sample was collected within approximately 20 cm of the pond or sea floor.

Water samples were collected by opening 1-liter polyethylene bottles at the desired depth. Subsamples for nutrient analyses were immediately placed in 125-milliliter (ml) acid-washed, triple rinsed, polyethylene bottles and stored on ice until returned to Honolulu. Water for other analyses was subsampled from 1-liter polyethylene bottles and kept chilled until analysis.

2.13 Monitoring Constituents

Water quality parameters evaluated included the 10 specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (Open Coastal waters) of the Water Quality Standards, Department of Health, State of Hawaii. These criteria include: total nitrogen (TN) which is defined as inorganic nitrogen plus organic nitrogen, nitrate + nitrite nitrogen (NO_3^- + NO_2^-, hereafter referred to as NO_3^-), ammonium (NH_4^+), total phosphorus (TP) which is defined as inorganic phosphorus plus organic phosphorus, chlorophyll a (Chl a), turbidity, dissolved oxygen, pH and salinity. In addition, orthophosphate phosphorus (PO_4^{-3}) and silica (Si) were reported because these constituents are sensitive indicators of biological activity and the degree of groundwater mixing, respectively. Total suspended solids (TSS) were also analyzed.

2.14. Analytical Methodology

Analyses for NH_4^+, PO_4^{3-}, and NO_3^- + NO_2^- (hereafter termed NO_3^-) were performed using a Technicon autoanalyzer according to standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983). TN and TP were analyzed in a similar fashion following digestion. Dissolved organic nitrogen (DON) and dissolved organic phosphorus (DOP) were calculated as the difference between total dissolved nitrogen (TDN) and dissolved inorganic nitrogen (DIN), and total dissolved phosphorus (TDP) and dissolved inorganic phosphorus (DIP), respectively. The level of detection for the dissolved nutrients is 0.2 µM for TN, DON and Si, 0.02 µM for TP, DOP, NO_3^- and NH_4^+, and 0.01 µM for PO_4^{3-}.

Turbidity was measured on a Monitek Model 21 90-degree nephelometer, and reported in nephelometric turbidity units (ntu, level of detection 0.01 ntu). Chl a was measured by filtering 300 ml of water through glass fiber filters; pigments on filters were extracted in 90% acetone in the dark at -5° C for 12-24 hours, and the fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer (level of detection 0.01 µg/L). Salinity was determined using an AGE Model 2100 laboratory salinometer with a precision of 0.0003‰. pH was determined using a lab meter with combination electrode and a precision of 0.01 pH units. Dissolved oxygen was measured using a YSI model 51 meter. TSS was determined gravimetrically using a Cahn electrobalance.

All lab analyses were conducted by Marine Analytical Specialists (Laboratory Certification NO. HI-0009).

2.2 ASSESSMENT OF MARINE BIOLOGICAL COMMUNITY STRUCTURE

Evaluation of the marine biological community was conducted by qualitative reconnaissance surveys along the length of the area fronting Kaloko Pond from the shoreline out to the 10 meter (30 foot) depth contour. Information gathered during the surveys included abundance estimates of the dominant flora and fauna, as well as observations on the factors that affect these biotic assemblages. Quantitative surveys of the offshore area were not possible as the entire region off the pond was subjected to breaking surf which makes deployment of sampling gear impossible.

3.0 RESULTS

3.1 WATER CHEMISTRY

3.1.1 Horizontal and Vertical Stratification

Tables 1-4 show results of all marine and pond water chemical analyses for samples collected in the vicinity of the proposed Kaloko Industrial Park, Phases III and IV development in May-June 2000. Tables 1 and 2 show results for sampling of Aimakapa Pond and the offshore ocean, while Tables 3 and 4 show results for sampling in Kaloko Pond and the offshore ocean. Tables 1 and 3 show nutrient concentrations in micromolar units (µM), while Tables 2 and 4 show nutrient concentrations in units of micrograms per liter (µg/L). Tables 5 and 6 show the results of analyses of water from wells and springs. Concentrations of twelve chemical constituents in surface and bottom water samples are plotted as functions of distance from the shorelines in Figures 2-5.

Examination of Tables 1-6 and Figures 2-5 show several major patterns of horizontal stratification of water chemistry constituents in the ponds and ocean. Probably the most obvious characteristic of the data set is the major differences between water quality in Aimakapa and Kaloko Ponds. These differences in water chemistry are primarily the result of differences in physical composition. Aimakapa pond is separated from the ocean by a fairly wide (~20 m) continuous sand berm which is not very permeable to exchange between the pond and the ocean. Such impermeability is apparent in the sharp, nearly vertical gradients at the shoreline of many of the water chemistry constituents (e.g., Salinity, Si, DON, DOP, TN, TP) in Aimakapa Pond (Figures 2-4). Compared to the sand berm, the rock wall that separates

Kaloko Pond from the ocean is highly permeable, and exchange of water between the ocean and pond is enhanced by channels ("makahas") constructed into the wall. It should be noted that these direct connections between the pond and ocean eliminate Kaloko Pond from the designation of "anchialine" which require that no such connections exist. As a result of the increased water exchange between Kaloko Pond and the ocean, there are few sharp gradients of water chemistry constituents at the marine shoreline.

While both ponds contain sediment bottoms, there is a substantial difference in the type of sediment. Bottom composition of Aimakapa Pond consists of soft flocculent silty mud that is penetrable for at least one meter. Bottom composition of Kaloko Pond is a hard sand/mud mixture that is largely covered with marine algae, primarily the introduced species *Acanthophora specifera*. Sand/mud bottoms in both ponds were distinctly anaerobic beneath the surface layer as evidenced by the strong odor of H_2S when the bottom was disturbed.

The sand bottoms of the ponds function as effective plugs to greatly limit groundwater input and circulation. The plugging is manifested in slower and lower amplitude tidal responses in the ponds compared to wells further inland (TNWRE 2000).

3.1.1.1 - Salinity

Salinity within both ponds showed surprisingly little horizontal gradation from the ocean to the shoreward sides of the ponds. There was only the slightest hint of vertical stratification between surface and bottom water in Aimakapa Pond with bottom water on the order of 0.001-003‰ higher than surface water. Vertical stratification of Kaloko Pond was slightly greater, with bottom water on the order of 0.1 to 0.9‰ higher than surface water.

The salinity between the two ponds, however, varied to a large extent. Salinity in Aimakapa Pond was approximately 13‰ (parts per thousand), while salinity in Kaloko Pond was 32-33‰. As seawater has a salinity of approximately 35‰, the composition of water in Aimakapa can be estimated as about 37% seawater and 63% freshwater (not factoring in evaporative loss). On the other hand, based on salinity, the composition of Kaloko Pond consists of about 93% seawater and 7% freshwater. Similar measurements made by Marine Research Consultants in 1996 of Kaloko pond revealed that salinity was approximately 6‰ lower (~29‰) in surface pond water compared to surface ocean waters. Comparison of these data suggest that salinity of the pond has increased over the last several years. The open channels in the rock wall allowing free exchange of water between the ocean and pond is likely the source of the increased salinity.

Comparing values of salinity within the ponds to salinities of springs around the perimeter of the ponds shows spring water at Aimakapa Pond is near the same salinity as pond water (13-17‰), while springs around Kaloko Pond have substantially lower salinities than the pond (9-14‰)(Tables 5-6). Water from groundwater monitoring wells located landward of the ponds all had lower salinities than any of the pond waters (Tables 5-6).

Typically, in nearshore marine areas of West Hawaii there is a pattern of decreasing salinity with distance from shore. This gradient is indicative of low salinity groundwater entering the ocean near the shoreline resulting in a distinct zone of mixing in the nearshore region. A somewhat unusual result in the present study is that the lowest salinities in the ocean samples were not found nearest to the shoreline at either pond site. Rather the lowest salinities were measured in samples approximately 25 m offshore. Such a result suggests that groundwater flow around the pond boundaries, with seepage through the porous basaltic shorelines adjacent to the ponds, has a larger effect on salinity of the ocean than seepage of pond water through the shoreline barriers. Horizontal and vertical stratification of salinity in the ocean samples was evident at all stations. Beyond 25 m from shore, with increasing distance from shore, salinity increased at all stations in both surface and bottom water. The difference in salinity between surface and bottom water samples was greater in the ocean than in the either pond.

3.1.1.2 - Nutrients

With the exception of NO_3^- and NH_4^+, water in Aimakapa Pond had distinctly higher concentrations of nutrients compared to ocean water samples collected directly offshore of the ponds. The distinct discontinuity between concentrations of nutrients between the seaward end of the ponds and the nearshore portion of the ocean indicates that the sand berm is an effective barrier preventing free exchange between the pond and ocean. As a result, while separated by a relatively small distance, pond and ocean water display very different characteristics with little apparent communication. The gradients in Kaloko Pond were far less pronounced, as the rock wall and associated channels provide far more mixing capability between the pond and the ocean.

As a result of the differences in permeability between the ponds and the ocean, the patterns of dissolved nutrients vary considerably between ponds. The patterns prescribed by the concentrations of dissolved Silica (Si) on the transects are essentially a mirror image of salinity

(Figure 2). Such a pattern reflects the two orders of magnitude difference in concentrations of Si between groundwater and ocean water. In addition, the mirror image of Si and salinity indicates that Si is a "conservative" tracer, in that it is not utilized by biotic or chemical reactions within the ponds and ocean. As a result, there is the same large variation in concentration of Si between the ponds, and same degree of stratification of Si as was evident in salinity.

The patterns of distribution of the other nutrients provides a good indication of the metabolic state of the ponds and offshore ocean. The most unique pattern is that of nitrate nitrogen (NO_3^-), which occurred in very low concentrations (>0.5 µM) within the ponds. Concentrations of NO_3^- were especially low throughout Kaloko Pond, not exceeding 0.1 µM except adjacent to the rock wall at the oceanic boundary (Tables 1-4, Figure 2). As NO_3^- is the form of nitrogen most abundant in groundwater (Tables 5-6), as well as the form of nitrogen that is most abundant in fertilizers, the near absence of the nutrient in the ponds suggests substantial uptake by benthic plants and plankton within the ponds. The sharp gradient of NO_3^- at the shoreline, peaking at the stations with lowest oceanic salinity and decreasing seaward, indicates that groundwater entering the ocean is primarily from flow around the ponds, rather than through them.

The pattern of the other form of inorganic nitrogen, NH_4^+, exhibits a substantially different pattern than NO_3^-, with an increase moving seaward across the ponds, and highest concentration occurring in the nearshore ocean (Figure 3). There is also fairly consistent vertical stratification, with higher concentrations of NH_4^+ in bottom water. While high level groundwater contains little or no NH_4^+, the monitoring wells at Kaloko-Honokohau National Historical Park all had highly variable concentrations of NH_4^+ (Tables 5-6). Similarly, the springs around the ponds also had detectable NH_4^+.

The other inorganic plant nutrient, phosphate phosphorus (PO_4^{-3}) displayed a pattern of distribution dissimilar to either NO_3^- or NH_4^+. Rather, the pattern of distribution of PO_4^{-3} was similar to the conservative tracer Si (Figure 4). Typically, the concentration of PO_4^{-3} in groundwater is an order of magnitude lower than the concentration of NO_3^- (Tables 5 and 6). However, in all of the pond samples, the concentrations of PO_4^{-3} are greater than NO_3^- (Figures 2-3). These relationships indicate that within the ponds NO_3^- is clearly the limiting nutrient with respect to plant uptake, as it has been nearly stripped totally from the water column, while PO_4^{-3} remains comparatively abundant.

The patterns prescribed by concentrations of TN, DON, TP and DOP are nearly identical (Figures 3 and 4). All show elevated concentrations in Aimakapa Pond, with higher concentrations in bottom water relative to surface water, followed by a steep gradient at the shoreline with low concentrations in the ocean. In Kaloko Pond, concentrations are essentially constant across the entire (pond and ocean) sampling regime. As the concentrations of the organic constituents of N and P (DON, DOP) are substantially greater than the inorganic constituents of N and P (NO_3^-, NH_4^+ and PO_4^{-3}), the patterns of TN and TP, are essentially the same as DON and DOP.

Typically, the nutrient cycle involves uptake of inorganic nutrients by plants (autotrophs) followed by output of organic materials, which are in turn taken up by animals (heterotrophs). The high concentrations of organic nutrients in Aimakapa Pond suggest that the cycle is essentially blocked at the organic uptake stage, by lack of sufficient organisms capable of utilizing the organic materials. In addition decomposition of organic material by bacterial breakdown results in elevated levels of DON and DOP. The residence time of Aimakapa Pond appears to be far longer than the nutrient cycling period, resulting in the buildup of organic materials.

3.1.1.3 - Other Constituents

The patterns of distribution of Chl a, turbidity and TSS in the ponds and ocean are all generally similar, with bottom water from Aimakapa Pond exhibiting far higher values than all other areas (Figure 5). As described above, the floor of Aimakapa Pond is composed of silty mud that is so fine in particle size that there is a continuous layer of resuspended material that contributes to the high levels of turbidity and TSS. It is apparent from the similar high levels of Chl a, that there is also a community of benthic plankton or resuspended plant material near the bottom of the pond.

All three constituents are also elevated in surface and bottom waters of Kaloko Pond relative to ocean water, but without the considerable vertical stratification of Aimakapa Pond. Chl a at all stations in Kaloko Pond is an order of magnitude greater than in ocean samples, which is expected based on the nearly complete uptake of NO_3^- in the water column.

3.1.2 Conservative Mixing Analysis

A useful treatment of water chemistry data for interpreting the extent of material input from land is application of a hydrographic mixing model. In the simplest form, such a model consists

of plotting the concentration of a dissolved chemical species as a function of salinity. Comparison of the curves produced by such plots with conservative mixing lines provides an indication of the origin and fate of the material in question (Officer 1979, Dollar and Atkinson 1992, Smith and Atkinson 1993). This method of data interpretation has recently been adopted by the State of Hawaii Department of Health as a new protocol for evaluating water quality standards in West Hawaii.

Figures 6-9 show plots of concentrations of eight nutrient constituents as functions of salinity for a variety of water samples (pond, ocean, wells, springs) collected in the Kaloko-Honokohau region in May-June 2000. In addition, data from the last available quarterly sampling (September 1999) of twenty-one monitoring wells and two drainage trenches as part of the NELHA CEMP are also included. Each graph in Figures 6-9 also shows a conservative mixing line that was constructed by connecting the end member concentrations of open ocean water and averaged high level groundwater concentrations from several potable wells located upland of Kaloko.

If the parameter in question displays purely conservative behavior (no input or removal from any process other than physical mixing), data points should fall on, or very near, the conservative mixing line. If, however, external material is added to the system through processes such as leaching of fertilizer nutrients to groundwater, data points will fall above the mixing line. If material is being removed from the system by processes such as uptake by biotic metabolic processes, data points will fall below the mixing line.

Dissolved Si represents a check on the model as this material is present in high concentration in groundwater, but is not a major component of fertilizer. In addition, Si is not utilized rapidly within the nearshore environment by biological processes. It can be seen in Figure 6 that most of the data points from Kaloko Pond and the ocean fall very close to the conservative mixing line for Si. All of the data points for NELHA samples fall in a linear array slightly above the conservative mixing line. This offset is a result of the high levels of Si that occur in deep seawater (~80 µM) which is used at NELHA, relative to surface seawater which has a concentration of Si of approximately 2 µM. Such agreement indicates that the end members used to construct the lines are representative of the system.

In Figure 6, data points for Si from Aimakapa Pond and some of brackish wells fall below the conservative mixing line suggesting either some form of biogeochemical alteration of Si in these areas, or another source of groundwater.

The plot of NO_3^- versus salinity reveal distinctly different results than plot of Si (Figure 6).

Plots of concentrations of NO_3^- show that most of the data points from the ocean and ponds fall below the conservative mixing line, especially in Aimakapa pond. Data points for the springs and wells, however, are near, or above the mixing line. These relationships indicate several important points. First, the elevation of data points above the mixing lines indicates a subsidy of NO_3^- from sources other than groundwater. In the cases of the wells and springs in the Kaloko-Honokohau area, it is possible that the subsidies are from land uses upland of the coastal area that are adding materials (e.g., fertilizers) through groundwater leachate. Such a scenario is typical of areas downslope from agricultural lands where fertilizers leach to groundwater, and subsequently percolate to the coastal ocean.

The data points that extend farthest above the conservative mixing line, hence contain the greatest subsidies of NO_3^- are the monitoring wells at NELHA. As virtually all of the water used for aquaculture practices at the facility is discharged of through trenches which provide for percolation to the water table, it appears that the elevated concentrations in the NELHA wells are a result of discharge of water used at the facility. It is important to note that the water sampled in monitoring wells at NELHA discharges to the nearshore ocean directly off NELHA at Keahole Point. It is also important that when scaled to salinity, the subsidies of NO_3^- at NELHA are approximately twice that of the brackish monitoring wells at Kaloko-Honokohau. Thus, subsidies of NO_3^- to the nearshore ocean from present activities at NELHA are far greater than from present activities in the Kaloko-Honokohau Commercial area.

It can also be seen from the occurrence of all of the pond data points below the mixing line, that there is substantial uptake of NO_3^- within the ponds. Uptake is most evident in Aimakapā Pond, where the concentrations of NO_3^- are essentially nil. Hence, even though there are subsidies of NO_3^- to groundwater, likely as a result of human activities, the nutrient is still limiting to biotic activity in the ponds. As a limiting nutrient, it is not likely that there are negative impacts associated with the present concentrations in groundwater that enters the ponds.

The other form of dissolved inorganic nitrogen, NH_4^+, does not show a linear pattern of distribution with respect to salinity for any of the data points (Figure 7). As with NO_3^-, well and spring samples had the highest concentrations of NH_4^+, when compared to the ponds or ocean. These relationships indicate a subsidy of NH_4^+ to low level groundwater that is not a result of input from high level groundwater or the ocean. Contrary to NO_3^-, the wells at NELHA contain far less subsidy of NH_4^+ than the wells at Kaloko-Honokohau.

PO_4^{3-} is also a major component of fertilizer, but is usually not found to leach to groundwater to the extent of NO_3^-, owing to a high absorptive affinity of phosphorus in soils. Similar to the results for NO_3^-, the PO_4^{3-} data points for pond samples, particularly Aimakapa pond, fall below the mixing line indicating uptake by pond plants (Figure 7). As with NO_3^- many of the data points from the monitoring wells at NELHA lie farther above the mixing lines than the data from the monitoring wells at Kaloko-Honokohau. As with NO_3^-, the elevations in the concentrations of PO_4^{-3} scaled to salinity in the NELHA wells are a result of the high concentrations of these nutrients in deep seawater used for aquaculture, and discharged into trenches.

Because DOP and DON occur in very low concentrations in both open ocean water and high level groundwater, the mixing lines for these constituents are essentially flat (Figure 8). The mixing diagrams for DOP and DON corroborate the discussion of high nutrient conversion of inorganic nutrients by plant metabolism and bacterial decomposition in Aimakapa pond. However, the anomalously high concentrations of DOP and DON in wells and springs in the Kaloko-Honokohau area are curious as these compounds are associated with organic activity that usually does not occur to a large extent within the water table. DON and DOP are also not components of fertilizers. As the highest concentrations of DON and DOP, and lowest concentrations of NO_3^-, are found in Well 4060-01 located directly behind Aimakapa Pond, it is possible that water from the pond is being carried landward by tidal action to the region of the monitoring wells. Such a theory is supported by the low levels of DON and DOP in both deep seawater used at the NELHA facility, and in the NELHA monitoring wells.

Mixing diagrams of TP and TN reflect the combined effects of inorganic and organic N and P, with data points above the mixing lines from most of the sources of groundwater (Figure 9).

Several points can be made to summarize the results of mixing analyses. First, and most importantly, there are no indications of buildup of nutrients within the ponds or nearshore ocean resulting from groundwater subsidies that may be a result of activities of man. The two constituents that show substantial elevations in the ponds (DON) and (DOP) are not the direct result of loading of nutrients, but rather metabolic byproducts of plant production and bacterial decomposition coupled with long residence time (slow water exchange). Subsidies to groundwater of NO_3^- and PO_4^{-3} are far greater at NELHA than in the Kaloko-Honokohau area as a result of high concentrations in deep seawater that is discharged into disposal trenches along the shoreline. Finally, it appears that water in the brackish monitoring wells mauka of Aimakapa and Kaloko Ponds may be influenced by landward flowing pond water driven by tidal

exchange.

3.2. BIOLOGICAL COMMUNITY ASSESSMENT

Marine community structure as represented in this report can be defined as the abundance, diversity, and distribution of benthos (bottom dwelling organisms), including stony and soft corals, marine plants (algae), motile benthos such as echinoderms, pelagic species such as reef fish, and federally protected species. When considering environmental changes caused by changes in land use or changes in non-point input of water of altered composition, benthic communities are probably the most useful biological assemblages for direct evaluation of environmental impacts to the offshore marine environment. Because benthos are generally long-lived, immobile, and can be significantly affected by exogenous input of sediments and other potential pollutants, these organisms must either tolerate the surrounding conditions within the limits of adaptability or die.

3.2.1 Zonation of the Marine Habitat

As described above, Kaloko Pond and the open ocean are separated by a rampart of basaltic boulders, while Aimakapa Pond is separated from the ocean by a solid berm of beach sand. The main structural feature of the offshore area seaward of both ponds is a basaltic ledge of pahoehoe lava. Adjacent to the Kaloko Pond frontage the shoreline is composed of a rocky shoreline composed primarily of outcrops of lava that extend seaward.

Because of the structure of the boulder rampart and beach berm that separate the ponds from the ocean, there is virtually no intertidal area . Beyond the boulder shoreline, the structure of the offshore environment off of Kaloko generally conforms to the pattern that has been documented as characterizing much of the west coast of the Island of Hawaii (Dollar 1975, 1982, Dollar and Tribble 1993).

The zonation scheme consists of three predominant regions. Beginning at the shoreline and moving seaward, the shallowest zone beyond the shoreline is comprised of a seaward extension of the basaltic shoreline bench. *Pocillopora meandrina*, a sturdy hemispherical coral is the dominant colonizer of the nearshore area. This species is able to flourish in areas that are

physically too harsh for most other species, particularly due to wave stress. The shallow flat pavement area directly in front of the Kaloko Pond seawall appears to be an ideal habitat for *Pocillopora meandrina*.

Moving seaward, the flat nearshore bench area terminates in a ledge that has a roughly vertical face that extends to a depth of approximately 25 feet. Beyond the ledge, bottom topography consists of a reef platform that is typical of West Hawaii. The transition area between the shallow flat pavement zone and the reef platform zone is characterized by high relief in the form of undercut ledges and basaltic boulder pinnacles. As wave stress in this region is less than in the shallower areas, and suitable hard substrata abound, the area provides an ideal locale for colonization by attached benthos, particularly reef corals, and generally the widest assortment of species and growth forms are encountered in this region. The predominant coral in the area is *Porites lobata*, which occurs in a variety of growth forms.

The seaward edge of the reef platform (at a depth of about 50 feet) is marked by an increase in slope to an angle of approximately 20-30 degrees. In the deep slope zone, substratum changes from the solid continuation of the island mass to an aggregate of generally unconsolidated sand and rubble. The predominant coral cover in the slope zone is typically interconnected mats of "finger coral" (*Porites compressa*), which grow laterally over unconsolidated substrata.

The physical structure of the offshore region at Aimakapa is somewhat different than off Kaloko. The nearshore area consists of an extended flat basalt shelf that extends approximately 100 m from shore. The surface of the platform contains holes and fissures, and small sand-filled channels, but relatively low cover of living corals. At the seaward termination of the shelf, a reef crest consisting of a shallower ridge of limestone separates the inner bench from the outer reef, which is similar to that described above off of Kaloko Pond.

3.2.2 Coral Communities

The predominant taxon of macrobenthos (bottom-dwellers) throughout the reef zones off of Kaloko Pond are Scleractinian (reef- building) corals. In total, twelve species of "stony" corals, and two "soft corals" were observed throughout the region of study. The dominant species in all of the zones off Kaloko-Aimakapa was *Porites lobata*. The second and third most abundant

species were *Porites compressa* and *Pocillopora meandrina*. Other species that were common in the shallow nearshore areas were *Montipora verrucosa*, *M. patula* and *Pavona varians*. It was estimated that coral cover on the shallow bench comprised approximately 15% of bottom cover at Kaloko and 5% at Aimakapa. It was not apparent that community structure in the shallow nearshore areas adjacent to the boulder rampart, or sand berm separating the ocean from the pond was affected by freshwater flow from the pond.

The mid-depth reef platform zone had the highest number of coral species at both survey sites. In the mid-depth zone, dominant species were *Porites lobata* and *Porites compressa*. *Porites lobata* occurs in various growth forms including flat encrustations and large dome-shaped colonies, which are responsible for much of the true "reef" accumulation in the mid-depth zones. The abundance of suitable solid surfaces for coral settlement and growth, as well as the reduced wave stress compared to the shallower boulder zones provides a suitable setting for a variety of smaller encrusting coral species. Coral cover on the outer reef platform comprised approximately 40-60% of bottom cover.

3.2.3 Other Benthic Macroinvertebrates

The other dominant group of macroinvertebrates are the sea urchins (Class Echinoidea). The most common urchin was *Echinometra matheoi*, which occurred in all reef zones. *E. matheoi* are small urchins that are generally found within interstitial spaces bored into basaltic and limestone substrata. *Tripneustes gratilla*, and *Heterocentrotus mammillatus* were other species of urchins that occurred commonly throughout the reef. Both of these urchins occur as larger individuals (compared with *E. matheoi*) that are generally found on the reef surface, rather than within interstitial spaces.

Sea cucumbers (Holothurians) observed during the survey consisted of three species, *Holothuria atra*, *H. nobilis*, and *Actinopyga obesa*. Individuals of these species were distributed sporadically across the mid-reef and deep reef zones. Numerous sponges were also observed on the reef surface, often under ledges and in interstitial spaces.

Frondose benthic algal zonation was not apparent at the study area off of Kaloko. However, encrusting red calcareous algae (*Porolithon spp.*, *Peysonelia rubra*, *Hydrolithon spp.*) were common on the boulders and exposed rocks throughout the study area. These algae were

also abundant on bared limestone surfaces, and on the non-living parts of coral colonies.

The design of the reef survey was such that no cryptic organisms or species living within interstitial spaces of the reef surface were enumerated. Since this is the habitat of the majority of mollusks and crustacea, detailed species counts were not included in the assessment. No dominant communities of these classes of biota were observed during the reef surveys at any of the study stations.

3.2.4 Reef Fish Community Structure

Reef fish community structure was largely determined by the topography and composition of the benthos. The reef fish community off Kaloko-Aimakapā is typical of that found along most of the Kona Coast, as described by Hobson (1974), and Walsh (1984). Fish community structure can be divided into six general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwelling fish, swarming tetrodonts, and surge-zone fish.

Surgeonfish (*Acanthuridae*) were the most abundant family of fish. The most common species were the yellow tang (lau'i-pala, *Zebrasoma flavescens*) and the goldring surgeonfish (kole, *Ctenochaetus strigosus*). On the shallower reef terrace, adult whitebar surgeonfish (maikoiko, *Acanthurus leucopareius*), orangeband surgeonfish (na'ena'e, *A. olivaceus*), and parrotfish (uhu, *Scarus spp.*) were also common. Planktivorous damselfish, principally of the genus *Chromis* were abundant in all areas surveyed. In areas where coral rubble was abundant, common fish included potters angelfish (*Centropyge potteri*), and several species of wrasses, notably fourline wrasse (*Psuedochilinus tetrataenia*), eightline wrasse (*P. octotaenia*), and yellowtail wrasse (aki-lolo, *Coris gaimard*).

Surge zone fish consisted principally of herbivores such as rudderfish (nenue, *Kyphosus bigibbus*), surgeonfish (*Acanthurus spp.*), and unicornfish (mostly umaumalei, *Naso literatus*). Saddle wrasse (hinalea lau-wili, *Thallassoma trilobatum*) and surge wrasse (hou, *T. purpureum*) were also abundant in the surge zone. Black durgeon (humuhumu-ele'ele, *Melanichthys niger*) and pinktail durgeon (humuhumu-hi'u-kole, *M. vidula*) were also observed congregating in the water column over the reef platform.

Several species of "food fish" (taken by subsistence and/or recreational fishermen) were observed during the survey. Rocky ledges and large coral heads sheltered fair numbers of squirrelfish (u'u, *Myripristes berndti*). Other food fishes included parrotfish (uhu, *Scarus spp.*), goatfish (moana kea and malu, *Parupaneus cyclostomus* and *P. bifasciatus*), jacks (papio, *Caranx melamphygus*), and grouper (roi, *Cephalopholus argus*). None of these species were particularly abundant. Orange-eyed surgeonfish (kole, *Ctenochaetus strigosus*), while abundant, was generally not large enough to be considered suitable as "food fish." Overall, fish community structure at Kaloko appeared fairly typical of the assemblages found in West Hawaii reef environments.

3.2.5 Endangered and Protected Species

Several species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) occurs commonly along the Kona Coast, and is known to feed on selected species of macroalgae. The endangered hawksbill turtle (*Eretmochelys imbricata*) is known infrequently from waters off the Kona Coast. The area off of Aimakapa Pond is clearly a preferred habitat for green turtles, as at least eight individuals were observed in the nearshore zone during the survey. In addition, at least ten turtles were observed hauled out on the basalt shelf to the south of the pond during a low tidal stand when much of the basaltic bench in this area was exposed.

Populations of the endangered humpback whale (*Megaptera novaeangliae*) are known to winter in the Hawaiian Islands from December to April. The present survey was conducted in March, when whales were present in Hawaiian waters. No whales were observed during the course of the survey. Similarly, no Hawaiian monk seals (*Monachus schlauslandi*) were observed in the area.

4.0 DISCUSSION and CONCLUSIONS

The purpose of this baseline survey is to provide the information to make valid estimates of the potential for impact to the marine and pond environments at Kaloko Honokohau National Historical Park, and possibly NELHA, from development of the Kaloko Industrial Park Phases III and IV. The information collected for this study provides the basis to understand the

processes that are operating in the pond-ocean system, and to specifically address the concerns raised in the planning process.

To summarize, it is generally accepted that the two large fishponds within the Kaloko-Honokohau National Historical Park function in a similar manner to smaller anchialine ponds that occur on the west coast of Hawaii. By definition anchialine ponds are surface exposures of the water table with no direct connection to the ocean that contain brackish water which is a mixture of seaward flowing groundwater and landward flowing seawater. Anchialine ponds in early successional stages usually have sediment-free bottoms which allow for relatively rapid hydologic exchange of water. It is important to note that healthy anchialine ponds are NOT nutrient limited systems, and naturally contain higher concentrations of plant nutrients than are utilized by the plant communities within the ponds. The excess nutrients do not lead to algal dominated water columns, however, as a result of a balance between residence time of water within the ponds, and production and consumption by pond biota. Specifically, rapid flux of water through the ponds, and grazing by resident populations of native species prevent plankton buildup within the water column. In the later stages of the anchialine pond cycle, infilling by sediment reduces the rate of water exchange and the balance between production and consumption is lost. Ultimately, in the last stages of pond senescence infilling is complete and pond become wetlands.

The results of this survey, as well as others (Brock and Kam 1997), indicate how Kaloko and Aimakapa Ponds fit into the anchialine pond conceptual framework. While there are major differences in the present structure and function of the two fishponds, there is an important similarity. The floors of both fishponds consist of thick sediment layers which act as "plugs" to greatly limit the input and exchange of freshwater to the ponds. As a result of the plugging, groundwater flow to ocean is predominantly around, rather than through the ponds. The restricted flow of freshwater through the ponds is borne out by the near complete lack of both vertical and horizontal gradients within the ponds, as well as substantial damping of tidal oscillations. If the rate of freshwater input was more in line with the mixing rate, distinct vertical, and possibly horizontal stratification would be evident.

Kaloko Pond is not technically an anchialine pond because it contains direct connections to the ocean. Water in the pond is near oceanic in salinity, indicating that groundwater comprises a very small component of the pond makeup. If ongoing construction of the new rock wall

separating the pond from the ocean includes more open channels, it is likely that salinity in the pond will increase even further, lowering the contribution from groundwater.

Aimakapa Pond, on the other hand, can be considered an anchialine pond because it is sealed from direct exchange with the ocean by a sand berm of low permeability. As a result, a substantial fraction of the water in the pond is comprised of groundwater. Because of the thick sediment layer coating the floor of the pond, however, water exchange is very slow resulting in long residence time within the enclosed basin. Owing to the slow rate of exchange, chemical composition of water in Aimakapa Pond consists of exceedingly high levels of organic nutrients that result from inorganic nutrient uptake and metabolic cycling by pond plants, as well as bacterial decomposition of organic material. In summary, the structure and function of these two ponds is distinctly different from a healthy anchialine pond.

Kaloko Industrial Park Phases III and IV does not include any plans for any direct alteration of the shoreline or offshore areas. Therefore, potential impacts to the marine environment can only be considered from activities on land that may result in delivery of materials to the ocean through infiltration to groundwater, changes in surface runoff, and wind transport. The project may have an impact on groundwater as a result of: 1) disposal of wastewater generated on-site; 2) disposal of stormwater runoff; and 3) percolating water from landscape irrigation. Presented below are considerations of potential impacts from sedimentation, nutrient enrichment and biocides that may be considerations for the planned project.

4.0.1 SEDIMENTATION AND RUNOFF

A potential mechanism for negative impact to nearshore marine and pond systems is increased sedimentation from wind and surface runoff as a consequence of grading and changes in land use. There appears to be little potential for alteration to the pond and marine communities offshore of Kaloko Industrial Park, Phases III and IV from increased sedimentation associated with the project for several reasons. The climate of the Kaloko area is one of the driest in the Hawaiian Islands. On an annual basis rainfall is likely to be far exceeded by evaporation at the proposed project site. Surface water runoff from storm events is infrequent. The basaltic composition of the land surface is highly porous and is capable of absorbing rainfall with little or no surface runoff. Even in the event of heavy rainfall, the porous nature of the soil ground cover is such that sheet flow carrying suspended sediment toward the ocean would be

expected to be relatively small. Rather, most rainwater that would enter the ocean as runoff would do so following percolation through the surface rock layers to the water table, followed by groundwater extrusion at the shoreline.

The project site is presently comprised of extensive areas of exposed soil and rock, with relatively little vegetative groundcover. During the construction phases, it is likely that permit regulations will limit the area of excavation at any one time, and require dust- control measures. In addition, the predominant direction of wind (land breezes) generated by thermal convection from solar heating of the land mass is inland, resulting in transport of dust inland, and not toward the ocean. As a result, it appears that there is little potential for significant input of sediment to the marine and pond environment resulting from the proposed project.

The entire floors of Kaloko and Aimakapa Ponds are covered with a thick layer of fine mud-sand sediment. As described above, the sediment layer plays a large role in restricting groundwater flow within the ponds. Pond biota is adapted to this high sediment composition. Should a small amount of sediment reach the pond as a result of construction activity, it is not likely that there will be any qualitative change to sediment composition.

Within the marine environment, the nearshore area contains locally high regions of cover of calcareous sands of marine origin. Corals and other reef organisms are capable of removing sediment suspended by natural phenomena, up to threshold levels of deposition where cleaning mechanisms are overwhelmed and organisms become buried. Because of the existence of natural sands, and the normally turbulent conditions which continually resuspend natural sediment, biotic community structure is presently adapted to extremes in sediment stress from natural conditions. Organisms that do occur in the region are therefore capable of withstanding the stress associated with large natural sediment loads. In comparison to the frequent natural sediment resuspension within the study area, any additional input from land resulting from construction activity would probably not have the potential to accumulate to the point were organisms could be buried.

4.0.2 ALTERATION OF GROUNDWATER FLOW

TNWRE (2000) provides a detailed description of the hydrology of the Kaloko area and the potential for changes that may occur to groundwater discharge to the ocean as a result of the

Kaloko Industrial Park, Phases III and IV project. Four aspects of the project development have the potential to change the groundwater flowrate and/or chemistry:

1) supplying potable water to the project from wells located in the high level aquifer directly inland will decrease the recharge to the basal lens.

2) disposal of wastewater in individual onsite systems such as septic tanks and leach fields will create a nutrient-rich source of local recharge to the basal lens.

3) Collection of surface runoff from impervious surfaces and its disposal in dry wells and seepage pits will create a source of local recharge with potential water quality consequences.

4) percolation of excess landscape irrigation and other miscellaneous outdoor uses of water are another source of local recharge with the potential to impact groundwater chemistry.

In summary, TNWRE (2000) found that within the northern half of Kaloko-Honokohau National Historical Park (down gradient from the subject property), the groundwater flowrate would be increased in the range of 7-10%, with a decrease in salinity of 6-8%. Both of these changes are within the range of seasonal and year-to-year variability of the natural system, and would therefore not likely cause any observable changes to the ponds or ocean.

Levels of nitrogen (NO_3^- or TN) would increase in the range of 9-17%, while phosphorus (PO_4^{-3} or TP) would increase in the range of 16-26%.The higher end of these ranges is greater than the seasonal and year-to-year variability in groundwater. However, such increases are not likely to result in changes to the ponds or nearshore ocean. As described above, healthy anchialine ponds are not nutrient limited, and already contain an excess of nutrients that are not utilized within the biogeochemical cycles within the ponds. As such, as long as there are no changes to the physical structure of healthy anchialine ponds (e.g., infilling) or changes to the balance of native biotic assemblages (e.g., introduction of alien species) an increase in nutrient concentrations in groundwater entering the ponds would have no effect.

With respect to the fishponds, Kaloko Pond presently consists primarily of seawater (~93%). As NO_3^- is the limiting nutrient in the fishponds, it is the nutrient that could provide the mechanism for change. At a maximum increase of 17% in the 7% of groundwater that

comprises pond water, concentrations would increase by less than 1% within the pond. Such a small increase is likely within the natural variability of the system and should not result in any noticeable effect. In Aimakapa pond, salinity indicates that pond water is about 63% groundwater. Therefore, an increase of NO_3^- of 17% could increase the concentration within the pond by about 11%. The data suggests however, that owing to the restricted circulation Aimakapa Pond has already reached a level of metabolic function far beyond a balanced cycle (e.g., large excesses of organic nutrients). As a result, input of more inorganic nutrients to the low-exchange pond should result in no further changes.

TNWRE (2000) also calculates the cumulative changes that could occur in the Kaloko-Honokohau National Historical Park area assuming that all of the present and proposed projects are implemented. These calculations indicate a 7% decrease in groundwater flowrate, with a 10% increase in salinity. Nitrogen levels would be expected to increase by 45-50%, which is a large increase over the present levels which are already relatively high. Similarly, phosphate would be expected to increase by 30-45%. The changes to flowrate, salinity, and nutrient concentrations for the cumulative scenario over the present situation above are primarily the result of a change from on-site wastewater disposal to use of the County Kealakehe Waste Water Treatment Plant.

The considerations of the effects of these nutrient increases to the ponds are essentially the same as described for the effects of the Kaloko Industrial Park, Phases III and IV. Non-nutrient limited systems should not change regardless of nutrient concentrations as long as other physical/biotic components remain unperturbed. The predominantly seawater composition, and perhaps increased exchange with the ocean in the future should mitigate any groundwater effects to Kaloko Pond. Restricted circulation in the enclosed basin of Aimakapa Pond has resulted in the present condition which consists of a "nutrient saturated system" that is already beyond the level of additional impact by further incremental nutrient enrichment.

It is also unlikely that there would be any effects to the nearshore marine environment as a result of increases in nutrient concentrations in groundwater. Dollar and Atkinson (1992) modeled the input of nutrients to the ocean downslope from two golf courses in West Hawaii over a four-year period. Results of the studies showed that at a location where fertilizer nutrients entered an embayment (Keauhou Bay) with restricted circulation relative to open coastal shorelines, nitrates increased by about 100% and phosphate increased by about 20%

over natural input. However, because the nutrients were retained within a surface layer, there was no exposure to the benthos. Circulation within the embayment was also rapid enough to prevent phytoplankton blooms. These results indicated that even with long-term input of extremely high nutrient subsidies, there are situations where there are no negative effects to the receiving environment. Similar lack of impact would be expected at the Kaloko-Honokohau region where nutrient subsidies would be less than have occurred at Keauhou.

4.0.3 EFFECTS of TOXIC MATERIALS

Oki et al. (1999) report that out of 151 trace metals and organic contaminates tested for, only chromium, and copper, and one semi-volatile organic compound (phenol) were detected in the three monitoring wells within Kaloko-Honokohau National Historical Park. Chromium and copper were also detected in a well up gradient of the commercial area mauka of the Park. As a result, phenol was the only compound that could be assumed to be delivered to groundwater from human activities at the existing commercial developments. Regardless of the low number of potentially toxic materials that have been detected within groundwater there are concerns regarding increased contamination as a result of future development.

The analyses performed for this report are directed at understanding the effects to aquatic systems through alteration in groundwater nutrients and salinity that might arise from the proposed development. These analyses are based on the premise that nutrients and salinity are natural components of the systems and that existing communities utilized these materials within ongoing biogeochemical cycling. As natural components of the system, changes in concentrations may or may not have an effect, depending on a variety of circumstances.

Toxic substances, such as the contaminants tested for by Oki et al. (1999) are not part of the natural composition of the ponds and ocean. Thus, it is not possible to predict the effects of varying concentrations of these materials to the natural systems, as is the case for nutrients. Rather, mitigation of effects from toxic contaminants should come from effective "best management practices" (BMP's) and engineering solutions incorporated into the project planning. Such planning should provide the methods to eliminate any potential contaminants to groundwater that could eventually reach the ponds or ocean.

4.0.4 EFFECTS TO NELH AND HOST PARK

A concern that has been raised regarding development in the Kaloko-Honokohau region is the effect to water chemistry at NELH and HOST Park mariculture facilities located at Keahole Point, approximately 3.5 miles from the project site. These concerns are apparently based on suppositions regarding upwelling and current-driven transport of materials emanating from the project site to the Keahole area. The concern is without merit for several reasons. First, the premise on which the NELH concept is based is to utilize the high nutrient content in cold deep seawater from below the photic zone to stimulate production in mariculture ventures. The close proximity of land to deep water afforded by the steeply sloping nearshore topography off Keahole Point makes this area uniquely suited as a site for the facility. Most of the water used at NELH is pumped from a depth of 1,995 feet (608 m), far below the thermocline which restricts exchange between deep and surface waters. Deep water that might be upwelled to the surface that could be influenced by the project could not be returned to the depth of intake. Hence, there is virtually no chance for contact between any water that might be influenced by activities on land and intake of cold water at NELH.

Secondly, the major point of the report is to address the potential for increased nutrient percolation to groundwater and the coastal ocean as a result of the proposed project. While it is extremely unlikely that any increases in nutrients in coastal seawater would be detectable 3.5 miles away from the project site, it must be recognized that the purpose of the NELH facility is to utilize high nutrient water for productive purposes. Hence, any increased nutrient concentrations at NELH cannot be considered a negative effect. This point is most effectively demonstrated in that the NELH and HOST Park tenants discharge all of their used water into on-site trenches which percolates to the water table and eventually to the nearshore ocean. The increased levels of nutrients in groundwater on the NELH property is clearly evident in data from monitoring wells on the site. Hence, while extremely remote, any effects from nutrient subsidies that may result from the proposed project are overshadowed by the standard operation of the NELH facilities.

4.0.5 POTENTIAL EFFECTS TO ENDANGERED AND PROTECTED MARINE SPECIES

As mentioned in the results there are several protected marine species that may inhabit the offshore environment. Because there is no plan for any work in the nearshore region, there is no potential for blasting or excavation that might affect behavior of whales, monk seals and other marine mammals. Similarly, as described above, there is little potential for changes in water quality resulting from construction. As part of the Kaloko area mauka of Queen

Kaahumanu Highway is a National Park, the Kaloko Industrial Park, Phases III and IV project will not alter access to the shoreline. Thus, there is little potential for any negative factors associated with the project that may affect turtles or other protected species.

5.0 SUMMARY

A major concern in the planning process for the Kaloko Industrial Park, Phases III and IV is impacts to pond and marine environments within the Kaloko-Honokohau National Historical Park, which lies directly down gradient from the project site. As there will be no alterations of any of the pond or marine habitats by the project, potential impacts could only result from alteration of groundwater that flows under the project site to the ocean.

The potential for impact to marine and pond communities as a result of development of the Kaloko Industrial Park, Phases III and IV project appears to be minimal. The two large fishponds within the Park are similar in that thick sediment lining the floors of the ponds effectively plugs the ponds from free exchange of groundwater. As a result, the major flow of groundwater appears to be around the ponds rather than through them. Water in Kaloko Pond is presently almost completely seawater with little vertical or horizontal stratification. Aimakapa Pond contains a greater percentage of groundwater than Kaloko, and is also unstratified. The lack of stratification, along with substantially damped tidal oscillations, indicate a reduced input of groundwater than would occur without the sediment plugs. Inorganic nutrients, particularly NO_3^-, entering the pond from groundwater input are removed from the water column by plant uptake.

The distinct step-function discontinuity between concentrations of water chemistry constituents between the seaward end of the Aimakapa Pond and the nearshore portion of the ocean indicates that the sand berm rampart is an effective barrier preventing free exchange between the pond and ocean. As a result of these limited water exchange in Aimakapa Pond, there is a large buildup of organic nutrients within the water column from. As a result, Aimakapa Pond can be considered "nutrient saturated."

Groundwater mixing with seawater in the nearshore ocean results in detectable vertical and horizontal gradients of water chemistry constituents. While separated by only a short distance, Aimakapa pond water and ocean water display very different characteristics with little apparent communication. Conversely, because of the direct connection between the

ocean and Kaloko Pond, water quality characteristics between the pond and the ocean are relatively similar. None of the nearshore areas of the marine environment appear to be affected by water quality of the ponds.

Estimates of changes in groundwater flow volume and salinity that would occur from the Kaloko Industrial Park, Phases III and IV project are within the range of natural variability. Increases in nutrient concentrations to groundwater also do not appear to have the potential to induce long-term changes in physio-chemical composition of pond or marine waters of a magnitude sufficient to cause changes in biological community structure. Estimates of cumulative changes to groundwater from the total assemblage of existing and proposed projects also do not appear to have the potential for alterations to pond or marine habitats. The natural progression of pond development (primarily a reduction in circulation through sediment deposition) dominates the functional aspects of the ponds, and will largely negate any effects of changes in nutrient concentrations. Aquatic and marine environments are routinely subjected to natural stresses that can be much more destructive than the small changes that might result from any development activity. Tolerance to such changes appears to already be part of the physiological range of the community.

Mitigation measures through BMP's and engineering solutions should be the primary considerations for eliminating potential impacts from toxic materials to pond and marine biota.

There is no indication that the project will have any effect on the NELH-HOST Park facility at Keahole Point. Cold water used by the mariculture facilities does not come into contact with surface ocean water. In addition, high nutrient water used at the facility is discharged into trenches that allows percolation to the water table. As a result, nutrient concentrations in groundwater that flows to the ocean is presently higher at NELH-HOST Park than it could be with construction and operation of the planned project.

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TABLE 3. Results of water chemistry measurements in Kaloko Pond and the coastal ocean directly off of the pond. "S" indicates surface sample; "B" indicates bottom sample. "DFS" indicates "distance from shore";negative values indicate distance inland from the beach berm; positive values indicate distance seaward from the beach berm. Nutrient concentrations are shown in micromolar units. For station sampling locations, see Figure 1.

SAMPLING STATION		DFS (m)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	DOP (µM)	DON (µM)	TP (µM)	TN (µM)	Turb (ntu)	TSS (mg/l)	Salt (o/oo)	pH (rel)	Chl-a (µg/l)	O2 (%sat)
1-S	KALOKO POND	-200-S	0.35	0.08	0.04	77.57	0.72	23.17	1.07	23.29	0.70	8.87	32.184	8.327	4.800	94.9
1-B		-200-B	0.30	0.06	0.13	76.27	0.48	18.03	0.78	18.22	0.80	14.80	32.240	8.349	8.979	96.5
2-S		-170-S	0.23	0.05	0.18	76.71	0.49	17.18	0.72	17.41	0.69	11.20	32.195	8.351	3.633	97.0
2-B		-170-B	0.39	0.05	0.25	44.03	0.43	16.70	0.82	17.00	0.72	10.80	33.513	8.351	7.951	97.7
3-S		-140-S	0.24	0.04	0.17	66.69	0.45	17.33	0.69	17.54	0.62	8.20	32.618	8.360	3.143	96.4
3-B		-140-B	0.35	0.06	0.21	45.37	0.47	16.70	0.82	16.97	0.66	10.80	33.409	8.361	2.903	98.5
4-S		-110-S	0.24	0.06	0.15	60.35	0.49	17.16	0.73	17.37	0.58	8.93	32.841	8.365	2.941	98.7
4-B		-110-B	0.31	0.05	0.54	40.77	0 42	15.56	0.73	16.15	0.63	11.86	33.595	8.342	2.530	94.5
5-S		-80-S	0.21	0.03	0.13	59.51	0.52	17.62	0.73	17.78	0.61	7.60	32.889	8.360	2.618	99.3
5-B		-80-B	0.36	0.04	0.18	37.85	0.53	18.25	0.69	18.47	0.59	7.27	33.736	8.297	2.736	82.6
6-S		-50-S	0.28	0.04	0.15	59.68	0.46	17.71	0.74	17.90	0.56	9.40	32.926	8.355	2.564	97.9
6-B		-50-B	0.26	0.06	0.18	44.48	0.51	16.76	0.77	17.00	0.62	12.40	33.477	8.341	4.116	93.4
7-S		-20-S	0.24	0.07	0.31	56.38	0.55	17.06	0.79	17.44	0.53	5.80	33.034	8.361	2.316	95.0
7-B		-20-B	0.30	0.03	0.18	51.81	0.45	15.53	0.75	15.74	0.56	8.93	33.233	8.356	2.622	96.4
8-S		-1-S	0.23	0.09	0.19	52.00	0.51	18.46	0.74	18.74	0.58	8.40	33.213	8.351	3.415	93.8
8-B		-1-B	0.23	0.26	0.38	50.39	0.48	16.57	0.71	17.21	0.54	6.47	33.277	8.335	3.176	91.8
9-S	OCEAN	1-S	0.37	3.04	0.40	62.65	0.37	14.27	0.74	17.71	0.31	14.20	32.416	8.408	7.636	94.3
10-S		3-S	0.33	3.39	0.57	66.43	0.24	9.25	0.57	13.21	0.28	4.80	32.401	8.377	0.885	98.3
11-S		10-S	0.34	3.67	0.62	66.57	0.25	9.12	0.59	13.41	0.38	2.93	32.418	8.355	0.730	95.9
12-S		25-S	0.31	5.88	0.25	115.18	0.29	8.66	0.60	14.79	0.19	4.27	30.685	8.333	0.331	115.6
12-B		25-B	0.73	5.64	0.53	108.98	0.34	19.95	1.07	26.12	0.17	2.80	30.918	8.336	0.470	124.4
13-S		50-S	0.30	4.13	0.25	83.02	0.29	9.26	0.59	13.64	0.20	3.20	31.791	8.298	0.466	119.1
13-B		50-B	0.25	3.15	0.20	25.43	0.30	8.15	0.50	11.46	0.14	2.90	32.538	8.289	0.387	117.3
14-S		100-S	0.17	2.10	0.18	47.33	0.30	7.95	0.47	10.23	0.12	1.80	33.107	8.260	0.277	111.3
14-B		100-B	0.15	0.48	0.15	12.20	0.30	8.07	0.45	8.70	0.13	1.67	34.298	8.238	0.239	108.8
15-S		150-S	0.15	0.77	0.13	14.51	0.27	6.36	0.42	7.26	0.13	1.98	33.798	8.180	0.096	112.0
15-B		150-B	0.11	0.19	0.08	3.87	0.26	6.34	0.37	6.61	0.05	1.78	34.183	8.160	0.075	109.4

TABLE 4. Results of water chemistry measurements in Kaloko Pond and the coastal ocean directly off of the pond. "S" indicates surface sample; "B" indicates bottom sample. "DFS" indicates "distance from shore";negative values indicate distance inland from the beach berm; positive values indicate distance seaward from the beach berm. Nutrient concentrations are shown in micrograms per liter. For station sampling locations, see Figure 1.

SAMPLING STATION		DFS (m)	PO4 (µg/L)	NO3 (µg/L)	NH4 (µg/L)	Si (µg/L)	DOP (µg/L)	DON (µg/L)	TP (µg/L)	TN (µg/L)	Turb (ntu)	TSS (mg/l)	Salt (o/oo)	pH (rel)	Chl-a (µg/l)	O2 (%sat)
1-S	KALOKO POND	-200-S	10.85	1.12	0.56	2172.0	22.32	324.38	33.17	326.06	0.70	8.87	32.184	8.327	4.800	94.9
1-B		-200-B	9.30	0.84	1.82	2135.6	14.88	252.42	24.18	255.08	0.80	14.80	32.240	8.349	8.979	96.5
2-S		-170-S	7.13	0.70	2.52	2147.9	15.19	240.52	22.32	243.74	0.69	11.20	32.195	8.351	3.633	97.0
2-B		-170-B	12.09	0.70	3.50	1232.8	13.33	233.80	25.42	238.00	0.72	10.80	33.513	8.351	7.951	97.7
3-S		-140-S	7.44	0.56	2.38	1867.3	13.95	242.62	21.39	245.56	0.62	8.20	32.618	8.360	3.143	96.4
3-B		-140-B	10.85	0.84	2.94	1270.4	14.57	233.80	25.42	237.58	0.66	10.80	33.409	8.361	2.903	98.5
4-S		-110-S	7.44	0.84	2.10	1689.8	15.19	240.24	22.63	243.18	0.58	8.93	32.841	8.365	2.941	98.7
4-B		-110-B	9.61	0.70	7.56	1141.6	13.02	217.84	22.63	226.10	0.63	11.86	33.595	8.342	2.530	94.5
5-S		-80-S	6.51	0.42	1.82	1666.3	16.12	246.68	22.63	248.92	0.61	7.60	32.889	8.360	2.618	99.3
5-B		-80-B	11.16	0.56	2.52	1059.8	16.43	255.50	27.59	258.58	0.59	7.27	33.736	8.297	2.736	82.6
6-S		-50-S	8.68	0.56	2.10	1671.0	14.26	247.94	22.94	250.60	0.56	9.40	32.926	8.355	2.564	97.9
6-B		-50-B	8.06	0.84	2.52	1245.4	15.81	234.64	23.87	238.00	0.62	12.40	33.477	8.341	4.116	93.4
7-S		-20-S	7.44	0.98	4.34	1578.6	17.05	238.84	24.49	244.16	0.53	5.80	33.034	8.361	2.316	95.0
7-B		-20-B	9.30	0.42	2.52	1450.7	13.95	217.42	23.25	220.36	0.56	8.93	33.233	8.356	2.622	96.4
8-S		-1-S	7.13	1.26	2.66	1456.0	15.81	258.44	22.94	262.36	0.58	8.40	33.213	8.351	3.415	93.8
8-B		-1-B	7.13	3.64	5.32	1410.9	14.88	231.98	22.01	240.94	0.54	6.47	33.277	8.335	3.176	91.8
9-S	OCEAN	1-S	11.47	42.56	5.60	1754	11.47	199.78	22.94	247.94	0.31	14.20	32.416	8.408	7.636	94.3
10-S		3-S	10.23	47.46	7.98	1860	7.44	129.50	17.67	184.94	0.28	4.80	32.401	8.377	0.885	98.3
11-S		10-S	10.54	51.38	8.68	1864	7.75	127.68	18.29	187.74	0.38	2.93	32.418	8.355	0.730	95.9
12-S		25-S	9.61	82.32	3.50	3225	8.99	121.24	18.60	207.06	0.19	4.27	30.685	8.333	0.331	115.6
12-B		25-B	22.63	76.96	7.42	3051	10.54	279.30	33.17	365.68	0.17	2.80	30.918	8.336	0.470	124.4
13-S		50-S	9.30	57.82	3.50	2325	8.99	129.64	18.29	190.96	0.20	3.20	31.791	8.298	0.466	119.1
13-B		50-B	7.75	44.10	2.80	712.0	9.30	114.10	15.50	160.44	0.14	2.90	32.538	8.289	0.387	117.3
14-S		100-S	5.27	29.40	2.52	1325	9.30	111.30	14.57	143.22	0.12	1.80	33.107	8.260	0.277	111.3
14-B		100-B	4.65	6.72	2.10	341.6	9.30	112.98	13.95	121.80	0.13	1.67	34.298	8.238	0.239	108.8
15-S		150-S	4.65	10.78	1.82	406.3	8.37	89.04	13.02	101.64	0.13	1.98	33.798	8.180	0.096	112.0
15-B		150-B	3.41	2.66	1.12	108.4	8.06	88.76	11.47	92.54	0.05	1.78	34.183	8.160	0.075	109.4

TABLE 1. Results of water chemistry measurements in Aimakapa Pond and the coastal ocean directly off of the pond. "S" indicates surface sample; "B" indicates bottom sample. "DFS" indicates "distance from shore";negative values indicate distance inland from the beach berm; positive values indicate distance seaward from the beach berm. Nutrient concentrations are shown in micromolar units."Bdl" stands for "below detection limit."For station sampling locations, see Figure 1.

SAMPLING STATION		DFS (m)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	DOP (µM)	DON (µM)	TP (µM)	TN (µM)	Turb (ntu)	TSS (mg/l)	Salt (o/oo)	pH (rel)	Chl-a (µg/l)	O2 (%sat)
1-S	AIMAKAPA POND	-230-S	0.51	0.16	bdl	439.57	3.28	79.37	3.79	79.53	4.10	6.00	12.855	8.195	2.815	88.1
1-B		-230-B	0.55	0.19	0.01	439.23	5.71	129.89	6.26	130.09	13.20	85.60	12.864	8.225	15.57	81.9
2-S		-190-S	0.64	0.25	0.04	403.45	3.58	102.90	4.22	103.19	6.00	13.20	13.158	8.509	5.064	91.3
2-B		-190-B	0.63	0.29	0.04	403.48	3.61	102.31	4.24	102.64	6.10	22.71	13.164	8.585	9.021	93.0
3-S		-150-S	0.63	0.28	0.03	402.61	3.57	102.21	4.20	102.52	6.20	16.00	13.169	8.548	5.203	93.7
3-B		-150-B	0.63	0.28	0.08	382.35	4.19	117.16	4.82	117.52	36.00	290.2	13.184	8.445	59.33	72.7
4-S		-110-S	0.65	0.30	0.06	397.99	3.72	107.52	4.37	107.88	6.60	19.80	13.248	8.538	16.28	91.3
4-B		-110-B	0.66	0.28	0.08	393.74	3.83	108.90	4.49	109.26	20.40	203.0	13.253	8.569	49.26	87.5
5-S		-80-S	0.67	0.32	0.07	397.31	3.77	106.84	4.44	107.23	8.20	9.87	13.175	8.599	23.45	90.6
5-B		-80-B	0.77	0.32	0.16	405.77	4.86	135.26	5.63	135.74	24.60	283.0	13.179	8.517	51.82	80.7
6-S		-40-S	0.66	0.31	0.11	395.68	3.83	108.31	4.49	108.73	6.80	15.40	13.223	8.609	16.87	91.7
6-B		-40-B	0.67	0.32	0.13	395.74	3.83	107.03	4.50	107.48	7.80	180.4	13.239	8.606	26.52	93.8
7-S		-1-S	0.64	0.28	0.12	397.33	3.58	102.56	4.22	102.96	6.30	8.93	13.253	8.652	4.699	97.7
7-B		-1-B	0.64	0.35	0.16	394.13	7.31	175.63	7.95	176.14	28.00	278.3	13.369	8.517	106.4	76.9
8-S	OCEAN	1-S	0.26	1.81	0.09	68.18	0.32	9.49	0.58	11.39	0.40	4.40	32.413	8.112	0.751	96.2
9-S		3-S	0.24	1.81	0.23	68.66	0.30	9.28	0.54	11.32	0.33	3.27	32.287	8.098	0.323	97.6
10-S		10-S	0.33	2.80	0.08	80.40	0.27	8.98	0.60	11.86	0.21	2.93	31.733	8.152	0.206	102.6
10-B		10-B	0.30	2.07	0.12	68.01	0.27	8.69	0.57	10.88	0.30	2.29	32.283	8.107	0.260	98.9
11-S		25-S	0.24	4.09	0.29	138.35	0.31	9.16	0.55	13.54	0.42	9.40	29.343	8.270	0.239	123.6
11-B		25-B	0.32	2.19	0.36	93.10	0.42	11.68	0.74	14.23	0.35	11.20	31.032	8.226	0.772	117.2
12-S		50-S	0.28	2.35	0.23	91.72	0.29	9.09	0.57	11.67	0.25	5.20	31.090	8.207	0.696	114.2
12-B		50-B	0.22	1.35	0.22	61.10	0.32	9.76	0.54	11.33	0.40	2.47	32.305	8.279	0.273	131.3
13-S		100-S	0.27	0.99	0.13	48.52	0.29	10.48	0.56	11.60	0.19	2.93	32.755	8.229	0.206	112.4
13-B		100-B	0.14	0.23	0.22	26.78	0.30	9.10	0.44	9.55	0.27	5.67	33.549	8.234	0.210	110.9
14-S		150-S	0.19	0.70	0.15	11.80	0.24	6.98	0.43	7.83	0.08	2.87	33.956	8.164	0.089	119.7
14-B		150-B	0.14	0.30	0.03	3.99	0.31	5.99	0.45	6.32	0.11	3.74	34.178	8.163	0.054	99.8

TABLE 2. Results of water chemistry measurements in Aimakapa Pond and the coastal ocean directly off of the pond. "S" indicates surface sample; "B" indicates bottom sample. "DFS" indicates "distance from shore";negative values indicate distance inland from the beach berm; positive values indicate distance seaward from the beach berm. Nutrient concentrations are shown in micrograms per liter. "Bdl" stands for "below detection limit." For station sampling locations, see Figure 1.

SAMPLING STATION		DFS (m)	PO4 (µg/L)	NO3 (µg/L)	NH4 (µg/L)	Si (µg/L)	DOP (µg/L)	DON (µg/L)	TP (µg/L)	TN (µg/L)	Turb (ntu)	TSS (mg/l)	Salt (o/oo)	pH (rel)	Chl-a (µg/l)	O2 (%sat)
1-S	AIMAKAPA POND	-230-S	15.81	2.24	bdl	12308	101.7	1111.2	117.49	1113.4	4.10	6.00	12.855	8.195	2.815	88.1
1-B		-230-B	17.05	2.66	0.14	12298	177.0	1818.5	194.06	1821.3	13.20	85.60	12.864	8.225	15.57	81.9
2-S		-190-S	19.84	3.50	0.56	11297	111.0	1440.6	130.82	1444.7	6.00	13.20	13.158	8.509	5.064	91.3
2-B		-190-B	19.53	4.06	0.56	11297	111.9	1432.3	131.44	1437	6.10	22.71	13.164	8.585	9.021	93.0
3-S		-150-S	19.53	3.92	0.42	11273	110.7	1430.9	130.2	1435.3	6.20	16.00	13.169	8.548	5.203	93.7
3-B		-150-B	19.53	3.92	1.12	10706	129.9	1640.2	149.42	1645.3	36.00	290.2	13.184	8.445	59.33	72.7
4-S		-110-S	20.15	4.20	0.84	11144	115.3	1505.3	135.47	1510.3	6.60	19.80	13.248	8.538	16.28	91.3
4-B		-110-B	20.46	3.92	1.12	11025	118.7	1524.6	139.19	1529.6	20.40	203.0	13.253	8.569	49.26	87.5
5-S		-80-S	20.77	4.48	0.98	11125	116.9	1495.8	137.64	1501.2	8.20	9.87	13.175	8.599	23.45	90.6
5-B		-80-B	23.87	4.48	2.24	11362	150.7	1893.6	174.53	1900.4	24.60	283.0	13.179	8.517	51.82	80.7
6-S		-40-S	20.46	4.34	1.54	11079	118.7	1516.3	139.19	1522.2	6.80	15.40	13.223	8.609	16.87	91.7
6-B		-40-B	20.77	4.48	1.82	11081	118.7	1499.4	139.5	1504.7	7.80	180.4	13.239	8.606	26.52	93.8
7-S		-1-S	19.84	3.92	1.68	11125	111.0	1435.8	130.82	1441.4	8.30	8.93	13.253	8.652	4.699	97.7
7-B		-1-B	19.84	4.90	2.24	11036	226.6	2458.8	246.45	2466	28.00	278.3	13.369	8.517	106.4	76.9
8-S	OCEAN	1-S	8.06	25.34	1.26	1909	9.92	132.86	17.98	159.46	0.40	4.40	32.413	8.112	0.751	96.2
9-S		3-S	7.44	25.34	3.22	1922	9.30	129.92	16.74	158.48	0.33	3.27	32.287	8.098	0.323	97.6
10-S		10-S	10.23	39.20	1.12	2251	8.37	125.72	16.60	166.0	0.21	2.93	31.733	8.152	0.206	102.6
10-B		10-B	9.30	28.98	1.68	1904	8.37	121.66	17.67	152.32	0.30	2.29	32.283	8.107	0.260	98.9
11-S		25-S	7.44	57.26	4.06	3874	9.61	128.24	17.05	189.56	0.42	9.40	29.343	8.270	0.239	123.6
11-B		25-B	9.92	30.66	5.04	2607	13.02	163.52	22.94	199.22	0.35	11.20	31.032	8.226	0.772	117.2
12-S		50-S	8.68	32.90	3.22	2568	8.99	127.26	17.67	163.38	0.25	5.20	31.090	8.207	0.696	114.2
12-B		50-B	6.82	18.90	3.08	1711	9.92	136.64	16.74	158.62	0.40	2.47	32.305	8.279	0.273	131.3
13-S		100-S	8.37	13.86	1.82	1359	8.99	146.72	17.36	162.4	0.19	2.93	32.755	8.229	0.206	112.4
13-B		100-B	4.34	3.22	3.08	749.84	9.30	127.4	13.64	133.7	0.27	5.67	33.549	8.234	0.210	110.9
14-S		150-S	5.89	9.80	2.10	330.4	7.44	97.72	13.33	109.62	0.08	2.87	33.956	8.164	0.089	119.7
14-B		150-B	4.34	4.20	0.42	111.72	9.61	83.86	13.95	88.48	0.11	3.74	34.178	8.163	0.054	99.8

TABLE 5. Concentrations of dissolved nutrients and salinity from wells and other shoreline locations in the vicinity of Kaloko-Honokohau, North Kona, Hawaii. Samples collected in May-June, 2000. Concentrations of nutrients are in micromolar units.Wells designated "K-H" are monitoring wells in Kaloko-Honokohau National Park. Springs around Kaloko and Aimakapa ponds are designated as "mauka" for springs along the landward margins of the ponds, and "makai" for springs along the ocean margins of the ponds. Nutrient concentrations are in micromoles (µM).

WATER SOURCE	WELL NO.	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	DOP (µM)	DON (µM)	TP (µM)	TN (µM)	SALT (o/oo)
HIGH LEVEL POTABLE WELLS	4057-01	3.76	86.00	bdl	801	0.08	14.72	3.84	100.72	0.109
	4158-02	3.64	80.12	bdl	844	0.20	14.52	3.84	94.64	0.144
	4258-03	3.85	70.20	1.20	833	0.50	19.40	4.35	90.80	0.165
	4358-01	3.40	71.84	0.04	908	0.95	11.92	4.35	83.80	0.182
BRACKISH WELLS										
K-H WELL 1	4061-01 -T	1.84	55.04	0.32	334	0.20	24.84	2.04	80.20	9.464
	4061-01 -T	1.44	56.24	3.52	304	2.96	32.08	4.40	91.84	9.463
	4061-01 -B	1.92	21.28	1.28	490	4.44	65.92	6.36	88.48	11.298
	4061-01 -B	2.64	54.40	1.36	477	3.36	38.24	6.00	94.00	10.655
K-H WELL 3	4161-01 -T	4.36	75.04	0.16	672	0.04	14.76	4.40	89.96	6.259
	4161-01 -T	4.64	76.88	1.60	701	2.64	43.20	7.28	121.68	6.325
	4161-01 -B	4.52	77.32	0.32	694	0.08	15.96	4.60	93.60	6.548
	4161-01 -B	5.28	76.40	1.52	709	2.24	31.36	7.52	109.28	6.601
K-H WELL 2	4161-02 -T	4.08	87.16	0.48	653	0.56	22.80	4.64	110.44	5.399
	4161-02 -T	9.04	104.32	5.12	691	2.88	42.16	11.92	151.60	5.361
	4161-02 -B	4.32	89.00	0.20	671	0.24	17.72	4.56	106.92	5.522
	4161-02 -B	5.20	89.68	0.04	696	2.32	32.48	7.52	122.80	5.883
	4262-01M-T	3.60	91.36	1.04	741	0.72	35.84	4.32	128.24	7.850
	4360-01	0.30	3.20	2.50	182	0.30	24.90	0.60	30.60	1.509
SALINE WELLS	4363-04	4.08	72.32	1.44	287	0.56	32.80	4.64	106.56	26.836
	4363-04	3.80	65.60	0.90	291	0.50	21.60	4.30	88.10	26.695
	3960-01	1.40	30.50	1.60	356	0.70	22.50	2.10	54.60	25.698
KALOKO SPRINGS	MAUKA	2.44	39.64	0.80	539	1.92	51.96	4.36	92.40	10.460
	MAUKA	3.84	63.28	3.04	650	3.68	51.76	7.52	118.08	9.899
	MAUKA	3.76	64.00	1.28	665	3.44	38.40	7.20	103.68	8.566
	MAKAI	3.20	56.96	1.84	601	2.64	25.76	5.84	84.56	14.254
AIMAKAPA SPRING	MAKAI	2.48	49.60	2.72	472	2.96	32.64	5.44	84.96	17.373
	MAKAI	15.12	64.24	12.40	388	1.76	76.96	16.88	153.60	13.309

TABLE 6. Concentrations of dissolved nutrients and salinity from wells and other shoreline locations in the vicinity of Kaloko-Honokohau, North Kona, Hawaii. Samples collected in May-June, 2000. Concentrations of nutrients are in micromolar units.Wells designated "K-H" are monitoring wells in Kaloko-Honokohau National Park. Springs around Kaloko and Aimakapa ponds are designated as "mauka" for springs along the landward margins of the ponds, and "makai" for springs along the ocean margins of the ponds. Nutrient concentrations are in micrograms per liter (µg/L).

WATER SOURCE	WELL NO.	PO4 (µg/L)	NO3 (µg/L)	NH4 (µg/L)	Si (µg/L)	DOP (µg/L)	DON (µg/L)	TP (µg/L)	TN (µg/L)	SALT (o/oo)
HIGH LEVEL POTABLE WELLS	4057-01	116.6	1204.0	bdl	22434	2.5	206.1	119.0	1410.1	0.109
	4158-02	112.8	1121.7	bdl	23632	6.2	203.3	119.0	1325.0	0.144
	4258-03	119.4	982.8	16.8	23324	15.5	271.6	134.9	1271.2	0.165
	4358-01	105.4	1005.8	0.6	25411	29.5	166.9	134.9	1173.2	0.182
BRACKISH WELLS										
K-H WELL 1	4061-01 -T	57.0	770.6	4.5	9349	6.2	347.8	63.2	1122.8	9.464
	4061-01 -T	44.6	787.4	49.3	8512	91.8	449.1	136.4	1285.8	9.463
	4061-01 -B	59.5	297.9	17.9	13732	137.6	922.9	197.2	1238.7	11.298
	4061-01 -B	81.8	761.6	19.0	13344	104.2	535.4	186.0	1316.0	10.655
K-H WELL 3	4161-01 -T	135.2	1050.6	2.2	18824	1.2	206.6	136.4	1259.4	6.259
	4161-01 -T	143.8	1076.3	22.4	19631	81.8	604.8	225.7	1703.5	6.325
	4161-01 -B	140.1	1082.5	4.5	19423	2.5	223.4	142.6	1310.4	6.548
	4161-01 -B	163.7	1069.6	21.3	19855	69.4	439.0	233.1	1529.9	6.601
K-H WELL 2	4161-02 -T	126.5	1220.2	6.7	18282	17.4	319.2	143.8	1546.2	5.399
	4161-02 -T	280.2	1460.5	71.7	19354	89.3	590.2	369.5	2122.4	5.361
	4161-02 -B	133.9	1246.0	2.8	18796	7.4	248.1	141.4	1496.9	5.522
	4161-02 -B	161.2	1255.5	9.0	19477	71.9	454.7	233.1	1719.2	5.883
	4262-01M-T	111.6	1279.0	14.6	20749	22.3	501.8	133.9	1795.4	7.850
	4360-01	9.3	44.8	35.0	5096	9.3	348.6	18.6	428.4	1.509
SALINE WELLS	4363-04	126.5	1012.5	20.2	8042	17.4	459.2	143.8	1491.8	26.836
	4363-04	117.8	918.4	12.6	8148	15.5	302.4	133.3	1233.4	26.695
	3960-01	43.4	427.0	22.4	9968	21.7	315.0	65.1	764.4	25.698
KALOKO SPRINGS	MAUKA	75.6	555.0	11.2	15092	59.5	727.4	135.2	1293.6	10.460
	MAUKA	119.0	885.9	42.6	18198	114.1	724.6	233.1	1653.1	9.899
	MAUKA	116.6	896.0	17.9	18608	106.6	537.6	223.2	1451.5	8.566
	MAKAI	99.2	797.4	25.6	16818	81.8	360.6	181.0	1183.8	14.254
AIMAKAPA SPRING	MAKAI	76.9	694.4	38.1	13207	91.8	457.0	168.6	1189.4	17.373
	MAKAI	468.7	899.4	173.6	10875	54.6	1077.4	523.3	2150.4	13.309

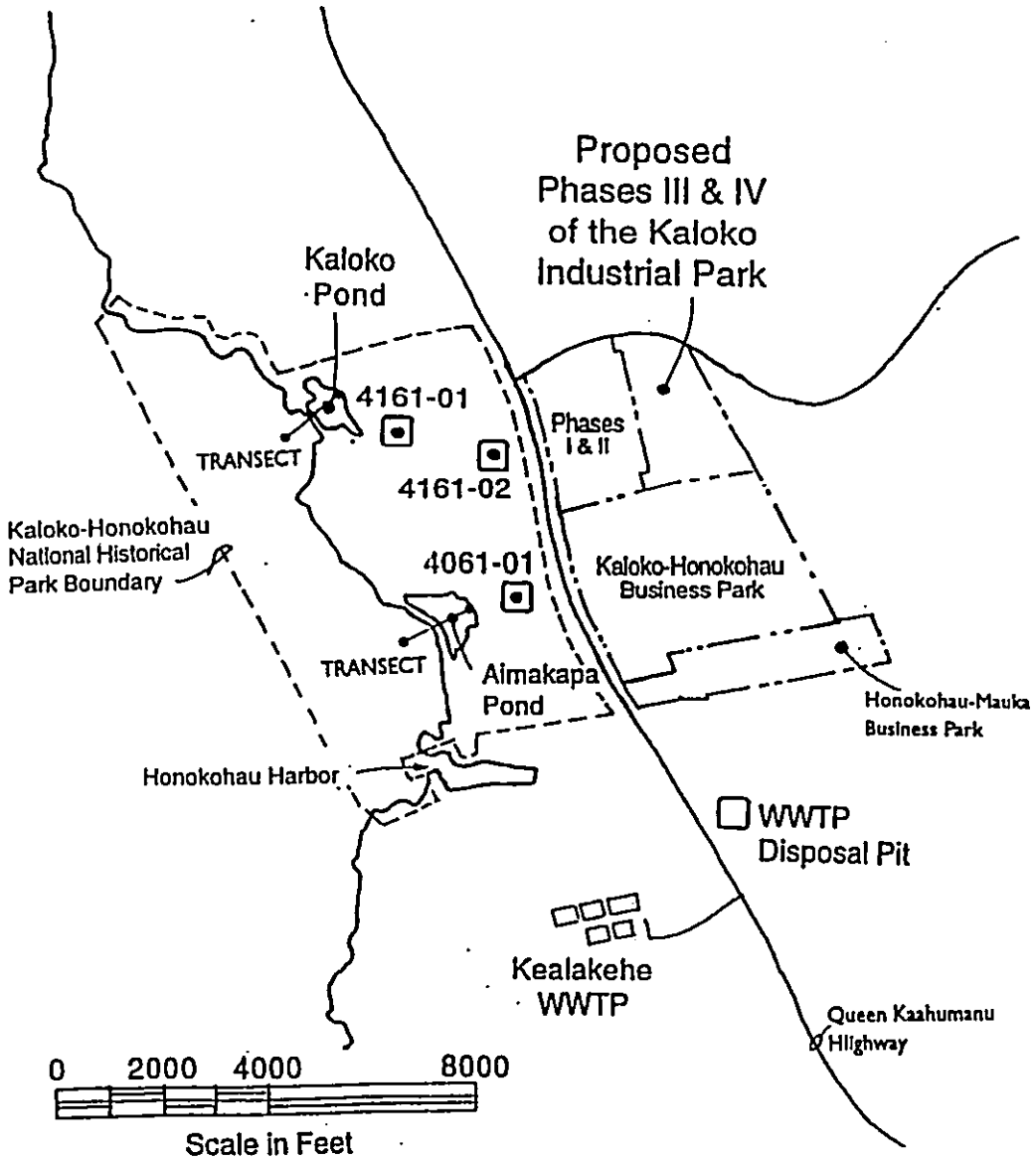

FIGURE 1. Map showing of location of proposed Phases III and IV of the Kaloko Industrial Park in North Kona, Hawaii. Also shown are locations of the Kaloko-Honokohau National Historical Park boundary, and Kaloko and Aimakapa Ponds within the Historical Park. Water sampling transects bisecting the ponds and extending into the ocean are also indicated, as are the locations of Honokohau Harbor and the three monitoring wells within the National Park (4161-01,02 and 4061-01).

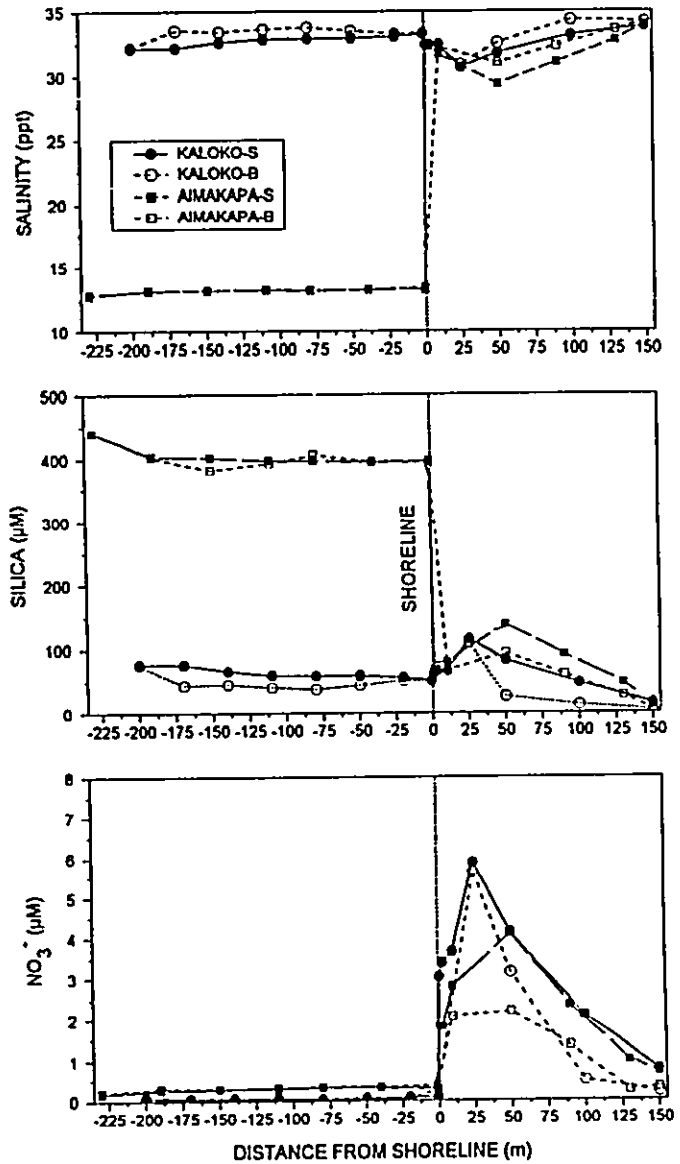

FIGURE 2. Plots of water chemistry constituents in surface (S) and bottom (B) samples collected in Kaloko and Aimakapa Ponds and offshore ocean in May-June 2000 as a function of distance from the ocean shoreline. Positive distances are distances from the shoreline into the ocean, negative distances are distances from the shoreline into the ponds. For transect locations, see Figure 1.

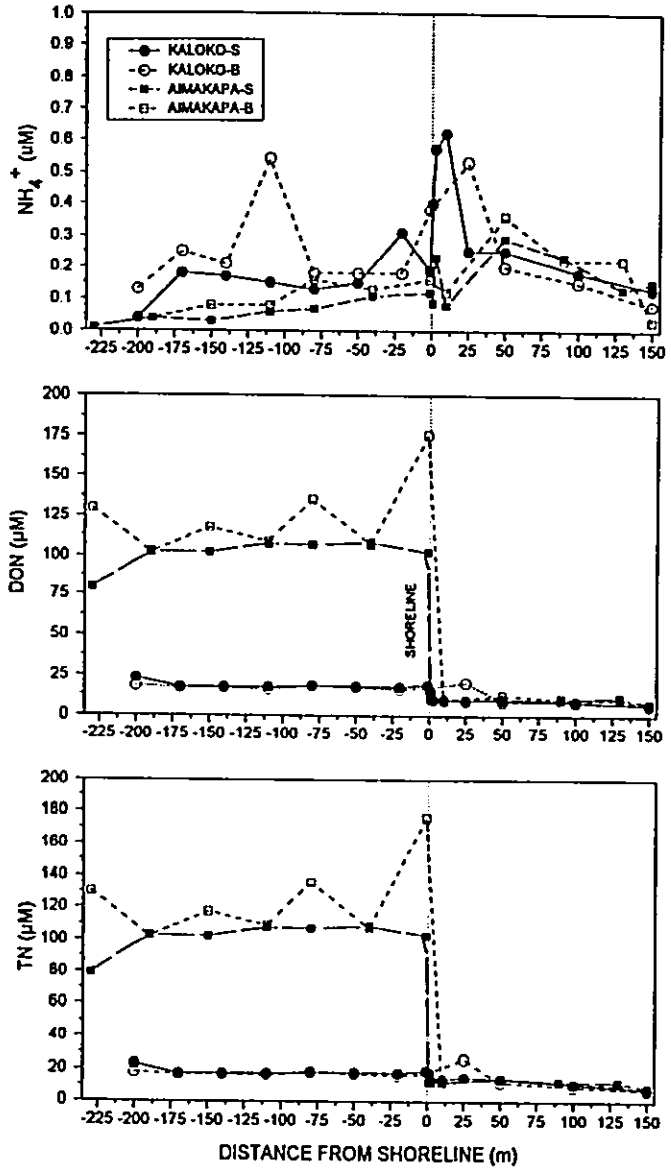

FIGURE 3. Plots of water chemistry constituents in surface (S) and bottom (B) samples collected in Kaloko and Aimakapa Ponds and offshore ocean in May-June 2000 as a function of distance from the ocean shoreline. Positive distances are distances from the shoreline into the ocean, negative distances are distances from the shoreline into the ponds. For transect locations, see Figure 1.

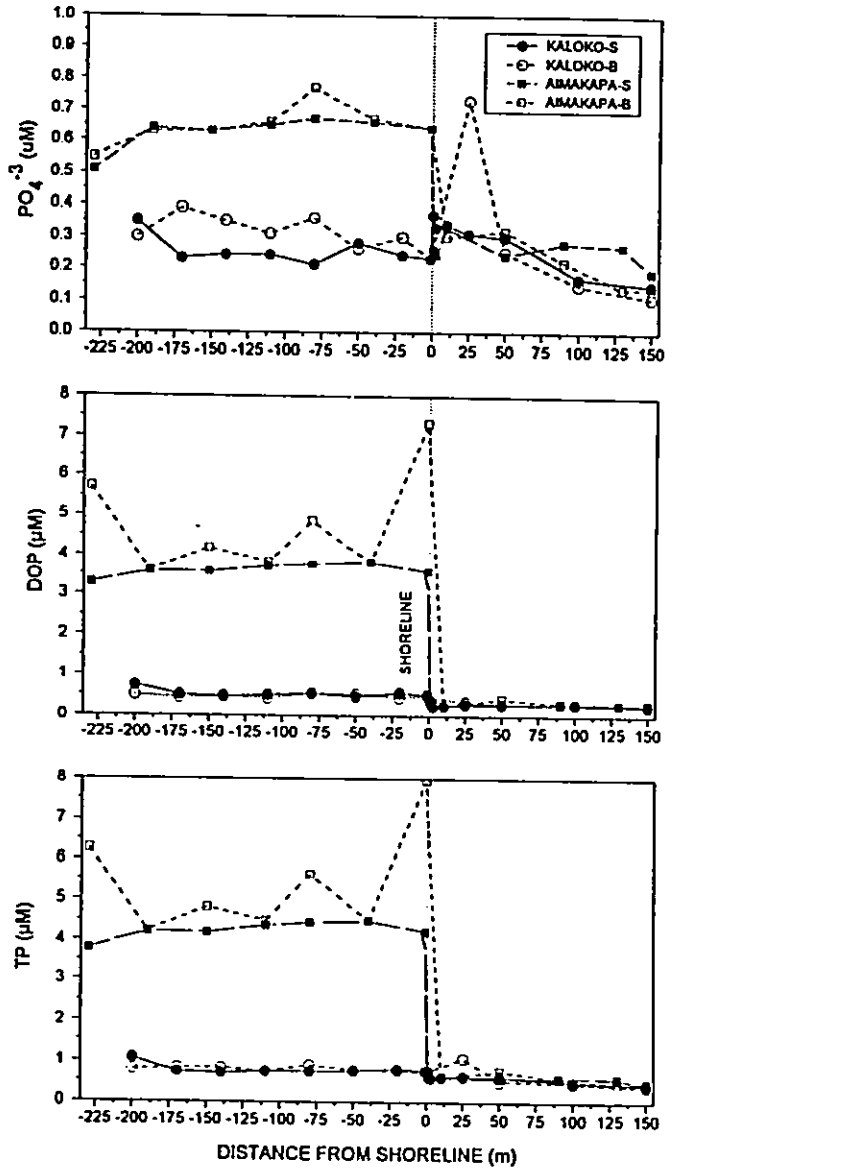

FIGURE 4. Plots of water chemistry constituents in surface (S) and bottom (B) samples collected in Kaloko and Aimakapa Ponds and offshore ocean in May-June 2000 as a function of distance from the ocean shoreline. Positive distances are distances from the shoreline into the ocean, negative distances are distances from the shoreline into the ponds. For transect locations, see Figure 1.

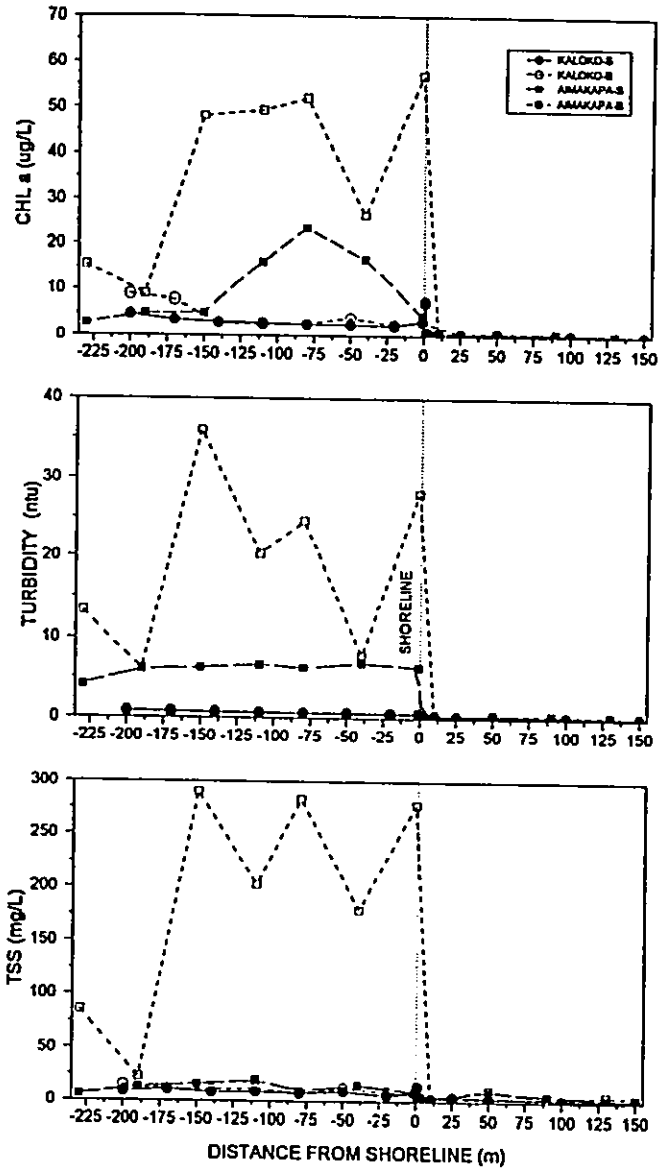

FIGURE 5. Plots of water chemistry constituents in surface (S) and bottom (B) samples collected in Kaloko and Aimakapa Ponds and offshore ocean in May-June 2000 as a function of distance from the ocean shoreline. Positive distances are distances from the shoreline into the ocean, negative distances are distances from the shoreline into the ponds. For transect locations, see Figure 1.

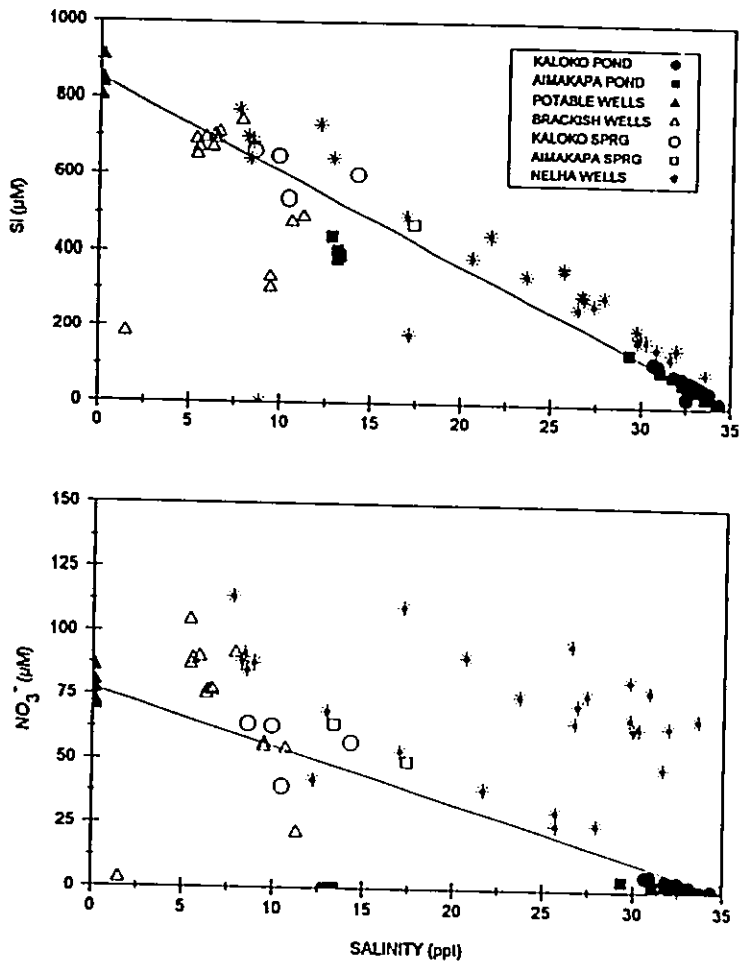

FIGURE 6. Plots of silicate and nitrate as functions of salinity measured in water samples collected in Kaloko and Aimakapa ponds, and springs near the ponds during May-June 2000. Also shown are data from potable wells upslope of the Kaloko-Honokohau region, brackish monitoring wells near Kalok Aimakapa ponds, and monitoring wells at NELHA. The solid line is the conservative mixing line connecting endpoint concentrations in open ocean water and high level (potable) groundwater.

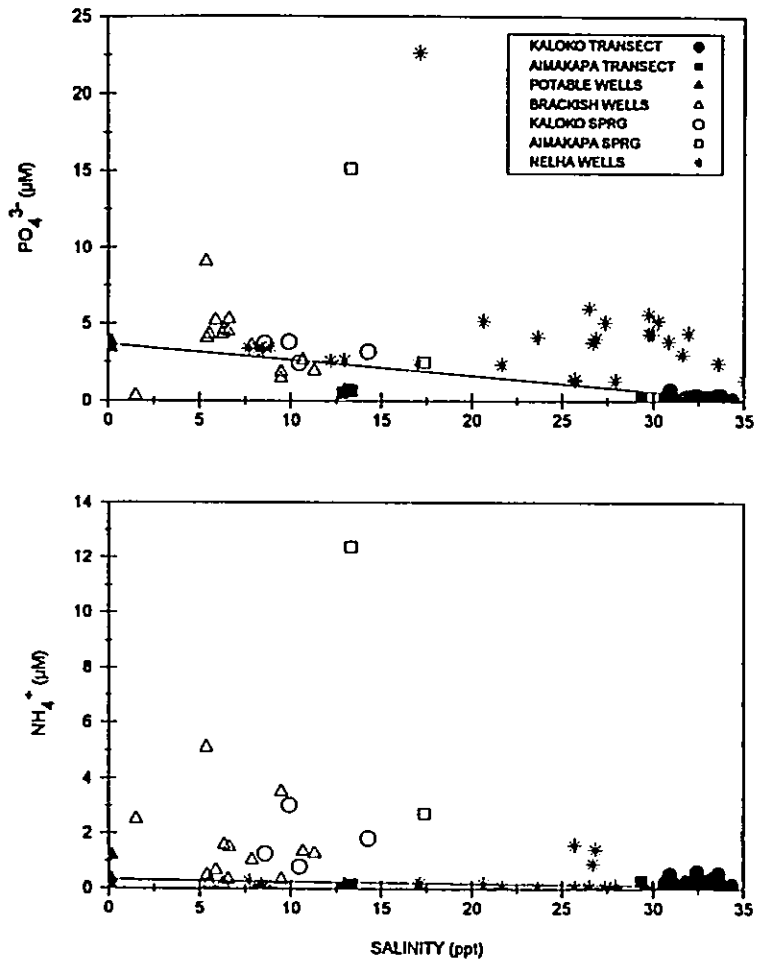

FIGURE 7. Plots of phosphate and ammonium as functions of salinity measured in water samples collected on transects through Kaloko and Aimakapa ponds and the offshore ocean, and springs near the ponds during May-June 2000. Also shown are data from potable wells upslope of the Kaloko-Honokohau region, brackish monitoring wells near Kaloko and Aimakapa ponds, and monitoring wells at NELHA. The solid line is the conservative mixing line connecting endpoint concentrations in open ocean water and high level (potable) groundwater.

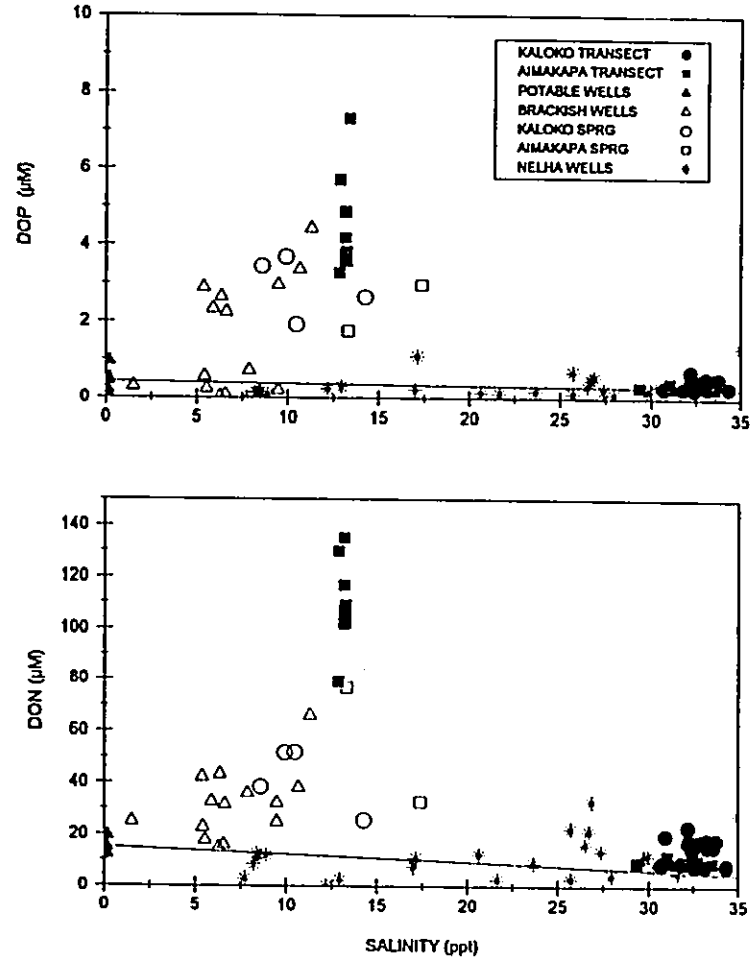

FIGURE 8. Plots of phosphate and ammonium as functions of salinity measured in water samples collected on transects through Kaloko and Aimakapa ponds and the offshore ocean, and springs near the ponds during May-June 2000. Also shown are data from potable wells upslope of the Kaloko-Honokohau region, brackish monitoring wells near Kaloko and Aimakapa ponds, and monitoring wells at NELHA. The solid line is the conservative mixing line connecting endpoint concentrations in open ocean water and high level (potable) groundwater.

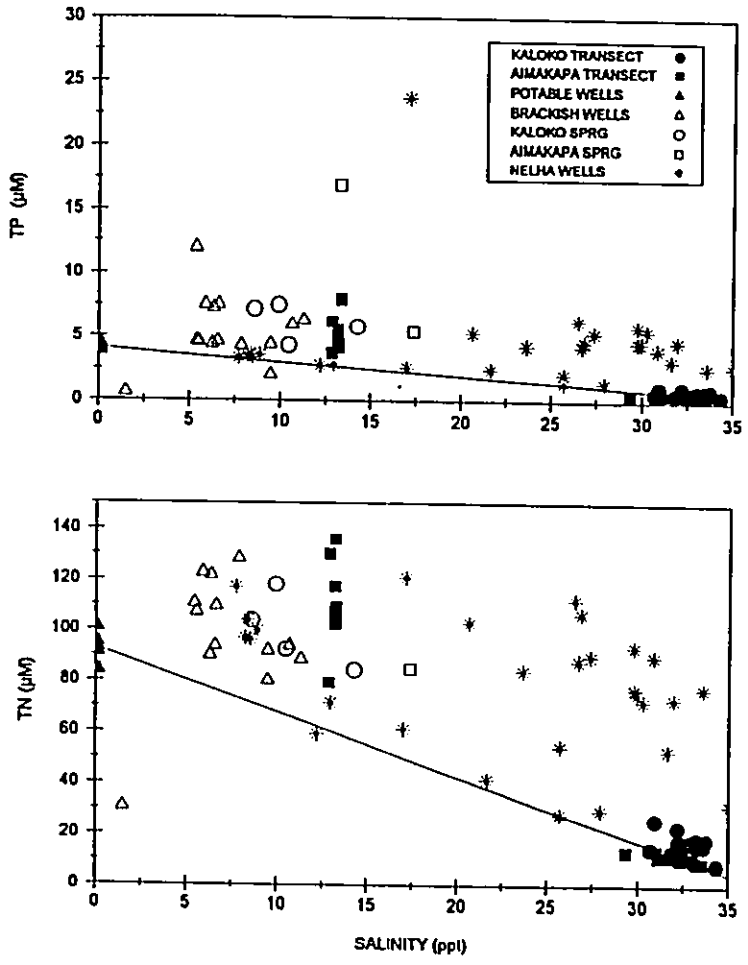

FIGURE 9. Plots of total phosphorus (TP) and total nitrogen (TN) as functions of salinity measured in water samples collected on transects through Kaloko and Aimakapa ponds and the offshore and springs near the ponds during May-June 2000. Also shown are data from potable wells of the Kaloko-Honokohau region, brackish monitoring wells near Kaloko and Aimakapa pond and monitoring wells at NELHA. The solid line is the conservative mixing line connecting end concentrations in open ocean water and high level (potable) groundwater.

Appendix C

Botanical Survey

Char & Associates

BOTANICAL SURVEY
KALOKO INDUSTRIAL PARK, PHASES III & IV
KALOKO, NORTH KONA, HAWAI'I

by

Winona P. Char

CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: WILSON OKAMOTO & ASSOCIATES, INC.

April 2000

BOTANICAL SURVEY
KALOKO INDUSTRIAL PARK, PHASES III & IV
KALOKO, NORTH KONA, HAWAI'I

INTRODUCTION

The proposed Kaloko Industrial Park, Phases III and IV development consists of approximately 102.3 acres located on TMK: 7-3-51:60. It is bounded on the north by Hina Lani Street, on the west by the existing Kaloko Industrial Park, on the south by a quarry and quarry-related uses, and on the east by undeveloped lands.

The Kaloko 'a'a lava flow located to the east (mauka) of the proposed industrial park supports native lowland dry forest. Four endangered plant species and one candidate endangered species are known from this flow.

Field studies to assess the botanical resources on the ±102.3-acre project site were conducted on 18 and 22 April 2000. The primary objectives of the survey were to:

1) provide a general description of the vegetation on the site;
2) inventory the flora;
3) search for threatened and endangered species as well as species of concern; and
4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator

with other studies conducted in the general area. Topographic maps as well as a very recent, colored, aerial photograph (scale 1" = 100') were examined to determine vegetation cover patterns, terrain characteristics, access, boundaries, and reference points. The property line along the east and south boundaries were surveyed and flagged prior to our field studies. Points along the property line were identified with 10-foot high PVC pipes.

A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, disturbances, drainage, exposure, topography, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium, and for comparison with the recent taxonomic literature. The portion of the Kaloko 'a'a flow which extends onto the property and the smaller 'a'a outcrops scattered through the koa haole/fountain grass-dominated areas were more intensively surveyed as rare native plants were more likely to occur on these areas.

DESCRIPTION OF THE VEGETATION

Two vegetation types are recognized on the project site. The Kaloko 'a'a flow supports only sparse vegetation with most of the plants occurring along the margins of the flow where it interfaces the much older pahoehoe flows. Parts of the 'a'a flow adjacent to the quarry have been bulldozed in the past.

The older, more weathered pahoehoe flows which cover about 75% of the project site support koa haole/fountain grass scrub vegetation. Smaller 'a'a lava ridges and outcroppings are scattered throughout the scrub-dominated pahoehoe flows. A large lava tube system is also found within the koa haole/fountain grass scrub.

An inventory of all the plant species observed on the site during the field studies is presented in the checklist at the end of the report.

'A'a Flow Vegetation

The jagged and spiny 'a'a flow is sparsely vegetated with plant cover about 1 to 3% on the top of the flow. Along the edge of the lava flow where it abuts the older pahoehoe flow, on its northern edge, plant cover is about 10 to 20%. Native shrubs occasionally found on the flow are the maiapilo or native caper (Capparis sandwichiana), naio or false sandalwood (Myoporum sandwicense), and alahe'e (Psydrax odorata); the shrubs vary in height from 3 to 12 feet tall. One small shrub of kolomona (Senna gaudichaudii) and one tree of lama (Diospyros sandwicensis) are also found along the edge of the flow. Huehue vines (Cocculus orbiculatus) are locally common in places, covering the woody components and sprawling over onto the course 'a'a.

Among the introduced or alien plants, Christmas berry shrubs (Schinus terebinthifolius) are occasional, while stiff clumps of fountain grass (Pennisetum setaceum) are occasional to common. Patches of the hairy swordfern (Nephrolepis multiflora) are occasionally found in low spots on the 'a'a flow.

The southern portion of the 'a'a flow was bulldozed and the surface layer removed during the early days of the adjacent quarry operation; the permit for the quarry operation was granted in 1968. This disturbed portion of the flow is covered primarily by fountain grass and Natal redtop grass (Melinis repens) on the flat, bulldozed sections and small, low thickets of koa haole

(Leucaena leucocephala) and Christmas berry shrubs on the rock piles scattered over the flow; plant cover is about 30 to 50%. A few, large, solitary 'ohi'a trees (Metrosideros polymorpha) have been left standing on this portion of the flow.

Koa Haole/Fountain Grass Scrub

This vegetation type occurs on the older, weathered pahoehoe flows which occupy about 75% of the project site. Koa haole shrubs, 5 to 10 feet tall, are abundant, with roughly 40 to 50% cover in most places. Clumps of fountain grass, 3 feet tall, form a very dense cover between the koa haole and other shrubs such as noni (Morinda citrifolia), maiapilo, Christmas berry, and naio. A few kiawe trees (Prosopis pallida), 15 to 20 feet tall, are found scattered through this scrub vegetation. Closer to Hina Lani Street, the koa haole shrubs are of shorter stature, 3 to 5 feet tall, and klu (Acacia farnesiana), a prickly shrub 3 to 5 feet tall, is occasional to common.

Shallow pockets of soil are found on the hummocky pahoehoe flows. These areas with some soil support plants of Portulaca pilosa, 'uhaloa (Waltheria indica), hairy spurge (Chamaesyce hirta), Natal redtop grass, partridge pea (Chamaecrista nictitans), 'ilima (Sida fallax), and a thin layer of dried out mosses.

A large collapsed lava tube is found along the eastern boundary. One large tree of 'ohe (Reynoldsia sandwicensis) is found in this depression. A few clumps of 'ala'ala wai nui or the native lowland peperomia (Peperomia blanda variety floribunda) can be observed on the side walls of the lava tube.

RARE PLANTS

Four endangered species are known from the Kaloko 'a'a flow located immediately above (mauka of) the Phases III and IV project site. These are the 'aiea (Nothocestrum breviflorum), Mariscus fauriei, ma'oloa (Neraudia ovata), and hala pepe (Pleomele hawaiiensis) (Char 1991; pers. comm. L. Mehrhoff, M. Bruegmann U.S. Fish and Wildlife Service). The flow contains one of the larger populations of hala pepe (±70 plants). Uhiuhi (Caesalpinia kavaiensis), an endangered species, was reported from the 250-foot elevation contour near the old jeep road, but has not been seen recently. One candidate endangered species, the ko'oko'olau (Bidens micrantha subspecies ctenophylla) also occurs on the 'a'a lava flow.

We did not find any of the endangered species on the project site during our field studies. Only the Bidens was found on the site; three plants occur on 'a'a substrate, while one is found on pahoehoe substrate.

The Bidens is a candidate endangered species. A candidate species is any species which is being considered for listing as threatened or endangered by the Secretary of Interior/U.S. Fish and Wildlife Service. Candidate species are not subject to the Federal and State Endangered Species laws. The listing process involves gathering information on biological and taxonomic data as well as threats to the species. It is anticipated that a candidate species will be listed as threatened or endangered sometime in the future; the U.S. Fish and Wildlife Service therefore encourages their consideration in environmental planning.

Bidens micrantha subspecies ctenophylla, a member of the daisy family (Asteraceae), is an erect, much-branching perennial herb,

3 to 6 feet tall. The leaves are simple to three-parted. The flowers are daisy-like with yellow ray petals and arranged in dense, rounded clusters. The fruit is an achene, black, straight, awned, and rarely winged. The plants are found on the leeward slopes of Hualalai and it is considered rare (Wagner et al. 1990).

The distribution of the four Bidens plants on the project site is presented in Figure 1. Bidens #1 is located about 20 feet from the east boundary line, along the edge of the 'a'a lava flow near a PVC pipe boundary marker. The plant is about 5 feet tall, healthy, but did not have any flowers or fruits. One dead plant about 6 feet tall is found nearby. Bidens #2 is found near the west boundary on a low 'a'a ridge and can be seen from Kamanu Street. It is about 6 feet tall, but about half of its branches are dead; no flowers or fruits were observed. Bidens #3, 3 feet tall, is in very poor condition with only one live branch; no flowers or fruits were observed. It is found on an 'a'a outcrop near an archaeological site flagged as "Site T-30". Bidens #4 is in excellent condition, 6 feet tall, with large bunches of flowers, but no fruits. It occurs on pahoehoe lava adjacent to a shallow collapsed lava tube at about the 250-foot elevation, near the Hina Lani Street boundary and an archaeological site identified as "Site T-28".

There are at least two dozen maiapilo or native caper plants (Capparis sandwichiana) on the project site. The Capparis is considered a species of concern by the U.S. Fish and Wildlife Service (1999). Species of concern are plants for which there is a need for more biological and/or taxonomic information regarding whether a species might require conservation actions in the future. The Capparis is not considered a high priority item as the plants are widespread throughout the Hawaiian Islands. It is an upright to sprawling shrub with large, attractive, fragrant white flowers.

Figure 1. Approximate locations of the four ko'oko'olau plants (Bidens micrantha subspecies ctenophylla) on the proposed Kaloko Industrial Park, Phases III & IV project site, North Kona, Hawai'i.

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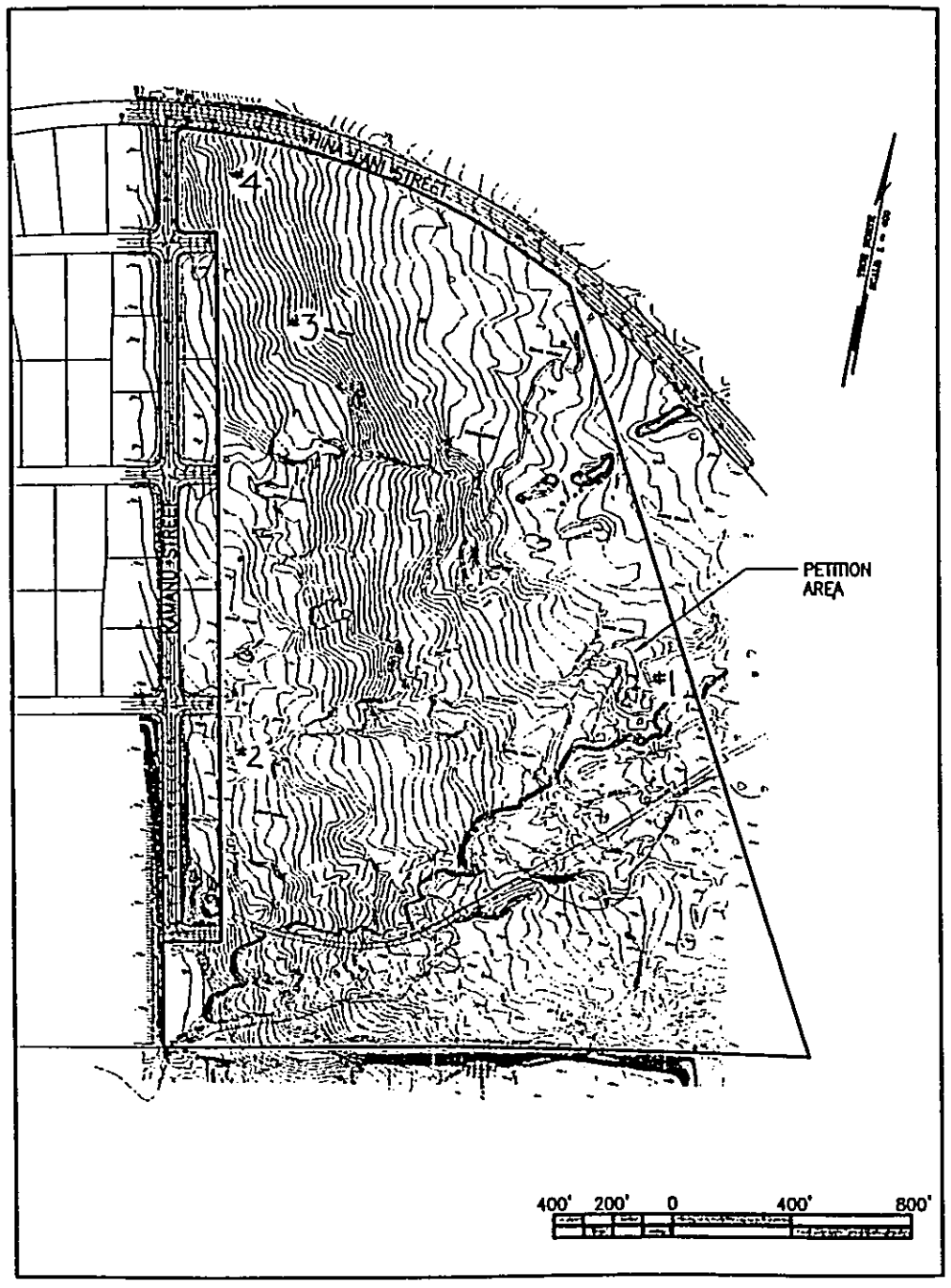

DISCUSSION AND RECOMMENDATIONS

Koa haole and fountain grass, both introduced or alien species, are the most abundant plants on the ±102.3-acre project site, especially on the areas with pahoehoe flows. Native species such as maiapilo, alahe'e, and naio occur primarily on the undisturbed portions of the 'a'a lava flow and on 'a'a outcroppings scattered through the koa haole/fountain grass scrub vegetation.

A total of 44 plant species were inventoried on the project site. Of these, 28 (64%) are introduced; one (2%) is originally of Polynesian introduction; and 15 (34%) are native. Of the natives, nine are indigenous, that is, they are native to the Hawaiian Islands and elsewhere, and six are endemic, that is, they are native only to the Hawaiian Islands. The endemic species are the ko'oko'olau (Bidens micrantha subspecies ctenophylla), 'ohe (Reynoldsia sandwicensis), maiapilo (Capparis sandwichiana), lama (Diospyros sandwicensis), 'ohi'a lehua (Metrosideros polymorpha), and pua kala (Argemone glauca). None of the plants on the project site is a listed threatened and endangered species protected by Federal and State Endangered Species laws. The Bidens is a candidate endangered species. The maiapilo is a species of concern, but not a high priority item.

The following recommendations are proposed for the four Bidens plants on the site. It is recommended that a buffer zone at least 30 to 50 feet wide be established in the immediate vicinity of the Bidens #1 plant along the east boundary. This would preserve Bidens #1 in place and also could serve as a firebreak. The lands upslope (mauka) of the project site support lowland native dry forest with four listed endangered species.

Seeds and cuttings should be taken from the other three Bidens on the lower (makai) portion of the property. The Amy B.H.

Greenwell Ethnobotanical Garden could be contracted for the propagation and establishment of the plants at their garden site at Captain Cook; the garden specializes in native dry land species. The Bidens would be removed from the project site, but their genetic material would still be preserved.

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PLANT SPECIES LIST -- Kaloko Industrial Park, Phases III & IV

The following checklist is an inventory of all the plant species observed on the project site during the field studies. The plant names are arranged alphabetically by families within each of three groups: Ferns, Dicots, and Monocots. The taxonomy and nomenclature of the Ferns follow Lamoureux (1988), while the flowering plants, Dicots and Monocots, are in accordance with Wagner et al. (1990). The few recent name changes for the flowering plants follow those reported in the Hawaii Biological Survey series (Evenhuis and Miller, eds. 1995-1998; Evenhuis and Eldredge, eds. 1999).

For each species, the following information is presented:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
   - E = endemic = native only to the Hawaiian Islands.
   - I = indigenous = native to the Hawaiian Islands and also elsewhere.
   - I? = questionably indigenous = data not clear if dispersal by natural or human-related mechanisms, but weight of evidence suggests probably indigenous.
   - P = Polynesian = plants originally of Polynesian introduction prior to Western contact, that is, Cook's discovery of the Hawaiian Islands in 1778.
   - X = introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (1778).
4. Presence (+) or absence (-) of a particular species within each of two vegetation types recognized on the project site (see text for discussion):
   - a = 'A'a Flow Vegetation
   - k = Koa Haole/Fountain Grass Scrub

Scientific name	Common name	Status	Vegetation type a	Vegetation type k
FERNS				
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	hairy swordfern, 'oka'pukapu	X	+	-
FLOWERING PLANTS				
DICOTS				
AMARANTHACEAE (Amaranth family)				
Amaranthus spinosus L.	spiny amaranth, paka'i kuku	X	-	+
ANACARDIACEAE (Mango family)				
Schinus terebinthifolius Raddi	Christmas berry	X	+	+
ARALIACEAE (Ginseng family)				
Reynoldsia sandwicensis A. Gray	'ohe	E	-	+
ASTERACEAE (Daisy family)				
Bidens mierantha ssp. cteniophylla (Sherff) Nagata & Ganders	ko'oko'olau	E	+	+
Pluchea carolinensis (Jacq.) G. Don	sourbush, pluchea	X	+	+
Tridax procumbens L.	coat buttons	X	+	+
CACTACEAE (Cactus family)				
Opuntia ficus-indica (L.) Mill.	panini, papipi	X	-	+
CAPPARACEAE (Caper family)				
Capparis sandwichiana DC	maiapilo, pilo, pua pilo	E	+	+
CONVOLVULACEAE (Morning glory family)				
Ipomoea indica (J. Burm.) Merr.	koali 'awa, koali 'awahia	I	+	+
CRASSULACEAE (Orpine family)				
Kalanchoe pinnata (Lam.) Pers.	air plant, life plant, 'oliwa ku kahakai	X	-	+

Scientific name	Common name	Status	Vegetation type a	k
EBENACEAE (Ebony family)				
Diospyros sandwicensis (A. DC) Fosb.	lama	E	+	-
EUPHORBIACEAE (Spurge family)				
Chamaesyce hirta (L.) Millsp.	hairy spurge, garden spurge	X	-	+
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	X	-	+
Ricinus communis L.	castor bean, koli	X	-	+
FABACEAE (Pea family)				
Acacia farnesiana (L.) Willd.	klu	X	-	+
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	-	+
Indigofera suffruticosa Mill.	indigo, 'iniko	X	+	+
Leucaena leucocephala (Lam.) de Wit	koa haole, ekoa	X	+	+
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe	X	-	+
Senna gaudichaudii (Hook. & Arnott) H. Irwin & Barneby	kolomona	I	+	-
Senna occidentalis (L.) Link	coffee senna, 'auko'i	X	-	+
MALVACEAE (Mallow family)				
Sida fallax Walp.	'ilima	I	+	+
MENISPERMACEAE (Moonseed family)				
Cocculus orbiculatus (L.) DC	huehue, hue	I	+	+
MYOPORACEAE (Myoporum family)				
Myoporum sandwicense A. Gray	naio, false sandalwood	I	+	+
MYRTACEAE (Myrtle family)				
Metrosideros polymorpha Gaud.	'ohi'a, 'ohi'a lehua, lehua	E	+	-
NYCTAGINACEAE (Four-o'clock family)				
Boerhavia coccinea Mill.		X	-	+
PAPAVERACEAE (Poppy family)				
Argemone glauca (Nutt. ex Prain) Pope	pua kala, kala, native poppy	E	+	-

Scientific name	Common name	Status	Vegetation type a	k
PIPERACEAE (Pepper family)				
Peperomia blanda var. floribunda (Miq.) H. Huber	'ala'ala wai nui	I	-	+
PORTULACACEAE (Purslane family)				
Portulaca oleracea L.	pigweed, 'akulikuli kula, 'ihi	X	-	+
Portulaca pilosa L.		X	+	+
Talinum fruticosum (L.) Juss.	talinum, fameflower	X	+	+
RUBIACEAE (Coffee family)				
Morinda citrifolia L.	noni	P	+	+
Psydrax odorata (G. Forster) A.C. Smith & S.P. Darwin	alahe'e, walahe'e	I	+	+
SAPINDACEAE (Soapberry family)				
Dodonaea viscosa Jacq.	'a'ali'i, 'a'ali'i ku makani	I	+	+
STERCULIACEAE (Cacao family)				
Waltheria indica L.	'uhaloa, hi'aloa, kanakaloa	I?	+	+
VERBENACEAE (Verbena family)				
Lantana camara L.	lantana, lakana	X	+	+
MONOCOTS				
AGAVACEAE (Sisal family)				
Furcraea foetida (L.) Haw.	Mauritius hemp	X	-	+
BROMELIACEAE (Pineapple family)				
Ananas comosus (Stickm.) Merr.	pineapple	X	-	+
POACEAE (Grass family)				
Chloris barbata (L.) Sw.	swollen fingergrass, mau'u lei	X	-	+

Scientific name	Common name	Status	Vegetation type a	k
Dactyloctenium aegyptium (L.) Willd.	beach wiregrass	X	-	+
Eragrostis amabilis (L.) Wight & Arnott	lovegrass	X	-	+
Melinis repens (Willd.) Zizka	Natal redtop, Natal grass	X	+	+
Pennisetum setaceum (Forssk.) Chiov.	fountain grass	X	+	+

Appendix D

Faunal Survey

Rana Productions, Ltd.

REPORT:

Faunal Survey of Avian and Mammalian Species Kaloko Industrial Park, Phases III & IV Kaloko, North Kona, Hawai'i.

Prepared by:

Reginald E. David
Rana Productions, Ltd.
P.O. Box 1371
Kailua-Kona, Hawai'i 96745

Prepared for:

Wilson Okamoto & Associates, Inc.
1907 Beretania Street, Suite 400
Honolulu, Hawaii 96826

March 2000

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Introduction:

This report summarizes the findings of a two day ornithological and mammalian survey of approximately 102.3 acres of land (TMK: 7-3-51:60) proposed for Phases III and IV of the Kaloko Industrial Park, North Kona, Island of Hawai'i (Figure 1). Fieldwork was conducted on March 4th and 5th, 2000.

The primary purpose of the survey was to determine if there were any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on, or in the immediate vicinity of the proposed development site. In addition, we were asked to assess the probability of any usage of the site by listed species given the current habitat available.

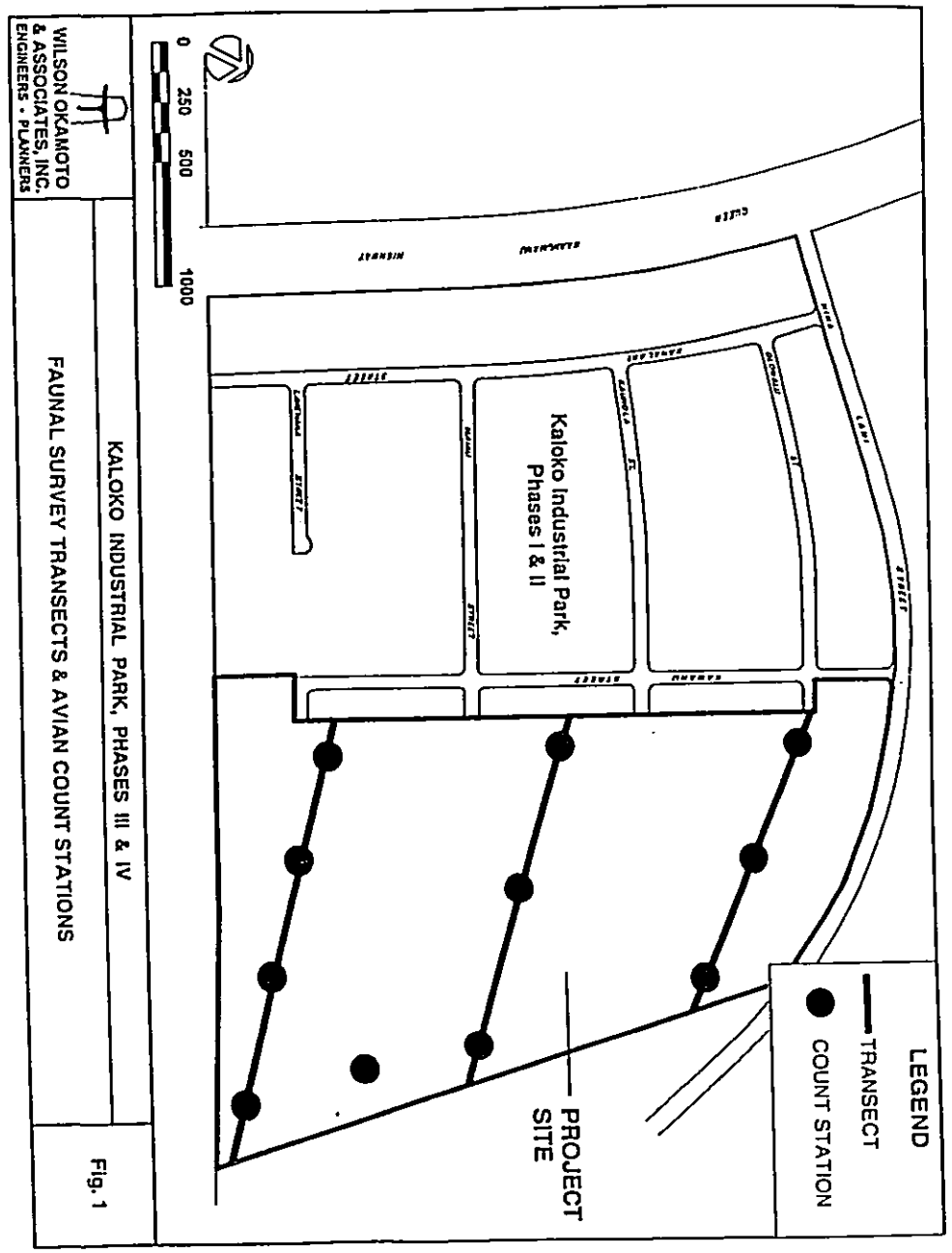
Avian phylogenetic order used in this report follows *Birds Of The World: A Checklist 4th Edition* (Clements 1991), and the *1st ,2nd and 3rd Supplements to Birds Of The World: A Checklist 4th Edition* (Clements 1997, 1998, Clements and Principe, Jr. 1992); scientific nomenclature follows *The AOU Checklist of North American Birds 7th Edition* (AOU 1998), Mammal scientific names follow *Mammals in Hawaii* (Tomich 1986). Plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner *et al.* 1990). Place names follow *Place Names of Hawaii* (Pukui *et al.* 1976).

General Site Description:

The project site encompasses approximately 102.3 acres located in the Ka-loko ahupua'a, North Kona, Island of Hawai'i. The area surveyed extends east from an elevation of approximately 200 feet to a maximum of 300 feet above mean sea level (Figure 1). The property is bound to the north by Hina Lani Street, to the west by Kamanu Street, to the south by West Hawaii Concrete's quarry, and to the east by undeveloped land.

The terrain gently slopes from east to west and is composed of a mix of pahoehoe and a'a lava flows dating from the Holocene and Pleistocene ages (1,500-3,000 years ago) (Wolfe and Morris 1996, USGS 1996).

The vegetation within the project site can be best characterized as a Lowland Vegetation Community with two recognizable vegetation associations. The vegetation on the northern part of the site falls within the Fountain Grass Grassland subtype of the Lowland Dry Grassland Community. The vegetation on the southern part of the site can be characterized as a degraded 'A'ali'i Lowland Shrubland subtype of the Lowland Dry Shrubland, although this portion of the site is also dominated by fountain grass (Gagne and Cuddihy 1990, Wagner *et al.* 1990, Herbst 1999). Much of the area south of the east/west 4-wheel drive road has been bulldozed and compacted. The vegetation present on this portion of the site is quite sparse, though there are a number of native and indigenous (native to, but also found elsewhere) plants within this area.



Mammalian Survey Methods:

With the exception of the Hawaiian hoary bat (*Lasiurus cinereus semotus*), all other terrestrial mammals found on the Island of Hawai'i are alien species. Most are ubiquitous in distribution, no trapping program was proposed or undertaken to quantify the usage by alien mammalian species of the project site. Observations of mammalian species were of an incidental nature. A running tally was kept of all vertebrate species observed and heard while within the boundaries of the site. The survey of mammals was limited to visual and auditory detection, coupled with observation of scat, tracks and other animal sign.

Avian Survey Methods:

Eleven count stations were established along three transects within the project site (Figure 1). Six-minute unlimited distance counts were made at each station (Reynolds *et al.* 1980). Count stations were counted twice. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated during the early morning hours between 6:00 a.m. and 11:00 a.m., the peak of daily bird activity. An additional 2 hours were spent on the evenings of the 4th and 5th of March 2000, in an attempt to detect nocturnally flying seabirds and owls overflying the project site. Time not spent counting was used to search the site and the surrounding area for species and habitats not detected during count sessions.

Results:

The lone mammalian species seen during the course of this survey were several small Indian mongooses (*Herpestes a. auropunctatus*). In addition we encountered skeletal remains of a feral pig (*Sus s. scrofa*) and one domestic cattle (*Bos taurus*). Scat of domestic dog (*Canis f. familiaris*), cat (*Felis catus*), donkey (*Equus a. asinus*) as well as feral goat (*Capra h. hircus*) were encountered in numerous places within the site. No live rodents were detected during the course of this survey; however, it is likely that roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) utilize various resources found within the site. Without conducting a trapping program, it is difficult to assess the population densities of these often hard-to-see mammals. All of these introduced mammalian species are deleterious to avian populations. Hawai'i's sole endemic terrestrial mammalian species, the endangered Hawaiian hoary bat, or 'Ope'ape'a, was not detected.

A total of 16 avian species representing 10 families were detected during station counts (Table 1). All of the species recorded are considered to be alien (introduced to Hawai'i by man) to the Hawaiian Islands. The most common species were House Finch (*Carpodacus c. mexicanus*) and Common Myna (*Acridotheres tristis*) (Table 1). These

Table 1

Key To Table 1	
ST / Status	RA / Relative Abundance
A - Alien	= #birds/ stations

AVIAN SPECIES DETECTED DURING STATION COUNTS WITHIN THE KALOKO INDUSTRIAL PARK, PHASES III & IV SITE

COMMON NAME	*SCIENTIFIC NAME*	*ST*	*RA*
PHEASANTS & ALLIES	*Phasianidae*		
Grey Francolin.	*Francolinus pondicerianus*	A	0.091
Black Francolin.	*Francolinus francolinus.*	A	0.273
Erckel's Francolin	*Francolinus erckelii*	A	0.091
Chicken	*Gallus gallus*	A	0.091
PIGEONS & DOVES	Columbidae		
Spotted Dove.	*Streptopeia chinensis.*	A	1.545
Zebra Dove.	*Geopelia striata.*	A	1.909
MIMIC THRUSHES	*Mimidae*		
Northern Mockingbird	*Mimus polyglottus*	A	0.364
STARLINGS	Sturnidae		
Common Myna.	*Acridotheres tristis.*	A	3.545
SILVEREYES	Zosterops		
Japanese White-eye	*Zosterops japonica*	A	1.273
LARKS	Alaudidae		
Sky Lark	*Alauda a. arvensis*	A	0.273
OLD WORLD SPARROWS	Passeridae		
House Sparrow	*Passer domesticus*	A	0.364
WAXBILLS & ALLIES	Estrilididae		
Warbling Silverbill	*Lonchura malabarica.*	A	0.455
FRINGILLIDS	Fringillidae		
Yellow-fronted Canary	*Serinus mozambicus*	A	0.909
House Finch.	*Carpodacus m. mexicanus.*	A	4.818
WARBLERS & SPARROWS	Emberizidae		
Yellow-billed Cardinal	*Paroaria capitata*	A	0.636
Northern Cardinal	*Cardinalis cardinalis*	A	0.636

two species represented 48.5% of the total birds recorded. House Finch records accounted for 28% of the total individual birds recorded. All of the birds detected are common alien species found throughout the leeward lowland areas on the Island of Hawai'i. No native, endangered or threatened avian species were detected within the proposed development site during the course of this survey (Federal Register 1998, DLNR 1986). The findings of both the avian and mammalian surveys were consistent with the present habitat available on the site.

Previous Surveys:

There have only been four comprehensive bat surveys conducted on the Island of Hawai'i (Jacobs 1994, Cooper et al. 1995, Cooper and David 1995, David 1996). Only one of these surveys addressed lands close to the project site addressed in this survey. David Jacobs conducted an Island-wide survey between 1990-1993 which attempted to ascertain the distribution and abundance of Hawaiian hoary bats by sampling along paved principal roadways around the Island of Hawai'i (Jacobs 1994). The bulk of the remaining published literature relies heavily on anecdotal and incidental information on bat distribution and abundance on the Island (Baldwin 1950, Bryan 1955, Tomich 1986).

The first systematic surveys of the avifauna of Hawai'i were undertaken in 1976. Starting in that year and continuing until 1983, the U.S. Fish & Wildlife Service (USFWS) conducted a state wide survey of the avifauna of Hawai'i (Scott *et al.* 1986). During the course of the Hawaii Forest Bird Surveys program (HFBS), the subject property was not surveyed, due to it's lack of native forest it was not thought that any native forest birds would be found in the habitat present. In recent years there have been several Environmental Impact Statement (EIS) level faunal surveys conducted on lands within the general vicinity of the project site (PBR 1991, CH2M Hill 1992, 1993, David 1995a, 1995b, 1999, 2000).

Discussion:

A one-time survey can not provide a total picture of the wildlife utilizing any given area. Certain species will not be detected for one reason or another. Seasonal variations in populations coupled with seasonal usage and availability of resources will cause different usage patterns throughout a year or, in fact, over a number of years. This site and most of North Kona has been experiencing severe drought conditions for the past 3 years.

The findings of the mammalian survey are consistent with other surveys conducted within the lowland areas of North Kona within the recent past (David 1995a, 1995b, 1999, 2000a, 2000b). It is likely that Hawaiian hoary bats overfly the project site upon occasion, as they have been seen in numerous lowland areas in North Kona on a seasonal basis (David 1993, Jacobs 1994, R. David unpublished field notes 1975-1999).

The low diversity and density of avian species detected during this survey is lower than one would ordinarily expect from this location. The ongoing drought has greatly impacted many of the lowland alien avian species normally present in this area. Results of recent faunal surveys conducted by the author in the lowland grassland areas of the North Kona District have shown greatly reduced avian diversity and density over the last year or so (David 1999, 2000a, 200b) as compared to earlier surveys and publications covering the same general area (David 1989, 1990, 1991a, 1992, 1993, 1994, 1995a, 1995b). The habitat currently found on the project site and within the fountain grass dominated lowland areas in North Kona do not provide the resources necessary for the sustenance or nesting of native avian species. In a wetter year it is to be expected that additional resident avian alien species utilize the existing habitat within the project site. It is likely that following the development of the site, and the installation of irrigated landscaping, that many of the commonly occurring alien species currently found in North Kona will be recorded on the site. If lawns, parking lots and other open areas are created it is likely that these features will also attract a number of migratory shorebirds between the months of September and May each year. Many of the more than 80 species of migratory and extralimital avian species which have been recorded from Hawai'i have been recorded from coastal areas in North Kona (Pyle *et al.* 1988, David 1991b, Pyle 1992, 1997). The more common of these are the Pacific Golden Plover (*Pluvialis fulva*), Ruddy Turnstone (*Arenaria interpres*) and the Wandering Tattler (*Heteroscelus incanus*).

It is possible that small numbers of the endangered endemic Hawaiian subspecies of the Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*), or Ua'u over-fly the project site between the months of May and October (Banko 1980, Harrison 1990). This species was formerly common on the Island of Hawai'i (Wilson & Evans 1890-1899). This pelagic seabird reportedly nested in large numbers on the slopes of Mauna Loa and in the saddle area between Mauna Loa and Mauna Kea (Henshaw 1902), as well as the mid to high elevations of Mount Hualalai. It has within recent historic times been reduced to relictual breeding colonies located at high elevations on Mauna Loa and possibly Mount Hualalai (Banko 1980, Harrison 1990, Cooper & David 1995, Cooper *et al.* 1995, R. David Unpbl Field Notes 1986-1995, 1999).

The primary cause of mortality in Dark-rumped Petrels is thought to be predation by alien mammalian species at the nesting colonies (Day and Cooper 1998, Cooper and Day 1994). Collision with utility structures is considered to be the second most significant cause of mortality of this seabird species in Hawai'i. Nocturnally flying seabirds, especially fledging birds, can become disoriented by exterior lighting on their way to sea in the Summer and Fall. When disoriented, seabirds often collide with manmade structures and, if not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Ainley and Podosky 1993, Ainley *et al.* 1994, Cooper and Day 1994, Day and Cooper 1997, Cooper and Day 1998, Podolsky et al. 1998). There is no suitable nesting habitat within the project site for this species.

The principal potential impact that development of the project site poses to Dark-rumped Petrels is the increased threat of the downing of birds disoriented by exterior lighting which may be required in conjunction with the proposed development.

Recommendations:

To reduce the potential for interactions between nocturnally flying Dark-rumped Petrels with external lights and man-made structures, it is recommended that any external lighting planned within the proposed development be shielded (Reed *et al.* 1985).

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Appendix E

Archaeological Inventory Survey

Haun & Associates

Report 004-042300

ARCHAEOLOGICAL INVENTORY SURVEY
KALOKO INDUSTRIAL PARK, PHASES III & IV
TMK: 7-3-51:60, KALOKO, NORTH KONA,
ISLAND OF HAWAII

May 3, 2000

Haun & Associates

Archaeological, Cultural, and Historical Resource Management Services
HCR 1 Box 4730, Keaau, Hawaii 96749 Phone: 982-7755 Fax: 982-6343

ARCHAEOLOGICAL INVENTORY SURVEY
KALOKO INDUSTRIAL PARK, PHASES III & IV
TMK: 7-3-51:60, KALOKO, NORTH KONA,
ISLAND OF HAWAII

By:

Alan E. Haun, Ph.D.

and

Dave Henry, B.S.

Prepared for:

Wilson Okamoto & Associates
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826

May 3, 2000

Haun & Associates

Archaeological, Cultural, and Historical Resource Management Services
HCR 1 Box 4730, Keaau, Hawaii 96749 Phone: 982-7755 Fax: 982-6343

SUMMARY

At the request of Wilson Okamoto & Associates, Haun & Associates conducted an archaeological inventory survey of TMK: 7-3-51:60, a c. 102.3-acre parcel located in the Land of Kaloko , North Kona District, Island of Hawaii. The objective of the survey was to satisfy historic preservation regulatory review inventory requirements of the Department of Land and Natural Resources-Historic Preservation Division (DLNR-HPD), as contained within Hawaii Administrative Rules, Title 13, DLNR, Subtitle 6, State Historic Preservation Rules.

Archaeological investigations within the project area have resulted in the identification of 45 sites with 81 component features. These include nine previously identified sites and 36 identified during the current study. Bulldozer activity associated with road construction along the western project area boundary has resulted in the destruction of five of these previously identified sites (Sites 15337, 15338, 15345, 15350 and 15351). There are 40 sites with 56 component features currently remaining within the project area.

The sites include 35 single feature sites and ten complexes of features. The feature types noted include 22 modified outcrops, 12 terraces, ten caves, nine mounds, seven pahochoe excavations, six cairns, five walls, three trails, three enclosures, two concentrations of marine shell, one cupboard and one series of grinding slicks. Functionally, the 81 features include the following: agriculture (n=42), temporary habitation (n=14), resource procurement (n=7), marker (n=6), garden boundary (n=4), livestock control (n=3), transportation (n=3), tool manufacture (n=1) and storage (n=1).

The identified site and component features conform to the traditional Hawaiian site/feature types expected in the Middle Zone (Cordy et al. 1991) based on previous archaeological work and historic documentary research. As expected, temporary habitation sites and trails were identified. The trails all appear to be "branch" trail segments as defined by Cordy et al. (1991). These trails were distinguished from major *mauka-makai* and coastal transportation routes because the branch trails facilitated access to resource and subsistence areas in the immediate vicinity of habitation sites. The temporary habitation sites contained very limited amounts of cultural material. Cultural deposits were uncommon, and where present, very shallow. These characteristics, and the limited evidence for structural modifications to the caves, indicate the temporary habitation use was of very limited duration. Also as expected, historic remains consisted of ranch walls.

All of the sites are assessed as solely significant under Criterion "d". These sites have yielded information important for understanding late prehistoric to historic land use in the project area. The mapping, written descriptions, photography, and test excavation at 32 of the 40 sites adequately documents them and no further work or preservation is recommended.

Eight sites, 21999, 22010, 22014, 22016, 22017, 22018, 22023, and 22032 retain the potential to yield information important for understanding prehistoric and historic land use. If these sites are not preserved, then limited data recovery is recommended. Data recovery at these sites would entail surface collection and excavation where deposits are present. The data recovery work should be guided by a Data Recovery Plan prepared for DLNR-HPD review and approval.

CONTENTS

ILLUSTRATIONS (cont.)

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INTRODUCTION

This report presents the results of an archaeological inventory survey conducted of TMK: 7-3-51:60, located in the Land of Kaloko, North Kona District, Island of Hawaii (*Figure 1*). The objective of the survey was to satisfy current historic preservation regulatory review inventory requirements of the Department of Land and Natural Resources-Historic Preservation Division (DLNR-HPD), as contained within Hawaii Administrative Rules, Title 13, DLNR, Subtitle 6, State Historic Preservation Rules (DLNR 1998).

The survey fieldwork was conducted March 20-27, 2000. Described in this final report are the project scope of work, field methods, and survey findings. Also included is background information relevant to the project area, and significance assessments of the sites with recommended further treatments.

Scope Of Work

Based on DLNR-HPD rules for inventory surveys the following specific tasks were determined to constitute an appropriate scope of work for the project:

1. Conduct background review and research of existing archaeological and historical documentary literature relating to the project area and its immediate vicinity--including examination of Land Commission Awards, *ahupua'a* records, historic maps, archival materials, archaeological reports, and other historical sources;

2. Conduct a high intensity, 100% pedestrian survey coverage of the project area;

3. Conduct detailed recording of all potentially significant sites including scale plan drawings, written descriptions, and photographs, as appropriate;

4. Conduct limited subsurface testing (manual excavation) at selected sites (a) to determine the presence or absence of potentially significant buried cultural deposits or features, and (b) to obtain suitable samples for radiocarbon age determination analyses;

5. Analyze background research and field data; and

6. Prepare and submit Final Report.

Project Area Description

The project area consists of a c. 102.3-acre parcel bounded on the north by Hina Lani Street, on the west by Kamanu Street and the Costco store, on the south by a gravel quarry, and on the east by undeveloped land. The project area is situated on the southwestern slopes of Hualalai Volcano. The surface mantle in this area is comprised of Pleistocene to recent Hualalai series lava flows. These flows include both pahoehoe and a'a, consisting predominately of olivine basalt (Macdonald, Abbott and Peterson 1983:364).

The parcel ranges in elevation from c. 170 to 300 feet. The terrain in the project area slopes moderately towards the ocean. There are two soil types present within the project area. An a'a lava flow comprises the southern one-third of the area. According to Sato et al., "this lava has practically no soil covering and is bare of vegetation, except for mosses, lichens, ferns, and a few small ohia trees...it is a mass of clinkery, hard glassy, sharp pieces piled in tumbled heaps" (1973:34).

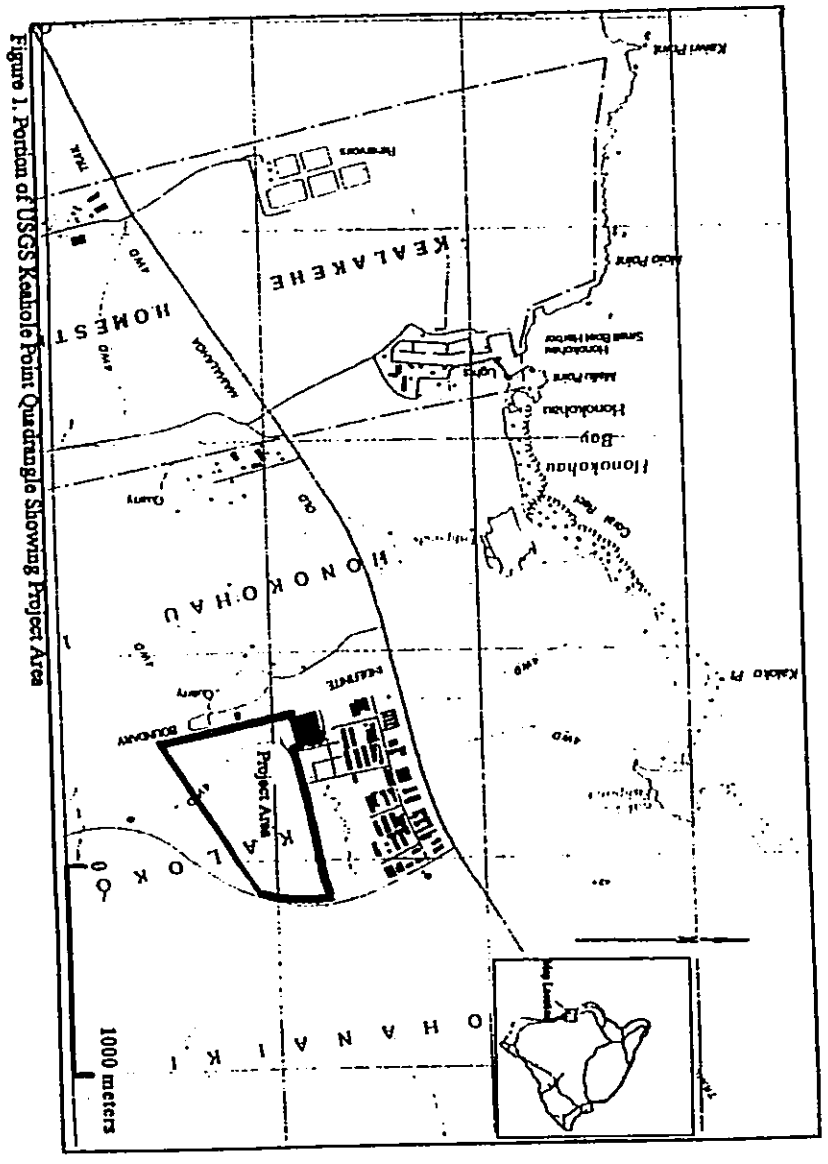

Figure 1. Portion of USGS Keahole Point Quadrangle Showing Project Area

The northern two-thirds of the project area consists of pahoehoe lava flows. Sato et al. state that this lava type evidences a, "billowy, glassy surface that is relatively smooth, and there are hummocks and pressure domes "(1973:34). The vegetation in this area consists of low fountain grass (*Pennisetum setaceum* [Forsk.] Chiov.), with scattered *kiawe* (*Prosopis pallida* [Humb. And Bonp.ex Willd.] HBK), *koa haole* (*Leucaena Leucocephala*), with occasional *noni*, Indian Mulberry (*Morinda citrifolia* L.).

The western and southern portion of the project area has been disturbed by recent bulldozing activity. These areas have been mechanically graded and are level and primarily free of vegetation. Additional disturbance to the survey area includes several roads, the former Huehue Ranch Road, which bisects the southern end of the project area in a *mauka/makai* direction, and a short branching dirt road that extends from Hina Lani Street to the south. This second road appears to have been created by people entering the area to obtain pahoehoe rock, indicated by the presence of several recent quarry areas.

Field Methods

The project area was subjected to a 100% surface examination, with crewmembers spaced at 15-meter intervals. Transects were oriented roughly northwest-southeast, or roughly parallel to the western project area boundary. The identified sites and features were flagged with blue or pink flagging tape and their locations plotted on a scaled project area map. The numerous identified agricultural features were subjected to minimal recording. This consisted of recording length, width, height and shape. Photographs were taken of representative feature type.

Non-agricultural sites were flagged with pink and blue flagging tape and marked with a metal site tag. The sites were then recorded in detail, which consisted of the preparation of scaled plan maps, the completion of standardized site/feature forms, and photographic documentation. The location of the metal site tags was plotted on the prepared plan maps.

Subsurface testing during the survey consisted of three units at two cave sites. The units were excavated in arbitrary levels within stratigraphic layers, and were terminated on bedrock substrate. Standardized excavation records were prepared after the completion of each stratigraphic layer. The soil removed during excavation was screened through 1/8" mesh. Portable remains collected were placed in paper bags, labeled with the appropriate provenience information. Recovered charcoal samples were carefully removed from either *in-situ* locations or collected during the screening process. These samples were deposited in aluminum foil pouches and placed in properly labeled paper bags. Following the excavation, a section drawing depicting the stratigraphy was prepared, post-excavation photographs were taken, and the units were backfilled. Recovered cultural remains were transported to Haun & Associates laboratory for analysis.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Historical Documentary Research

Most of the following derives from the extensive research by Kelly (1971) done in conjunction with the Kaloko Ahupua'a research of Cordy et al. (1991). Kaloko lies within an area of lava-covered land north of Kailua called Kekaha, which "describes a dry, sun-baked land"(1971:2). Kaloko is well known for its large fishpond for which the *ahupua'a* is named. The pond is a *loko kuapa* type (Summers 1964) formed by the construction of a wall, aligned with the adjacent shorelines, across the mouth of a small bay.

The fishpond at Kaloko is mentioned in a story told by Kamakau (1961) of a spy sent to Hawaii by the ruling chief of Maui. The spy reported seeing the fishpond upon his return to Maui. Kelly (1971:22) believes this occurred between the late 1600s and early 1700s depending upon the generation span used in calculating chiefly genealogies.

A late 1600s reference to Kaloko comes from Fornander (1969) and Kamakau (1964). The twins, Kameeiamoku and Kamanwa, are said to have carried the bones of the ruling chief of Maui, Kahekili, to a cave at Kaloko. Kamakau (1961) reported the subsequent burial of Kamehameha's bones in the same cave by Kameeiamoku's son Hoapili and Keopuolani. King David Kalakaua reportedly later removed the bones; however, this account conflicts with informant information and other documents, which suggest the bones were not removed (Kelly 1971:23-25).

Ellis reported the observations of the Reverends Thurston and Bishop during a walk along the coast north from Kailua in 1823. They described houses along the coast built on lava and small gardens in the lava where sweet potatoes, watermelon, and tobacco were grown.

During The Great Mahele, the grandson of Kamehameha I, Lot Kamehameha, selected Kaloko as his property. Kelly (171:5) cites correspondence indicating that Kaloko was Lot Kamehameha's most valuable property because of the fishpond, and that fish from the pond were sold in the market in Kailua town in 1860.

According to Kelly (1971:6-8), there were at least 14 claims for *kuleana* in Kaloko, of which 12 were awarded. The awarded claims were all situated inland between 1,100 ft and 1,800 ft elevation. The Waihona 'Aina database (Waihona 'Aina Corp. 1998) lists 24 claims within Kaloko, of which 13 were awarded. The apparent discrepancy between the database and Kelly apparently results from the large number of unawarded claims not located by Kelly. Cordy et al. (1991:414) lists 13 awarded claims and five claims that were not awarded. All, except two of the claim testimonies that also claimed house lots, were for cultivated plots. Crops mentioned in the testimonies include sweet potatoes and taro.

Kelly (1991:12) cites missionary and later census data that documents a decline in the population of North Kona in the 1800s. The Hawaiian Kingdom Directory for 1880-1881 lists a blacksmith and a coffee planter in upland Kaloko along the government road (Kelly 1971:13). A map by J.S. Emerson in 1888 shows a house inland of the fishpond (Kelly 1991:14).

In 1906, Kaloko was sold to John A. Maguire and subsequently became part of Huehue Ranch (Cordy et al. 1991). Kelly (1991) describes the succession of caretakers of the Kaloko fishpond from the early 1900s until the early 1960s when the pond fell into disrepair.

Previous Archaeological Research

More than 20 archaeological projects have been conducted within Kaloko. The following summary is in chronological order for areas inland of the Queen Kaahumanu Highway. The summary concludes with the coastal area seaward of the highway and the important *ahupua'a*-wide research of Cordy et al. (1991). The location of the previous projects is depicted in *Figure 2*. Soehren (1979) conducted a reconnaissance survey of a proposed access road that corresponds to today's Hina Lani Street. The survey did not identify any sites. Soehren (1980a) conducted a reconnaissance survey of a 90-acre parcel situated on the inland side of the Queen Kaahumanu Highway between 80 ft and 160 ft elevation (TMK: 3-7-3-09:Por.1). Today, the area is occupied by the Kaloko Light Industrial Park, which borders the project area to the west. The survey did not identify any sites. A single waterworn pebble was found that was believed to be a possible slingstone. Soehren noted the potential presence of lava tubes and burials.

Soehren (1980b) conducted a reconnaissance survey of a large parcel of unstated area situated on the inland and north sides of the parcel he previously surveyed (Soehren 1980a). The area includes the present project area. Soehren identified a steppingstone trail marked by at least two cairns on a narrow finger of a'a lava. The trail was situated approximately 1,000 ft inland of the Queen Kaahumanu Highway and appeared to extend toward Honokohau to the southwest and Hue to the northeast. Two similar trail segments, 50 ft apart, on a'a lava were identified approximately 500 ft inland of the first trail. A possible burial in the a'a was observed near the north end of the upper trail.

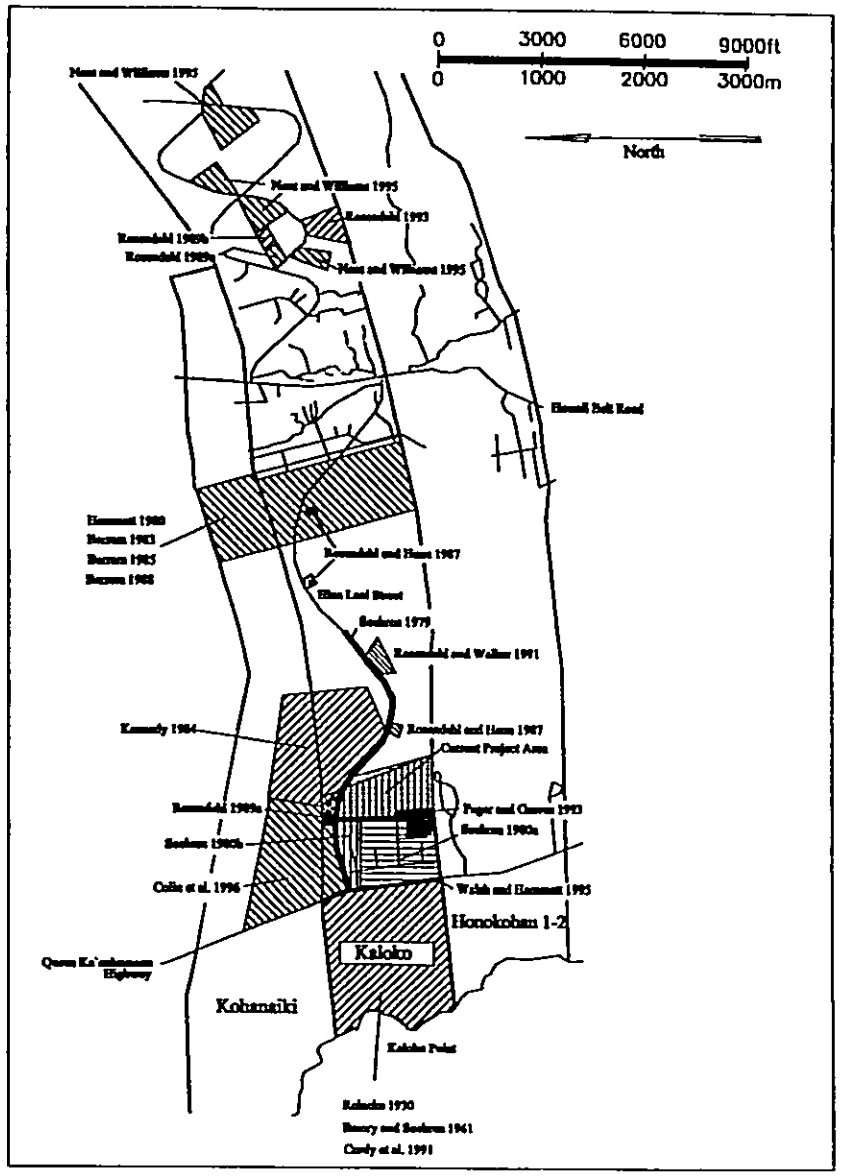

Figure 2. Previous Archaeological Work

Soehren identified a lava tube crossed by a fence marking the inland boundary of the project area. On the seaward side of the fence he noted a pile of discarded corrugated metal roofing in the depression at one tube entrance. One the north side of the fence he identified overhangs with cleared areas and marine shell. He also noted water dripping in the tube and suggested it was used for temporary habitation, possibly refuge, and as a water source. This site corresponds with Site 22016 recorded during the current survey. A second lava tube containing marine shell, which corresponds with Site 22017, was encountered approximately 400 ft south of the first tube. Soehren noted the potential presence of additional lava tubes and burials.

Kennedy (1983, 1984) conducted reconnaissance and intensive archaeological surveys of an approximately 200-acre parcel in Kaloko and Kohanaiki between 250 ft and 500 ft elevation (TMK: 3-7-3-09:Por. 17). The area is situated immediately inland of the present project area on the east side of Hina Lani Street and north of the former Huehue Ranch Road, which extends east to west through the southern portion of the current project area. The survey identified approximately 39 sites, most situated in Kaloko, with 79 features including 45 cave entrances, 13 platforms, 9 *ahu*, five enclosures, four walls, 2 trails and 2 petroglyph panels. The petroglyphs included traditional forms and letters, possibly names. A probable historic ranch wall followed the *ahupua'a* boundary between Kaloko and Kohanaiki. The only described trail was a 90 m long inland-seaward segment of a curbstone-lined trail averaging 2.5 m in width classified as a historic Type "B" trail based on Apple (1965).

Kennedy's exact site count is unclear because no tabular listing of sites is provided. The petroglyphs and several platforms were situated within caves. A number of the caves, which contained over 200 chambers, had multiple entrances. Cordy et al.'s (1991:340) review of the report and its site interpretations concluded that a total of 16 sites were identified. Excavations were conducted in three caves. The excavations recovered fishing gear, *kukui* nutshell, fishbone, a possible canoe gunwale fragment, a cache of possible *konane* game stones, an adze, abraders, bone picks, marine shell, and basalt and volcanic glass flakes. A radiocarbon sample produced an uncorrected, uncalibrated age of 1790*/-50 years. Four surface features suspected to be burials were dismantled with negative results.

Most of the caves were interpreted to be temporary habitations. One cave may have been a water source. Most of the *ahu*, or cairns, appeared to mark trail routes or cave locations. One cave excavation produced 12 human teeth thought to be from the same individual, a young adult, indicating a probable burial function in addition to habitation.

Barrera (1985, 1988) conducted survey and excavations in a 409-acre parcel, which spanned Kaloko and Kohanaiki Ahupua'a between approximately 800 ft to 1,000 ft elevation in the Kaloko Mauka Subdivision (TMK: 3-7-3-09:19). Hammatt (1980) and Barrera (1983) previously conducted reconnaissance surveys of the parcel. Much of the area was mechanically altered. The 1985 survey identified 58 sites with 92 features and one site, a portion of the late 1800s Kohanaiki Homesteads, with an undetermined number of features. In 1988, Barrera conducted excavations at 22 previously identified sites and added 84 site designations for features within the homesteads area. Most of the sites were situated in Kohanaiki.

The majority of the features were agricultural mounds (c. 100), platforms, terraces, and walls. Several of the walls were interpreted as possible field boundaries. Approximately 25 features were probable temporary habitations including lava blisters, C-shapes, and terraces. A 9.5 m by 11.3 m enclosure (Site10736, Barrera 1988) was interpreted to be a men's house based upon its construction, isolation, and presence of branch coral, human remains, and artifacts. Alternatively, these characteristics could indicate a *heiau* function, which is perhaps more likely because the structure is isolated from other habitation features. Excavations at the habitation sites produced small amounts of artifacts and food remains. Forty-six volcanic glass hydration rind age determinations ranged from the late 1400s to the mid-1700s.

Rosendahl and Haun (1987) conducted a reconnaissance survey of three one-acre potential water tank sites situated at 350 ft, 630 ft, and 910 ft elevation along Hina Lani Street (TMK: 3-7-3-09:Por.1, 17). Only one site, a historic ranch wall, was identified in the inland-most parcel. Rosendahl (1989a) subsequently conducted a survey for an additional one-acre parcel situated on the north side of the intersection of

Hina Lani Street and Kamanu Street. The survey identified a steppingstone trail segment on a'a lava designated Site 13493, which was subsequently relocated by Colin et al. (1996).

Rosendahl and Walker (1991) conducted a helicopter survey of a 20-acre, a'a lava flow-covered parcel situated on the south side of Hina Lani Street between 400 ft and 480 ft elevation (TMK: 3-7-3-09:Por.17). The survey identified one site, a trail extending north-south marked by two cairns

Rosendahl (1993) conducted an archaeological field inspection of a 23-acre parcel (TMK: 3-7-3-24:5) situated between 2,000 ft and 2,200 ft elevation. Much of the parcel was disturbed previously by mechanical clearing. Four sites were identified. The sites consist of an agricultural mound, a temporary habitation cave containing two small enclosures, and a historic ranch wall and corral. No portable remains were observed at the sites. Rosendahl (1989b, 1989c) conducted field inspections of two nearby small parcels. One lacked cultural remains and the other (1989b) contained a terrace, an alignment, a modified outcrop and a cairn.

Fager and Graves (1993) conducted an archaeological inventory survey of a 15-acre parcel situated between 150 ft to 230 ft elevation. The project area borders and slightly overlaps the seaward boundary of the current project area. The survey identified 17 sites with 60 features. Agricultural features comprised nearly 77% of the total feature count. Agricultural features consisted of terraces, modified outcrops, enclosures, excavated depressions, and mounds. Three temporary habitation sites were recorded. These sites consisted of three caves and a historically occupied walled terrace.

The Fager and Graves survey also identified several historic ranch walls, cairns interpreted to be markers, a trail segment, and pahoehoe excavations interpreted to be quarry sites. Excavations were conducted in two cave sites. The excavations yielded marine shell, goat and pig bone, *kukui* nutshell, and charcoal. A radiocarbon sample produced four potential age ranges spanning the 1500s to late 1800s. Two walls, Sites 15335 and 15336, extend into the southwest corner of the present project area. Both walls were interpreted by Fager and Graves top be historic ranch walls; however, the latter wall is probably part of a garden enclosure because it is not core-filled and is very low.

Colin, Devereux, and Hammatt (1996) conducted an archaeological inventory survey of a 244-acre parcel (TMK: 3-7-4-09:17, Por. 2) situated between 90 ft and 340 ft elevation in the *ahupua'a* of Kaloko and Kohanaiki. The area is bounded to the west by Queen Kaahumanu Highway and the south by Hina Lani Street. The majority of the parcel is situated in Kohanaiki. The survey identified 55 sites with 90 features including cairns (2 features), agricultural features (9), trail segments (20), enclosures (9), walls (3), possible burials (9), a scoria quarry, and temporary habitation features (34). Eight sites were tested. The authors report that two radiocarbon dates were processed; however, no results are presented in the report.

The agricultural features consisted of excavated planting areas and enclosures on pahoehoe lava. The possible burials consisted of a lava tube with possible human bone fragments and eight filled crevices, none of which were tested. Temporary habitations, defined based on Cordy et al. (1991), primarily consisted of modified lava tumuli (12), pavements (7), and terraces (4). The categories wall, alignment, mound, enclosure, C-shape, rockshelter, platform, and modified depression were each represented by one or two examples. All of the excavations were conducted in habitation features yielding low to moderate amounts of marine shell, *kukui* nutshell and sea urchin. Rare remains consisted of fish bone, pig bone, and unidentified bone. Thirteen artifacts were recovered, primarily volcanic glass flakes from a single cave.

Walsh and Hammatt (1995) conducted an inventory survey of a 300 ft-wide strip of land paralleling Queen Kaahumanu Highway between Kona International Airport and Palani Road. In Kaloko, the survey identified an enclosure, a pahoehoe excavation, a wall, a trail, and a modified outcrop complex.

Nees and Williams (1995) conducted a survey of five parcels totaling 110 acres between 2,100 ft and 2,900 ft elevation in the Kaloko Mauka Subdivision (TMK: 3-7-3-24:010, 3-7-3-25:016). Small portions of two parcels were previously surveyed by Cordy et al. (1991), who identified formal fields between 900 ft and 2300 ft elevation. The survey identified a wall, a possible pigpen, a modified outcrop, a possible burial mound, an area of mounds, an area of terracing, and a culturally modified lava tube containing a bur-

ial. No excavations were conducted. The authors conclude that above 2,100 ft elevation in Kaloko, agricultural features are isolated and scattered in areas best suited to agriculture.

Cordy, Tainter, Renger, and Hitchcock (1991) describe their *ahupua'a*-wide study conducted in the early 1970s and summarize the work of Reinecke (1930) and Emory and Sochren (1961) in the coastal portion of Kaloko. The study included a survey of the entire *ahupua'a* seaward of the Queen Kaahumanu Highway and sample areas inland of the highway. Excavations were conducted at 20 sites near the coast, 11 sites between 30 m and 244 m elevation, and five upland sites above 610 m elevation.

Cordy et al. utilized four environmental zones to characterize settlement patterns: (a) the Coastal Zone from sea level to 15 ft elevation, (b) the Middle Zone from 15 ft to 800-900 ft elevation, (c) the Lower Upland Zone from 900 ft to 1500 ft elevation, and (d) the Upland-Forest Zone between 1,500 and 6,000 ft elevation. Their settlement pattern model has been largely confirmed by the subsequent studies described above.

Based on their data, the authors believe the *ahupua'a* was permanently settled between AD 900 and 1200. Most of the sites were presumed to have been occupied in late prehistory in the 1600s and 1700s and this period is used to generate the settlement pattern model. Many sites also had a historic component. A *heiau*, coastal trail, *ahupua'a* boundary shrine, and permanent habitation sites, including the residence of at least one chief and four men's houses, were clustered next to the shoreline and around the fishpond. Temporary habitation sites were also present in the coastal zone. Branch trails linked habitation sites with subsistence sites and water sources along the coast. Subsistence sites included the fishpond at the coast and animal enclosures and agricultural complexes in the lower portion of the middle zone. A series of *mauka-makai* trails extend from the coast inland. Burials were concentrated in a cemetery in the lower middle zone and individual burials were present at two coastal sites.

Inland of the lower Middle Zone adjacent to the Coastal Zone, sites were widely scattered and primarily consisted of trails leading to the uplands associated with markers (cairns) and temporary habitations, primarily in lava tubes. Settlement pattern data for the Upland Zone were derived from historic records. In the early to mid-1800s, the zone was used for agriculture and scattered habitations. This pattern is assumed to have prevailed in late prehistory as well. By the 1870s and 1880s, residential sites were more common and agricultural use continued as a small community developed near the upper road. This coincided with the near abandonment of the coastal habitations. In the late 1800s to early 1900s, the focus of land use shifted to large-scale ranching.

The Upland-Forest Zone was characterized by an extensive field system consisting of formal walled fields from 900 ft elevation up to approximately 2,300 ft, which was believed to be the lower limit of the late prehistoric forest edge. The major field boundary walls were perpendicular to the coast. Other agricultural features included terraces, depressions, mounds, and probable pigpens. Temporary habitation sites were scattered among the fields and at least one small shrine was present. Below 900 ft and above 2,300 ft elevation agricultural features were present, but were scattered and informal. By the mid-1800s, the forest edge was reported to be at the 1,700 ft elevation, leading the author's to conclude that much of the area was abandoned coincident with depopulation between European Contact and the 1850s.

PROJECT EXPECTATIONS

The project area is situated in the intermediate Middle Zone as defined by Cordy et al. (1991). Prehistoric use of the project area is potentially represented by scattered temporary habitation sites associated with trails, and potentially, a few scattered agricultural features. Chronologically, sites may have been used as early as the 900-1200s, with the most extensive period of use occurring between the 1600s and early historic period. The temporary habitation sites would predominately be in caves. The trails would be associated with marker cairns and used by coastal residents to reach the inland fields and forest resources.

The same pattern is expected during the mid- to late 1800s; however the focus of permanent habitation likely shifted inland. Thus, people were transiting through the area to obtain marine resources from the coast. By the late 1800s to early 1900s, sites associated with cattle ranching are expected. Other potential sites include transportation infrastructure such as vehicle roads. Ranching activity, which continued until at least the mid-1900s, would be evidenced by stone walls and corrals, and later wire fencing.

FINDINGS

Archaeological investigations within the project area have identified 45 sites with 81 component features, and one isolated object. The 45 sites include seven identified by Fager and Graves (1993) during a survey that overlapped the current project area, two previously noted by Soehren (1980b), and 36 identified during the current study. Bulldozer activity associated with road construction along the western project area boundary apparently destroyed five sites identified by Fager and Graves (Sites 15337, 15338, 15345, 15350 and 15351). There are 40 sites with 56 component features remaining within the project area.

The sites include 35 single feature sites and ten complexes of features. The feature types noted include 22 modified outcrops, 12 terraces, ten caves, nine mounds, seven pahoehoe excavations, six cairns, five walls, three trails, three enclosures, two concentrations of marine shell, one cupboard and one series of grinding slicks. Functionally, the 81 features include the following: agriculture (n=42), temporary habitation (n=14), resource procurement (n=7), marker (n=6), garden boundary (n=4), livestock control (n=3), transportation (n=3), tool manufacture (n=1) and storage (n=1). The identified sites and features, and the isolated object are described below. The sites and features are summarized in *Table 1* and their locations are presented in *Figure 3*.

The current survey also identified five additional lava tube caves within the project area. These caves were carefully examined and were determined to contain no cultural remains. The location of these five non-cultural caves is also depicted in *Figure 3*.

Destroyed Sites

Five of the previously identified sites were destroyed prior to the current survey. These include a complex of temporary habitation and agricultural features (Site 15337), a livestock control enclosure (Site 15338), an agricultural terrace (Site 15345), a complex comprised of a steppingstone trail and a pahoehoe excavation (Site 15350), and a complex with two temporary habitation caves and a wall (Site 15351). Four of the five sites were situated in the southwestern portion of the project area, with the remaining site located in the northwestern corner. These destroyed sites are summarized below. For more information regarding these sites, see Fager and Graves (1993).

Site 15337

Site 15337 was a complex of 18 features located in the southwestern portion of the project area, previously recorded by Fager and Graves (1993). The location of this site is within an area that has been impacted by bulldozer activity associated with road construction. No evidence of this site was found during the current survey. According to Fager and Graves, the site was comprised of a temporary habitation terrace (Feature A), 10 agricultural terraces (Features B-1 through B-10), six mounds (Features C-1 through C-6) and one modified outcrop (Feature D).(1993: 30-32). The agricultural features were constructed of piled cobbles and boulders, with no associated cultural remains. *Table 2* summarizes the physical characteristics of the 17 agricultural features.

Feature A was a rectangular-shaped terrace located in the approximate center of the site, surrounded by the agricultural features. It was 5.6 m long (NNW/SSE) by 4.3 m wide, built on the western side of an outcrop. Retaining walls were present on the south and western sides, built of stacked and faced a'a boulders and cobbles. These walls varied in height from 0.9 to 1.0 m. The surface of the terrace was level and evidenced several historic artifacts, comprised of thick gauge wire, two blue glass bottles, and metal fragments. This terrace was assigned a temporary habitation function by Fager and Graves, apparently due to the presence of these historic remains.

Table 1. Summary of Identified Sites

Site	Total Features	Formal Type: Modified outcrop	Terrace	Cave	Mound	Pahoehoe excavation	Cairn	Wall	Trail	Enclosure	Marine shell concentration	Grinding slicks	Cupboard	Function: Agriculture	Temporary habitation	Resource procurement	Marker	Garden boundary	Livestock control	Transportation	Tool manufacture	Storage	Temporary Field Designation
15335	1							1											1				1a
15336	1																						6
15337*	18	1	10		6									17	1								-
15338*	1									1									1				-
15345*	1		1											1									-
15350*	2					1			1							1				1			-
15351*	3			2				1							2				1				-
21882	1	1												1									41
21883	1	1												1									28
21884	4	1				2	1							1		2	1						27
21885	1	1												1									18
21999	1			1											1								24
22000	1					1										1							17
22001	1	1												1									10
22002	1	1												1									25
22003	1	1												1									29
22004	1						1										1						30
22005	1	1												1									19-f
22006	1					1										1							31
22007	1	1												1									36
22008	1	1												1									37
22009	1	1												1									38
22010	1									1					1								39
22011	1	1												1									40
22012	1						1										1						42
22013	1	1												1									16
22014	2			1						1					2								19b-c
22015	1				1									1									22
22016	2			2											2								9
22017	4	1		2		1								1	2	1							13, 14, 20
22018	7	5		1	1									6	1					1			12
22019	1								1														11
22020	1						1										1						21
22021	1	1												1									33
22022	1					1										1							35
22023	2			1					1						1			1					43
22024	1	1					1							1									47
22025	1						1										1						45
22026	1										1										1		46
22027	1						1											1					5
22028	1							1												1			4
22029	1							1										1					3
22030	1											1									1		2
22031	2				1			1			1			1				1					1b, 1c
22032	1										1					1							48
Totals	81	22	12	10	9	7	6	5	3	3	2	1	1	42	14	7	6	4	3	3	1	1	

* = Site destroyed prior to current project

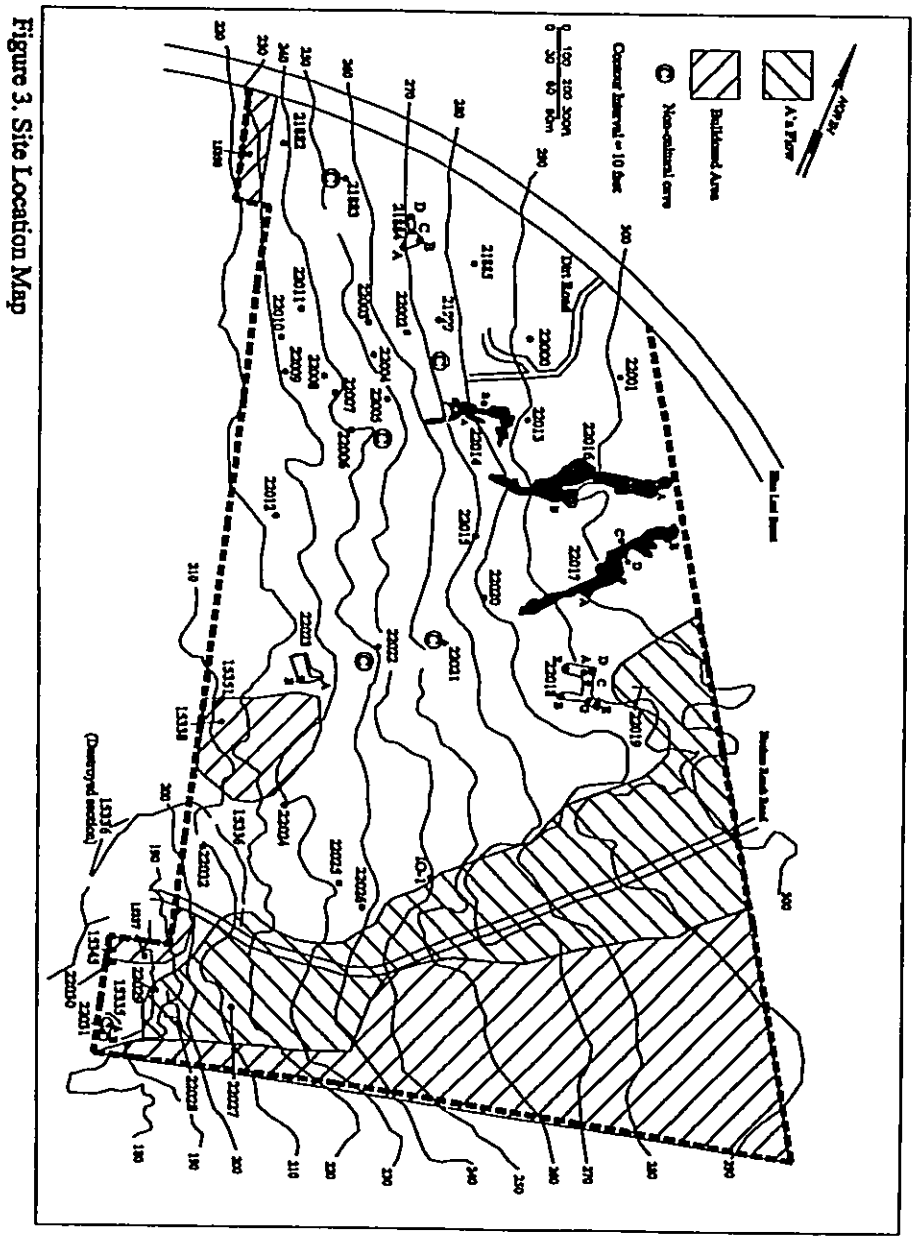

Figure 3. Site Location Map

The ten agricultural terraces varied in length from 0.8 to 4.2 m (averaging 2.28 m), in width from 0.6 to 3.2 m (averaging 1.4 m) and in height from 0.15 to 0.95 m (averaging 0.53 m). Four of the terraces were rectangular in shape and six were linear. The six mounds at Site 15337 included three that were linear in shape, two that were oval and one triangular-shaped. These features varied in length from 1.3 to 3.3 m (averaging 2.29 m), in width from 0.5 to 1.2 m (averaging 0.9 m) and in height from 0.22 to 0.5 m (averaging 0.39 m). Feature D was an irregularly-shaped modified outcrop located c. 6.0 m south-southeast of the Feature A terrace. It measured c. 0.8 m in length, 0.7 m in width and 0.1 m in height, located on top of a pahoehoe outcrop.

Table 2. Summary of Site 15337 Agricultural Features

Feature	Type	Length	Width	Height	Shape
B-1	Terrace	4.20	3.20	0.63	Linear
B-2	Terrace	3.30	1.50	0.42	Linear
B-3	Terrace	1.20	0.90	0.33	Linear
B-4	Terrace	0.80	0.60	0.31	Rectangular
B-5	Terrace	1.40	0.90	0.25	Linear
B-6	Terrace	4.00	0.80	0.15	Linear
B-7	Terrace	2.00	1.50	0.90	Rectangular
B-8	Terrace	1.50	0.70	0.85	Rectangular
B-9	Terrace	2.00	0.90	0.95	Rectangular
B-10	Terrace	2.00	2.00	0.50	Linear
C-1	Mound	2.90	0.90	0.40	Linear
C-2	Mound	1.70	0.50	0.50	Linear
C-3	Mound	2.50	0.70	0.32	Oval
C-4	Mound	3.30	1.10	0.22	Linear
C-5	Mound	2.00	1.10	0.42	Triangular
C-6	Mound	1.30	1.20	0.50	Oval
D	Modified outcrop	0.80	0.70	0.10	Irregular

Site 15338

Site 15338 was a large U-shaped enclosure located along the western project area boundary. It was documented by Fager and Graves as an historic enclosure, "constructed from bulldozer push" (1993:33). This area is extensively disturbed, and though piles of bulldozed boulders are present in the vicinity, no structure corresponding to Fager and Graves description was identified.

According to Fager and Graves, the enclosure measured c. 30.0 m long (N/S), 2.5 m wide and 2.8 m in height. A water trough was located along the western interior wall, and a large metal tank (2.1 m diameter by 3.1 m tall) was situated outside the enclosure, 15.0 m to the west. A water hose extended from the tank, and was partially covered by a stacked and faced wall that measured c. 2.3 m long by 0.8 m wide. No cultural remains were observed. This site was interpreted as an animal husbandry feature, apparently based on its shape and the presence of the water trough.

Site 15345

Site 15345 was a terrace located in the southwestern portion of the project area, in an area that has been extensively disturbed by bulldozer activity. No remnants of this site were observed during the current survey. It was recorded by Fager and Graves as an L-shaped structure that had been built up on the west and south sides to a height of 0.8 m (1993:38). The feature measured c. 3.8 m long by 2.9 m wide, with a level surface. No cultural remains were noted. This site was interpreted as an agricultural terrace by Fager and Graves.

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Site 15350

Site 15350 was a complex of two features previously recorded by Fager and Graves (1993). The site was located in the northwestern corner of the project area, in an area that has been bulldozed in conjunction with the construction of Kamanu Street. This site has been destroyed subsequent to the present project. It was comprised of a steppingstone trail segment (Feature A) and a pahoehoe excavation (Feature B).

Feature A was comprised of a series of pahoehoe slabs that extended across an a'a flow in a NNE/SSW direction. The slabs measured from 0.3 to 0.75 m in diameter. According to Fager and Graves, two additional trails branched off the main trail to the west, though no information concerning their lengths was presented (1993:42). A waterworn basalt cobble was found at the southern end of the trail.

Feature B was a pahoehoe excavation situated c. 3.3 m east/southeast of the trail. It was oval in shape and measured c. 1.8 m long (N/S), 1.6 m wide and from 0.4 to 0.82 m in depth. No cultural remains were observed.

Site 15351

Site 15351 was a complex of two caves (Features A and B) and a wall (Feature C), previously identified by Fager and Graves (1993:42). It was determined by Fager and Graves that this site was situated outside of their project area so virtually no information was collected. According to the report, Feature A evidenced some modification near the entrance, and Feature B contained prehistoric cultural remains (1993:42). These two features were assigned temporary habitation functions. Feature C was interpreted as an historic cattle wall.

The location of this site, as depicted on Fager and Graves site location map (1993:2) indicates it is situated immediately *mauka* of the western boundary of the current project area, in an area that has been extensively disturbed by bulldozing activity. No evidence of this site was found in this location. However, it is potentially possible that Site 15351 may correspond to Site 22023, a complex comprised of a cave with two entrances and an enclosure wall, identified during the current survey. Site 22023 is situated c. 90.0 m north-northeast of the plotted location of Site 15351, although the limited data available concerning Site 15351 makes this determination equivocal. Site 22023 is described later in this section.

Modified Outcrops and Mounds

The current survey identified 15 single feature agricultural sites, comprised of 14 modified outcrops (Sites 21882, 21883, 21885, 22001-22003, 22005, 22007-22009, 22011, 22013, 22021 and 22024) and one mound (22015). These sites are spatially isolated from other sites and are constructed of crudely piled pahoehoe cobbles and boulders. These sites are generally situated in areas of surface pahoehoe lava, and all unaltered and in good condition. They are interpreted as agricultural features due to their informal method of construction and lack of cultural remains. The physical characteristics of these features are summarized in *Table 3*.

The 14 modified outcrops range in length from 1.05 to 6.5 m (averaging 2.92 m), in width from 0.6 to 3.7 m (averaging 1.55 m), and in height from 0.3 to 0.75 m (averaging 0.46 m). Twelve of the 14 modified outcrops are irregularly shaped, one is oval and one is linear. These features are scattered throughout the northern two-thirds of the project area, generally situated on uneven pahoehoe terrain. They are located at elevations from 219 to 302 ft elevation. The features are in good condition and appear to be unaltered. *Figure 4* illustrates an example of a modified outcrop identified during the study.

Site *22015* is the single feature agricultural mound site, located in an area of uneven pahoehoe lava, at an elevation of 280 ft elevation. This mound is oval in shape and is c. 2.5 m long, 1.4 m wide and 0.5 m in height.

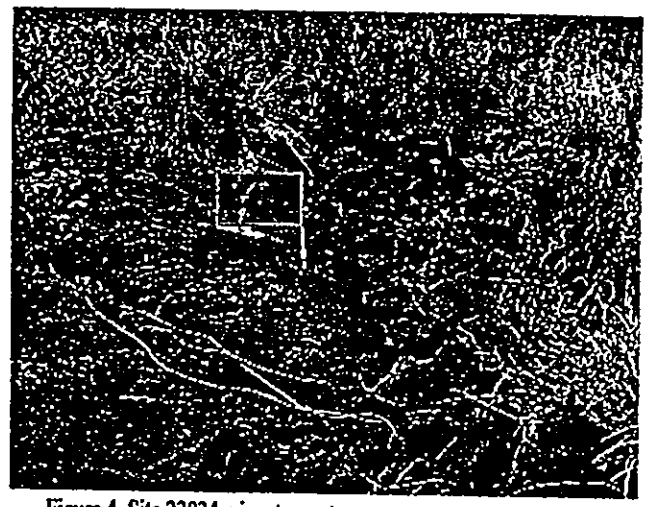

Figure 4. Site 22024, view to west

Figure 5. Site 22022, view to east

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Table 3. Summary of Single Feature Modified Outcrops and Mounds

Site/Feature Designation	Type	Length	Width	Height	Shape	Elevation (ft)
21882	Modified outcrop	3.10	1.50	0.45	Irregular	232
21883	Modified outcrop	2.50	1.05	0.75	Irregular	256
21885	Modified outcrop	4.10	3.20	0.42	Irregular	264
22001	Modified outcrop	3.10	1.75	0.40	Irregular	302
22002	Modified outcrop	1.40	0.65	0.35	Irregular	268
22003	Modified outcrop	1.05	0.75	0.35	Oval	255
22005	Modified outcrop	1.55	1.05	0.42	Irregular	248
22007	Modified outcrop	6.50	3.70	0.65	Irregular	239
22008	Modified outcrop	1.25	0.05	0.38	Irregular	238
22009	Modified outcrop	2.30	0.65	0.60	Linear	232
22011	Modified outcrop	2.50	0.08	0.60	Irregular	236
22013	Modified outcrop	1.25	0.00	0.35	Irregular	292
22015	Mound	2.50	1.40	0.50	Oval	280
22021	Modified outcrop	3.20	1.50	0.35	Irregular	275
22024	Modified outcrop	5.40	1.30	0.30	Irregular	219

Pahoehoe Excavations

Three single feature pahoehoe excavation sites were recorded. These include Sites 22000, 22006 and 22022. All of these excavations are irregular in shape and all are situated on uneven pahoehoe flows. No cultural remains were found in association with any of these sites. Stones removed from the excavations are scattered around the exterior of each excavation. The nature of these sites suggests they were created during efforts to prospect for scoria abrader raw material for tool manufacture.

Site 22000 is 1.75 m long, 1.0 m wide and 0.45 m deep, located at c. 292 ft elevation. Site 22006 is situated at c. 250 ft elevation. It is c. 1.65 m long, 0.85 m wide and 0.48 m in depth. Site 22022 is 0.83 m in length, 0.45 m in width and 0.57 m deep, located at c. 242 ft elevation. An example of a pahoehoe excavation noted during the study is presented in *Figure 5*.

Cairns

Isolated stacked stone cairns were noted in five locations within the project area (Sites 22004, 22012, 22020, 22025 and 22027). These structures are small, well-built features that based on their nature, likely functioned as markers. No cultural remains were present at any of the five sites. These single feature sites are described below.

Site 22004 is a cairn situated on an a'a ridge in the northwestern portion of the project area at c. 254 ft elevation. The cairn consists of an upright, slightly leaning pahoehoe slab (0.69 m tall, 0.37 m wide and 0.12 m thick), supported by three smaller pahoehoe boulders at the base (*Figure 6*).

Site 22012 is located on the top of a rugged a'a ridge near the western project area boundary, at c. 224 ft elevation. It consists of a series of three stacked flat pahoehoe slabs. The stack of stones is 0.6 by 0.95m at the base, 0.2 by 0.25 m at the top and 0.21 m in height (*Figure 7*).

Site 22020 is situated in the approximate center of the project area, on an exposed pahoehoe outcrop, at c. 281 ft elevation. The cairn is constructed of stacked pahoehoe slabs, cobbles and small boulders, four to five courses in height. It is roughly oval in shape and is c. 1.35 by 1.85 m at the base, 0.95 by 1.05 m at the top and 0.62 m in height (*Figure 8*).

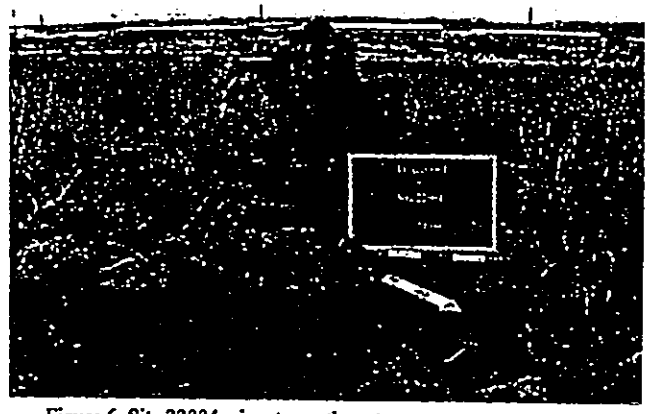

Figure 6. Site 22004, view to southwest

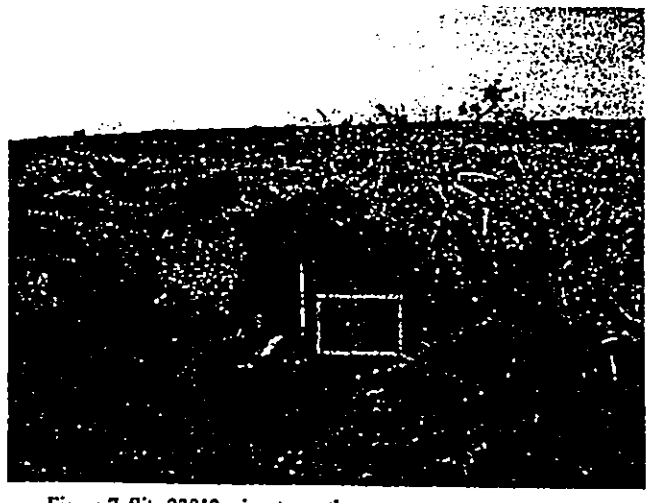

Figure 7. Site 22012, view to southwest

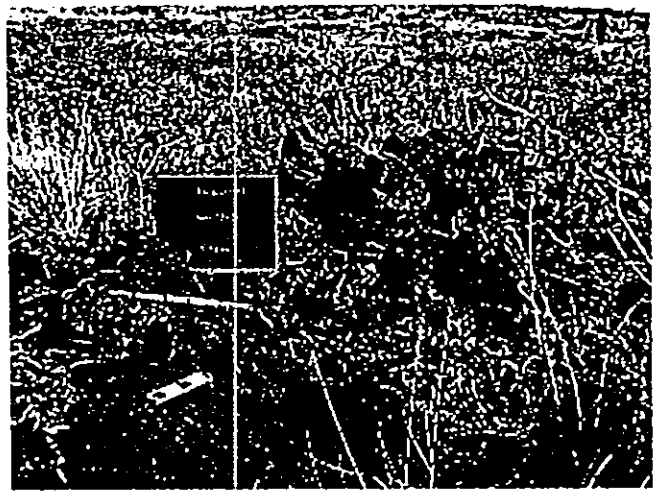

Figure 8. Site 22020, view to northwest

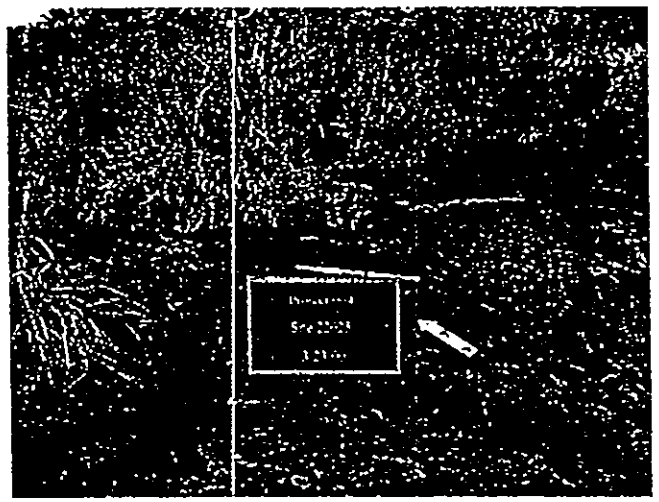

Figure 9. Site 22025, view to northeast

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Site 22025 is located on an exposed pahoehoe flow in the southwestern portion of the project area. It is situated c. 50.0 m north of a large a'a flow at 222 ft elevation. The cairn is comprised of three pahoehoe stones stacked one on top of the other. The base consists of a flat pahoehoe slab (0.35 by 0.4 m). The middle stone is a subangular cobble that is c. 0.2 m square by 0.23 m tall. The top stone is a smaller cobble that is c. 0.1 m square by 0.05 m tall. The height of the cairn is c. 0.4 m (*Figure 9*).

Site 22027 is situated in the southwestern portion of the project area on a rugged a'a flow, at c. 214 ft elevation. This cairn consists of an upright a'a slab, supported at the base by piled a'a cobbles. The upright is c. 0.59 m tall, by c. 0.2 m in diameter. The base of the structure is c. 0.34 by 0.54 m (*Figure10*).

Walls

Single feature wall sites were present in three locations within the project area. These include Sites 15335, 15336 and 22029. Two of the walls are interpreted as boundary walls defining garden plots, and one appears to have functioned as a cattle wall. These sites are described below.

Site 15335 is a wall initially documented by Fager and Graves (1993). The wall is built of stacked and piled a'a cobbles and boulders, with several pahoehoe slabs incorporated into the base (*Figure 12*). It is in relatively good condition, however, the western end has been impacted by bulldozing activity. It extends from this disturbance across a weathered a'a flow in a roughly easterly direction for c. 23 m. It then angles to the south for an additional 4.0 m, terminating c. 3.5 m north of a pahoehoe outcrop. The wall ranges in width from 0.7 to 1.2 m at the base, and 0.42 to 0.62 m at the top. The height of the wall varies from 0.65 to 1.05 m. Site 22031 is situated to the south of this wall.

Site 15335 is interpreted as a boundary wall, likely used to protect a garden plot from livestock. This is based on the wall's shape and method of construction. This plot is located in the area south of the wall and north of the pahoehoe outcrop. The ground surface in this area is relatively level with pockets of soil and scattered stones. No cultural remains were present.

Site 15336 is a wall located in the southwestern portion of the project area at elevations ranging from 205 to 210 ft elevation. The wall extends across areas of weathered a'a and pahoehoe lava flows that slope gently to the west. A *makai* portion of this wall was documented by Fager and Graves in an adjacent parcel (1993). This previously recorded section has been destroyed by construction activity. According to Fager and Graves, the wall extended in a roughly north-northeasterly direction a distance of c. 158 m, then angling to the northeast for an additional 55 m, extending outside their project area. (1993:2).

The portion of the wall in the current project area originates on the *mauka* side of a disturbed area along the western project area boundary. The majority of the wall is in good condition, with some disturbance noted. It extends from the disturbed area a distance of c. 20.0 m in an east-southeasterly direction, to a c. 8.0 m wide section that has been bulldozed. No remnant of the wall is present in this area. The wall is present again on the eastern side of the bulldozed zone, extending in a roughly southeasterly direction for c. 80 m. A second bulldozed area is present at the southern end of this section, measuring c. 4.0 m in width. The wall continues on the southern side of the bulldozed area, extending 17.5 m to the south/southwest, to where it terminates on top of a large a'a flow, c. 3.0 m north of the former Huehue Ranch Road.

The wall evidences varying construction materials throughout its length. The northern and southern portions of the wall are built of a'a cobbles and boulders, with the central portion being constructed of pahoehoe stones. The wall is stacked and faced, with a narrowly core-filled interior. It varies in width at the base from 1.05 to 1.15 m, and at the top from 0.55 to 0.85 m. The height of the wall ranges from 0.65 to 1.2 m (*Figure 11*). The height of the wall and its method of construction suggest that Site 15336 functioned as a cattle wall.

Site 22029 is a wall situated in the southwestern portion of the project area at c. 180 ft elevation. The site is located at the western end of a swale within a rugged a'a flow. The swale slopes moderately to the west. Site 22029 is c. 3.1 m in length (NNW/SSE), 0.48 to 0.53 m wide and the base and 0.25 to 0.4 m wide at the top. The wall is c. 0.6 m tall on the downslope side and 0.45 m tall on the upslope side. It is

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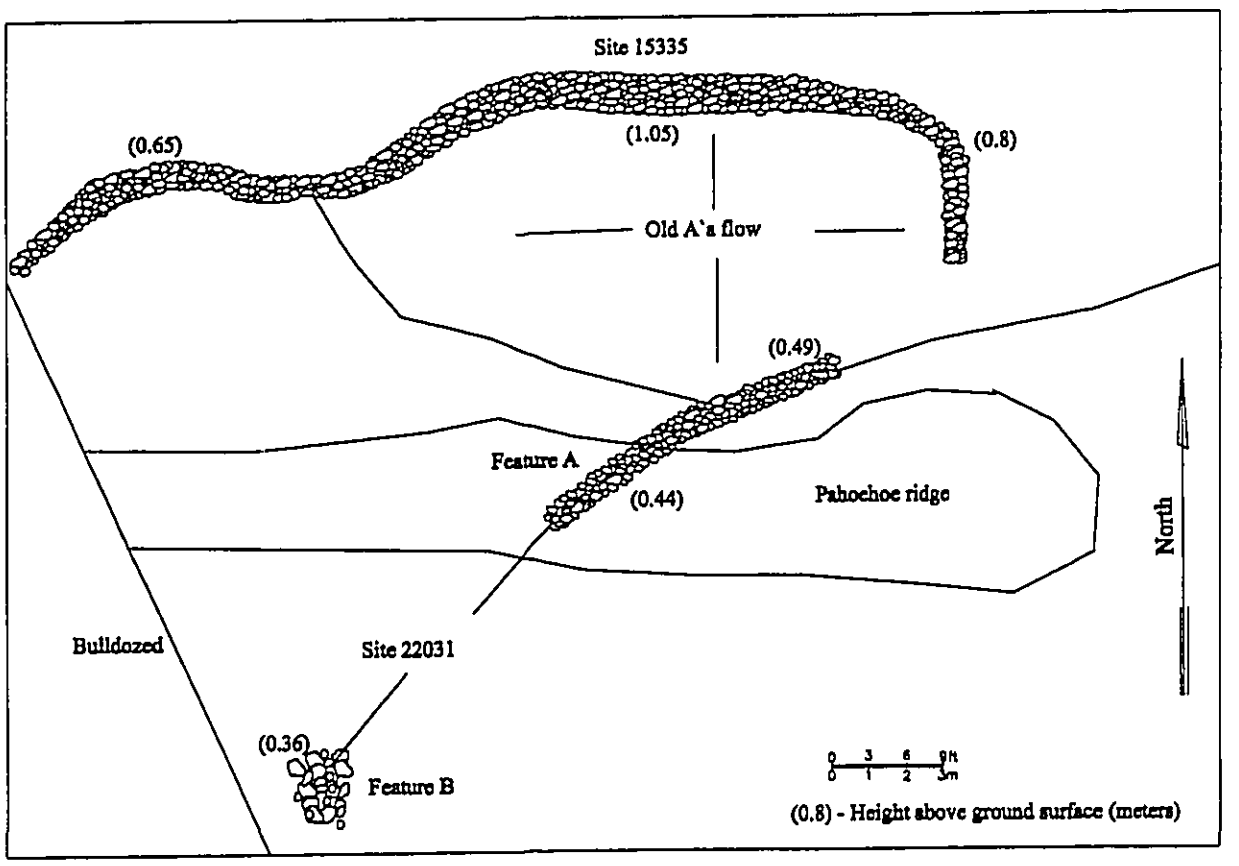

Figure 12. Plan Map of Sites 15335 and 22031

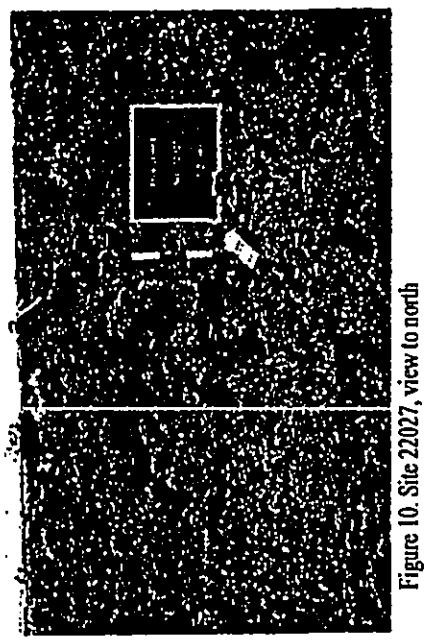

Figure 10. Site 22027, view to north

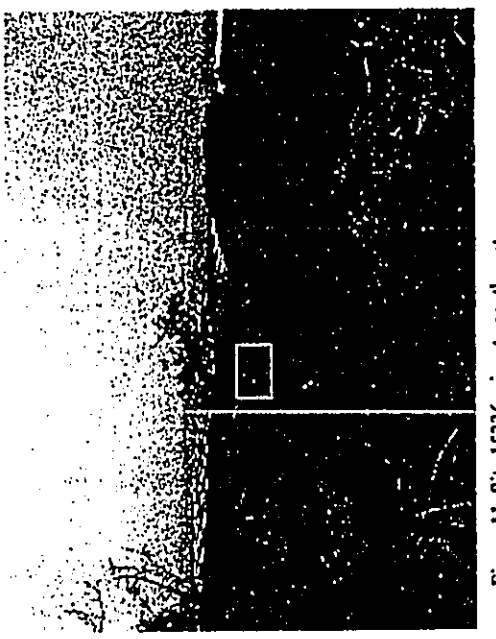

Figure 11. Site 15336, view to southwest

built of stacked a'a cobbles, three to four courses in height (*Figure 13*). No cultural remains were present. The low height of this wall and its location at the *makai* end of a swale, suggests it functioned as a garden enclosure.

Marine Shell Concentrations

Isolated surface concentrations of marine shell were observed in two locations during the current survey (Sites 22010 and 22032). The nature of both of these sites indicates they are the remnants of single episode, temporary habitation occupations. Both sites are in good condition and appear unaltered. Sites 22010 and 22032 are described below.

Site 22010 is a sparse concentration of approximately 100 sun-bleached marine shells located in the northeastern portion of the project area at c. 222 ft elevation. The site is situated in an area of smooth pahoehoe lava that slopes slightly to the west. The shells are situated in an area 10.0 m long (N/S) by 7.0 m in width. Several thin pockets of soil are present within this area, but the majority of the surface is comprised of bare lava. Most of the shells at the site are small broken *cowrie* shells, though smaller numbers of *opihi* and *pipipi* are also present.

Site 22032 is a small shell concentration situated at c. 209 ft elevation, in the southwestern portion of the project area. The site is located in an area of weathered a'a that slopes slightly to the west. The shells are sun bleached and include three small *cowrie* shells, six *opihi* and two *pipipi* shells. Several pieces of waterworn coral were also present. These ecofacts are present in an area 0.5 m long (N/S) by 0.45 m wide (*Figure 14*).

Trails

Two trail segments were documented within the project area during the present survey. These include Sites 22019 and 22028. Both sites are located on rugged a'a flows, indicating that they were used as a means of traversing this uneven terrain. Sites 22019 and 22028 are both in good condition and are unaltered.

Site 22019 is a steppingstone trail located near the eastern project area boundary, at c. 294 ft elevation. The terrain in this area consists of an a'a ridge sloping to the west, surrounding several older pahoehoe outcrops. The trail is oriented in an east/northeasterly direction, with overall dimensions of c. 16.5 m. The trail is comprised of a series of 18 flat pahoehoe slabs that have been placed on the a'a lava, between several pahoehoe outcrops. The slabs vary in size from 0.2 by 0.3 m, to 0.45 to 0.55 m. No cultural remains were found at this site. Site 22019 is illustrated in *Figure 15*.

Site 22028 is a trail that extends through an area of uneven, rugged a'a, in the southwestern portion of the project area at c. 185 to 198 ft elevation. The trail is comprised of a narrow path (0.6 to 0.7 m wide) that has been cleared of stones and is crudely paved with a'a cobbles, with the occasional pahoehoe slab. The trail originates at the top of the swale containing Site 22029, on the southern side. It extends roughly to the southeast for c. 65.0 m, ending at a bulldozed area. A spur trail extends off the main trail to the west a distance of c. 34 m. This spur is located c. 8.0 m north of the southern end. No cultural remains were present at the site. *Figure 16* depicts Site 22028.

Abrader Grinding Workshop

Site 22026 consists of a series of six abraded surfaces located on an exposed pahoehoe outcrop. The site is situated in the southwestern portion of the project area at c. 238 ft elevation. This outcrop is smooth with a relatively level surface. It is bounded on the south by a tall a'a ridge, and on the north, east and west by uneven pahoehoe lava that slopes slightly to the west. The outcrop is c. 10.5 m long (N/S) by 8.5 m wide. The six abraded surfaces are located in the southwestern and central portions of the outcrop.

These six surfaces range in size from 0.18 m in diameter to 0.75 by 0.88 m (*Figure17*). The depth of the surfaces is approximately 1 mm, barely penetrating the surface veneer of the weathered pahoehoe.

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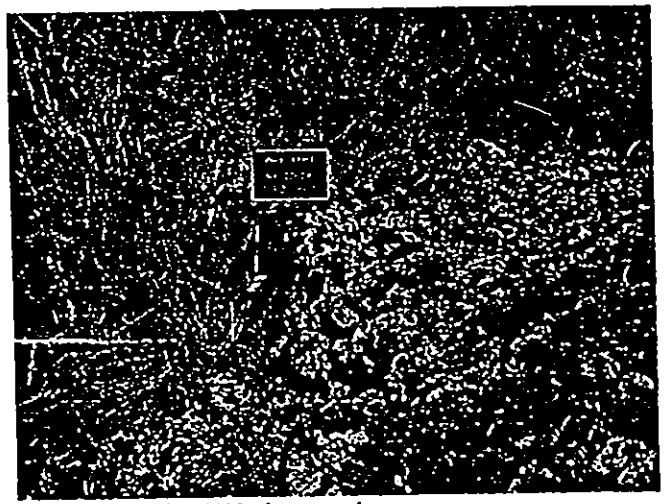

Figure 13. Site 22029, view to north

Figure 14. Site 22032, view to southwest

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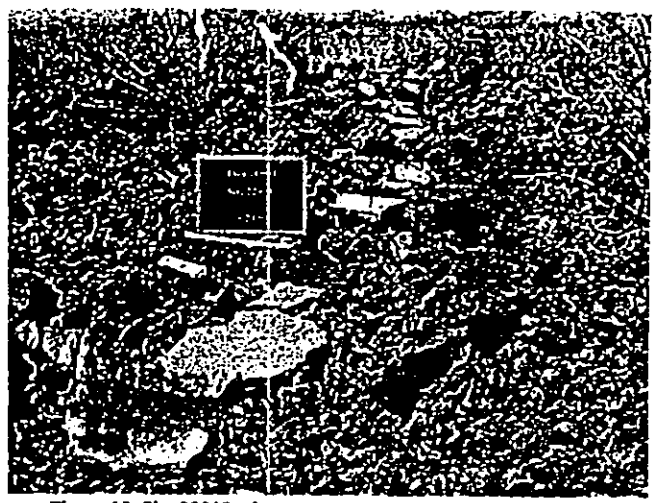

Figure 15. Site 22019, view to west

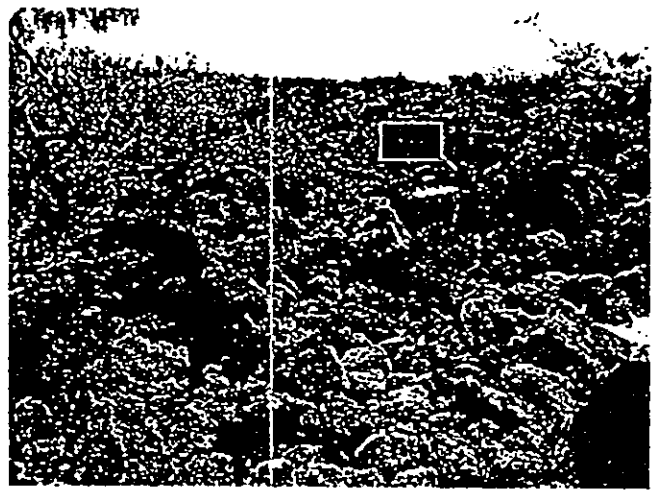

Figure 16. Site 22028, view to east

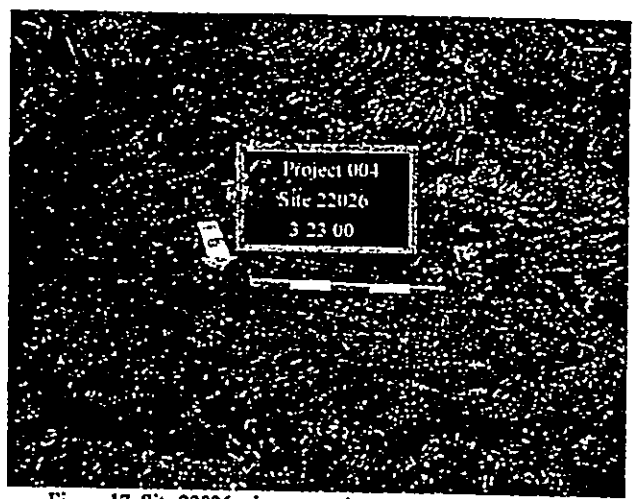

Figure 17. Site 22026, view to south

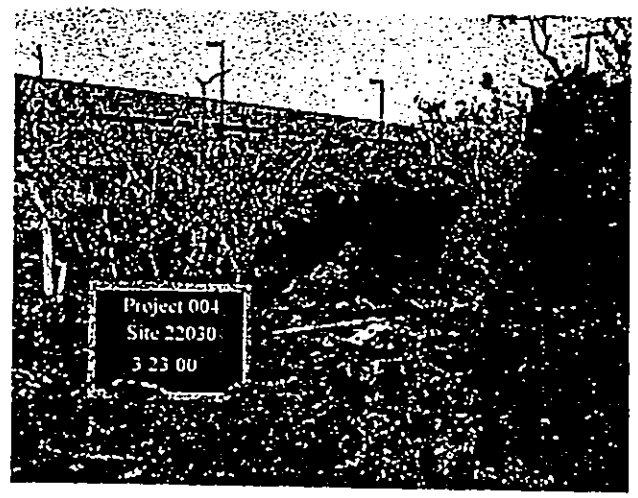

Figure 18. Site 22030, view to northwest

The nature of this site suggests it was used as a grinding area for the manufacture of abraders; however, no complete tools were present. This site is unaltered and in good condition.

Cupboard

Site 22030 is a small cupboard located in the southwestern portion of the project area, at c. 170 ft elevation. The site is in an area of uneven a'a lava that slopes slightly to the west. It consists of a large a'a slab (1.41 m long, 1.09 m wide and 0.2 m thick), that has been placed on top of piled a'a cobbles on the south, west and east sides. There is an entrance into the cupboard on the north-northwestern side, measuring c. 0.31 m wide by 0.59 m tall. The interior of the cupboard is c. 0.62 m long (NW/SE), 0.59 m wide and 0.53 m tall (*Figure 18*). The floor inside the cupboard consists of a pavement of small a'a cobbles. No cultural remains were present. This site is in good condition and is unaltered.

Cave

Site 21999 is a small cave located in the north-central portion of the project area at c. 276 ft elevation. The terrain in this area consists of uneven pahoehoe lava that slopes slightly to the west. The entrance to the cave is c. 3.0 m long (N/S) and 0.35 to 0.85 m wide. The floor of the cave is c. 1.3 m below the exterior ground surface. The overall cave interior is irregularly shaped, with four small passages. The main chamber is oval in shape, c. 7.2 m long (E/W), and 6.1 m wide. The ceiling heights range from 1.0 to 1.1 m. There is a low raised shelf around the north, west and east sides of this chamber, which varies in height from 0.2 to 0.3 m above the cave floor. Exposed bedrock is present on the surface of this shelf, with the floor in the main part of the cave evidencing a thin (0.02 m) covering of brown silt loam soil over bedrock.

Cultural remains were observed in the main cave chamber. These consists of a cluster of goat bones in the southwestern corner, a piece of waterworn coral at the north end, below the raised shelf, and a concentration of *kukui* nut shell, charcoal and urchin spines at the southern end. This concentration is c. 1.5 m long (E/W) by 0.85 m wide. A sample of the kukui nut shell was submitted for radiocarbon analysis, yielding a modern date.

There are two crude piles of subangular pahoehoe cobbles in this portion of the cave. The first is located at the north end of the main chamber, south of the raised shelf. It is 0.95 m long (N/S), 0.4 m wide and 0.35 m tall. The second is located c. 1.2 m north of the first, on the raised shelf. It is 0.7 m long (E/W), 0.4 m wide and 0.4 m tall. No cultural remains were found in association with these piles.

The four passages are located above the main cave floor at the north and eastern ends of the cave. The first extends to the northwest, measuring c. 4.5 m long (NW/SE), from 0.55 to 0.9 m wide, with ceiling heights ranging from 0.5 m at the southeastern end, to 0.2 m at the northwestern end.

The second passage is situated adjacent to the first to the east. It is 2.45 m long (N/S), 1.73 m wide and 0.3 m in height. The third passage is located at the northeast end of the cave. It measures c. 4.6 m long (NE/SW), 1.6 m wide, with ceiling heights ranging from 0.55 m at the southwest end, to 0.3 m at the northeast end. The final passageway is situated adjacent to the third to the south. It is 2.25 m long (WNW/ESE) and 0.8 to 2.2 m wide. The ceiling heights are 0.7 m at the west end and 0.3 m at the east end. The floor in these passages consists of exposed bedrock, with no cultural remains present. Site 21999 is illustrated in *Figure19*.

Feature Complexes

The seven remaining sites consist of complexes of features (Sites 21884, 22014, 22016, 22017, 22018, 22023, and 22031). These sites, described below, consisted of two to seven features, averaging three features.

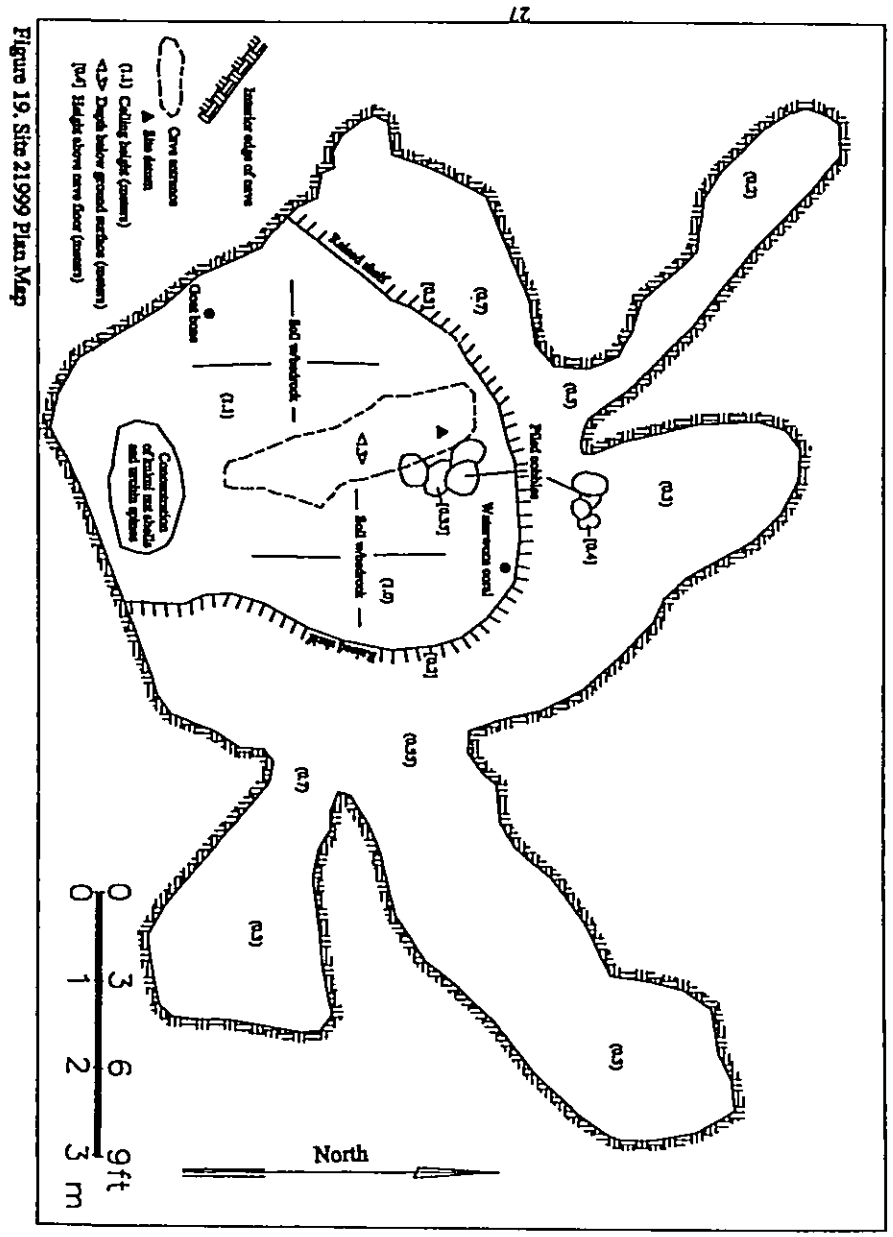

Figure 19. Site 21999 Plan Map

Site 21884

Site 21884 is a complex of four features located in the northern portion of the project area, in an area of uneven pahoehoe lava that slopes slightly to the west. The site is situated at c. 270-275 ft elevation. The features consist of a cairn (Feature A), two pahoehoe excavations (Features B and D) and a modified outcrop (Feature C). The distribution of the Site 21884 features is presented in *Figure 3*.

Feature A is a well-built cairn constructed on top of a domed pahoehoe outcrop. It is 2.1 m by 1.4m at the base and 1.25 to 1.0 m at the top. It is built of stacked subangular pahoehoe cobbles and small boulders, four to six courses in height. No cultural remains were present. The nature of this feature suggests it functioned as a marker.

Features B and D are pahoehoe excavations. Feature B is situated c. 15.0 m northeast of Feature A. It is 0.95 m long (E/W), 0.65 m wide and 0.4 m in depth. Feature D is located c. 22.0 m north/northwest of Feature B. This feature is c. 1.45 m long (NW/SE), 0.95 m wide and 0.63 m in depth. Both features are irregular in shape, with the stones removed during the excavation piled around the edge of the holes. No cultural remains were present at either feature. These excavations are interpreted as scoria prospecting features.

Feature C is an irregularly-shaped modified outcrop located between Features B and D. This feature consists of a pile of subangular pahoehoe cobbles and small boulders placed on the surface of an exposed pahoehoe outcrop. It measures c. 2.15 m in length (N/S), 1.08 m in width and 0.35 m in height. No cultural remains were present. Feature C is interpreted as an agricultural feature due to its informal method of construction and lack of portable remains.

Site 22014

Site 22014 is a complex of two features located in the north-central portion of the project area at elevations ranging from 260 to 288 ft elevation. The terrain in this area consists of uneven pahoehoe lava that slopes moderately to the west/southwest. The complex consists of a large lava tube (Feature A) and an enclosure located on the ground surface outside the cave (Feature B). *Figure 20* illustrates Site 22014.

Feature A is a large lava tube with three entrances. The cave is oriented in a roughly ENE/WSW direction, following the slope of the ground surface. The southwestern-most entrance is oval in shape, measuring c. 2.75 m long (E/W), 1.0 m wide and 1.4 m deep to the cave floor. This entrance opens onto a long linear chamber oriented in a NE/SW direction. The cave extends to the southwest from the entrance c. 21.0 m to where it terminates, and to the northeast c. 11.0 m, where it opens onto a larger chamber. The width of this portion of the cave ranges from 3.9 to 5.1 m, with ceiling heights varying from 0.7 to 1.4 m. The floor throughout the majority of this portion of the cave is exposed pahoehoe lava, with the exception of an oval-shaped pocket of soil located adjacent to the entrance to the southwest. This soil area is c. 2.4 m long (E/W), 1.55 m wide and c. 0.04 m thick, over bedrock. Several cowrie and *pipipi* shells and a goat skull were present on the surface of the soil. Roof fall is present in this chamber on both sides of the entrance and at the extreme southwestern end.

There are two small passages extending to the northwest from this chamber. The first is located adjacent to the entrance to the southwest. It is c. 3.1 m long (NW/SE), 2.4 m wide with a c. 1.0 m high ceiling. The second passage is c. 4.8 m northeast of the first, on the northern side of the entrance. This passage is 13.1 m long (NW/SE), 2.4 to 2.7 m wide and 0.6 m in height. The floor in these passages is exposed bedrock with no cultural remains present.

The cave opens up into a large room at the northeast end of the first chamber. This room is irregularly-shaped, with a second entrance located at the northeastern end. The chamber is c. 36.5 m long (E/W) and from 2.4 to 12.7 m wide. The ceiling heights in this chamber range from 0.65 m at the eastern end, to 1.3 m in the center. This chamber is bisected by several floor-to-ceiling lava formations. The floor throughout this area is pahoehoe lava with no cultural remains present.

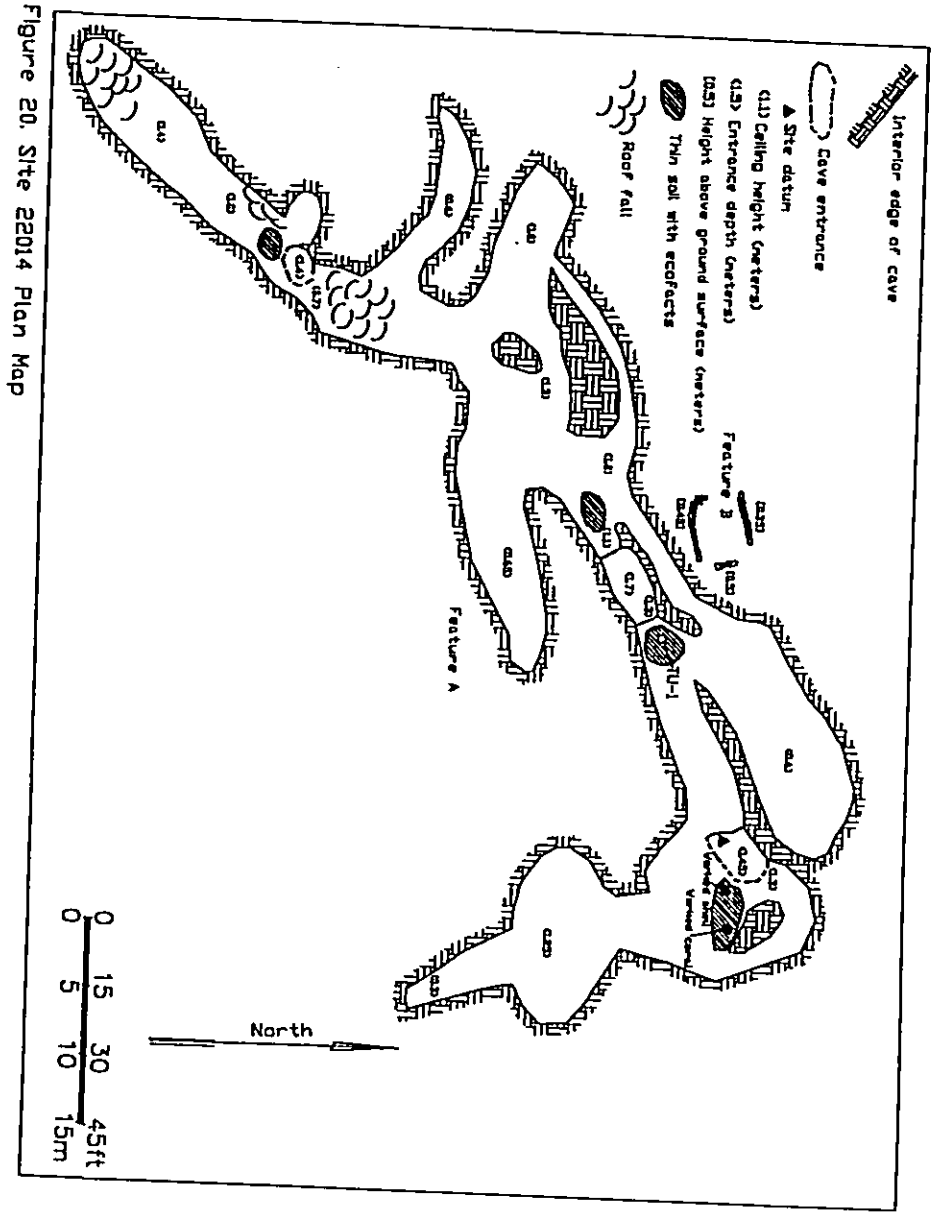

Figure 20. Site 22014 Plan Map

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The entrance at the northeast end of this chamber is oval-shaped, measuring c. 5.5 m long (NE/SW), 2.9 m wide and 1.7 m deep below ground surface. The Feature B enclosure is situated outside of this entrance on the ground surface, c. 5.1 m to the north-northwest. There are two areas of soil with several cowrie shells and urchin spines, one to the southwest of the entrance and one to the northeast. The southwestern soil area is c. 2.45 m long (E/W) by 1.7 m wide. This deposit consists of a dark brown silt loam that is c. 0.03 m thick.

The second soil area is 2.9 m long (N/S) by 2.75 m wide. A 0.5 by 0.5 m test unit was excavated in this area (TU-1). The excavation of this unit revealed a layer of very dark grayish brown (10YR 3/2) silt loam, that varied in thickness from 0.06 to 0.08 m. Cultural remains recovered from this layer consisted of marine shell, fish bone, sea urchin spines, Crustacea remains, and *kukui* shell fragments. The excavation of TU-1 was terminated on the lava floor of the cave. The cultural remains recovered from this unit are presented in *Table 4*. The stratigraphy of TU-1 is presented in *Figure 21*.

Table 4. Summary of Cultural Remains from Site 22014, Feature A, TU-1

Family	Genus/Species	NISP	MNI	WL
Cypraeidae	*Cypraea maurituna*	2	2	2.80
Muricidae	Drupa (sp.)	2	2	1.35
Conidae	Conus (sp.)	1	1	1.00
Echinoidea		1	1	0.25
Fishbone		1	1	0.40
Crustacea		2	1	0.30
Kukui Shell Frag		2	2	1.20

The cave continues to the northeast from the second entrance, dividing into two chambers. The first chamber extends to the northeast c. 20.7 m to where it terminates. It is c. 6.2 m wide and from 0.6 m to 1.0 m in height. The floor in this area is bare lava with no cultural remains present.

The second chamber extends to the east-northeast, c. 16.2 m, where it meets the final cave entrance. This chamber is 3.4 m wide and 1.3 m in height. No cultural remains or soil were noted in this area. The third entrance is c. 5.0 m long (NE/SW) 2.9 m wide and 1.45 m in depth below the ground surface. An oval-shaped area of soil is located adjacent to this entrance to the east. It is c. 4.9 m long (E/W) by 2.4 m wide and 0.08 m deep. Pieces of cowrie shell, urchin spines, *kukui* nut shells, a piece of ground shell, and a coral abrader were noted on the surface of this soil area.

The cave continues to the south from the soil area a distance of 24.0 m. This final chamber varies in width from 2.0 to 12.4 m, and in height from 0.3 to 1.25 m. No soil is present and no cultural remains are present. Feature A is interpreted as a temporary habitation site based on its formal type and associated cultural remains.

Feature B is located c. 5.1 m north-northwest of the middle entrance to the Feature A cave. This feature is a crudely built, roughly oval-shaped enclosure, with overall dimensions of 5.1 m (ENE/WSW) by 4.3 m. It is built of stacked pahoehoe cobbles and boulders on exposed pahoehoe lava. The walls of the enclosure are 0.4 to 0.6 m wide and from 0.35 to 0.5 m in height (*Figure 22*). No cultural remains were found at this feature. Feature B is interpreted as a temporary habitation based its formal type and its association with the Feature A cave.

Site 22016

Site 22016 is a complex consisting of two large, adjacent sinkholes and a series of five associated caves (*Figure 23*). This site was previously identified by Soehren (1980b). Only two of the caves evidence cultural remains. The site is located in the northeastern portion of the project area at elevations ranging from 275 to 310 ft elevation. The terrain in this area is uneven pahoehoe lava that slopes slightly to the west. Although partially altered by modern activities, the site is in good condition.

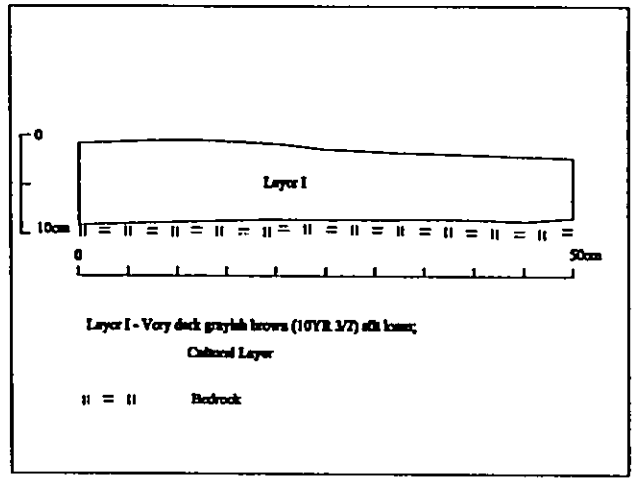

Figure 21. Site 22014, Feature A, TU-1 West Profile

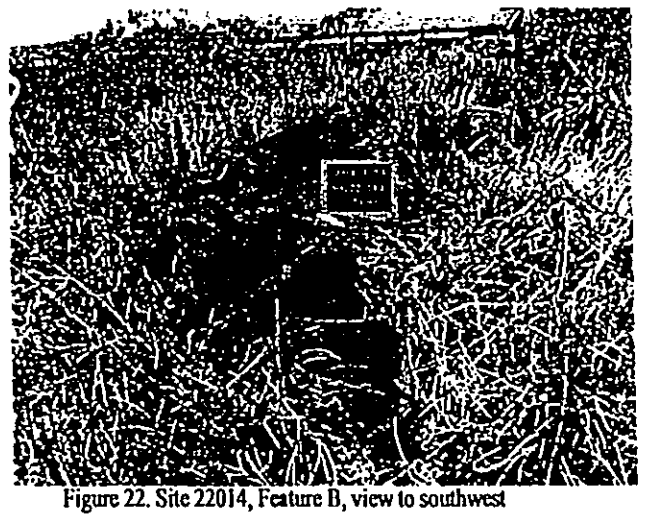

Figure 22. Site 22014, Feature B, view to southwest

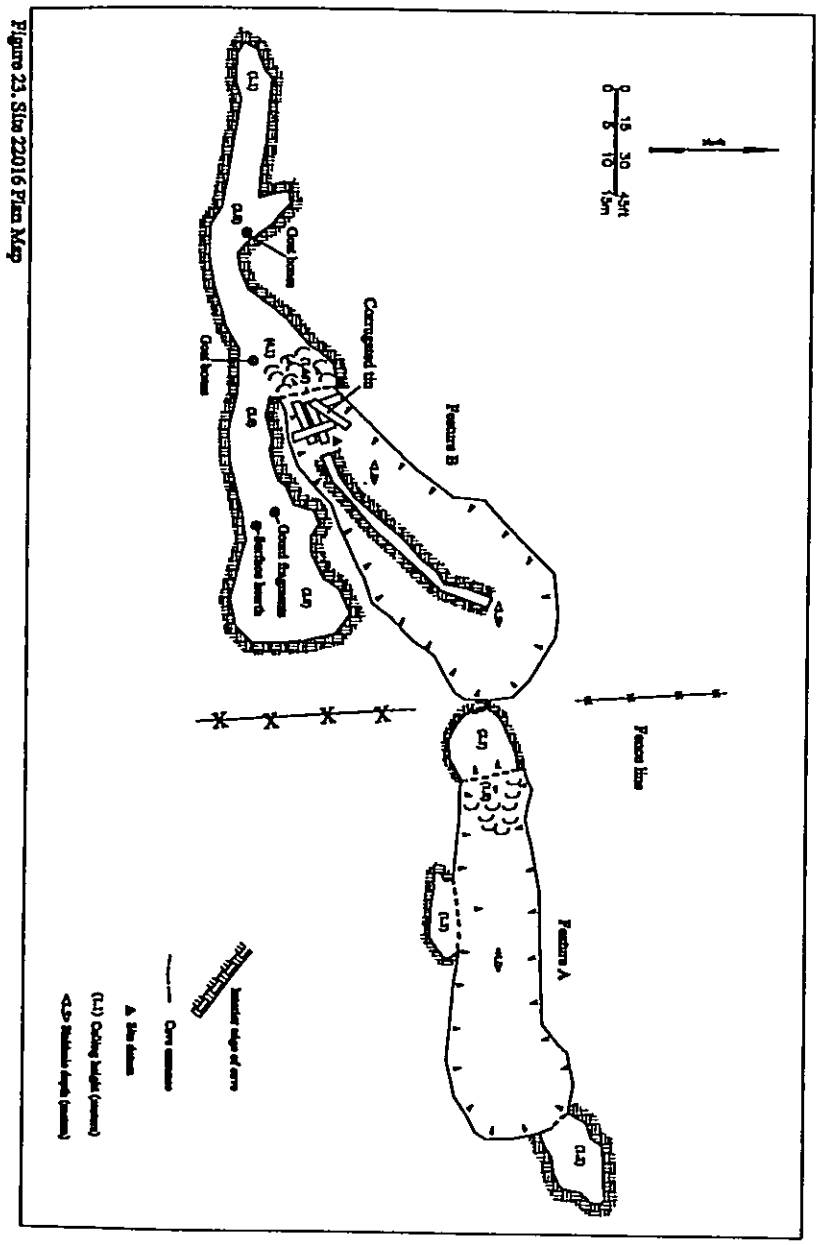

Figure 23. Site 22016 Plan Map

Feature A is large sinkhole located along the eastern project area boundary. The sinkhole is c. 48.0m long (E/W) and from 9.3 to 15.6 m wide. The walls of the sinkhole are bare pahoehoe lava and the floor is pahoehoe covered with thick grass. The sinkhole is c. 4.0 m below the surrounding terrain at its deepest point. No cultural remains were noted within the sinkhole.

Three caves extend from the sinkhole; one to the northeast, one to the south and one to the west. Only the northeastern cave evidenced cultural remains. This cave is 12.6 m long (NE/SW) and from 5.6 to 7.3 m wide with a ceiling height of 1.3 m. The floor of the cave consists of exposed pahoehoe lava with no soil present. Two pieces of *cowrie* shell were observed in the cave, one just inside the dripline to the east, and one at the northern end.

The southern cave is 11.3 m long (E/W), 4.0 m wide and 1.5 m in height. The western cave is roughly oval in shape, measuring c. 8.6 m long (E/W) and 8.0 m wide. There are two entrances into the western cave, one at the eastern end and one to the west. The eastern entrance is c. 1.8 m high and is filled with roof fall. The western entrance is a c. 1.2 m diameter hole that appears to have been created during mechanical grubbing for a wire fence line. No soil or cultural remains were present in either cave.

The Feature B sinkhole is located to the west of Feature A. It is c. 51.0 m long (NE/SW) and from 7.9 to 19.3 m wide. The floor and walls of the sinkhole consist of pahoehoe lava. The base of the sinkhole ranges from 1.8 to 3.5 m below the surrounding ground surface. A large pile of rusted corrugated tin roofing material is present at the western end of the sinkhole.

A small linear lava tube is present in the floor of the sinkhole. It measures c. 28.6 m long (NE/SW), and from 1.0 to 1.5 m wide. The tube is open at each end, with ceiling heights ranging from 0.6 to 1.0 m. The floor of this tube is bare lava with no cultural remains present.

There is a large cave located at the southwest end of the sinkhole, west of the corrugated tin. The cave is linear. The cave is 79.5 m long (E/W) and from 4.7 to 15.3 m wide. Ceiling heights range from 1.1 m at the western end to 4.1 m just inside the dripline. The dripline height is 1.65 m. A large pile of roof fall is located at the entrance, which slopes down to the west. The floor of this cave is bare lava, with no soil present.

Cultural remains were noted in the cave. Several gourd fragments were observed within a shallow hole in the eastern portion of the cave. Adjacent to these fragments is a surface concentration of charcoal, which appears to represent a hearth. This concentration measured c. 0.55 m long (N/S), 0.4 m wide and 0.03 m deep. A sample of this charcoal was collected and submitted for radiocarbon dating. The results of this analysis yielded a calibrated date range of 1445-1655 AD (see Appendix A). Additional materials inside the cave consist of two piles of recent goat bones. Site 22016 is interpreted to be a temporary habitation site based on the site type and cultural remains present.

Site 22017

Site 22017 is a complex of four features located in the northeastern portion of the project area, south of the Site 22016 complex. This site was previously identified by Soehren (1980b). The site is situated at elevations ranging from 282 ft to 310 ft elevation. The terrain in this area consists of pahoehoe ridges that slope slightly to moderately to the west and southwest. The four features consist of two lava tube caves (Features A and B), a modified outcrop (Feature C) and a pahoehoe excavation (Feature D) (*Figure 24*). These features are unaltered and are in good condition.

Feature A is a large lava tube with five entrances and a collapsed area. The cave is oriented in a roughly northeast-southwesterly direction, with an overall length of c. 167 m. The collapsed sinkhole floor

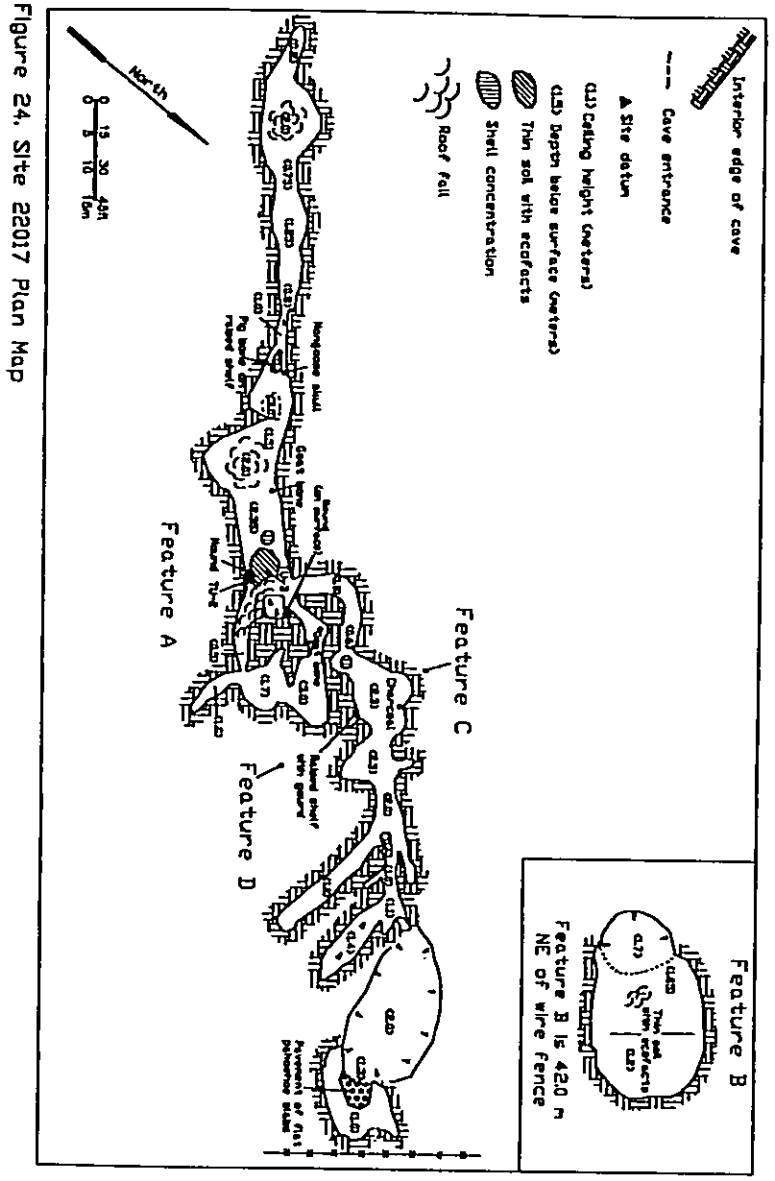

Figure 24. Site 22017 Plan Map

is pahoehoe lava covered with thick grass. No cultural remains were observed in this area. The floor of the sinkhole is c. 2.0 m below the surrounding ground surface.

A small cave extends to the east from the sinkhole. This cave is c. 13.2 m long (N/S) by 7.2 m wide with a 1.0 m high ceiling. The dripline height is c. 1.3 m. There is a crude pavement of pahoehoe cobbles and flat slabs located just inside the dripline. This pavement is oval-shaped and is c. 4.5 m long (N/S) by 3.4 m wide (*Figure 25*). The remaining portion of the cave floor is bare lava. No cultural remains were observed. There is a second, smaller entrance located at the northeastern end of the cave that was apparently created during mechanical grubbing associated with a wire fence line. This entrance is c. 1.85 m long (NW/SE) by 1.3 m wide and 0.95 m deep.

The lava tube continues on the western side of the sinkhole originating at an opening that consists of an oval-shaped hole that is 1.8 m long (NNE/SSW), 1.3 m wide and 1.1 m deep. This opens on to an irregularly-shaped passage that extends in a generally southwesterly direction for c. 51.0 m. This chamber ranges in width from 1.7 to 8.0 m and from 0.6 to 2.5 m in height. The floor throughout this area is comprised of bare pahoehoe lava. Cultural remains include several pieces of charcoal along the northern wall, c. 32.0 m southwest of the entrance. A gourd fragment was observed in a raised shelf along the south wall of the cave, directly opposite the charcoal. This shelf is c. 1.9 m above the cave floor. A concentration of cowrie shell on a deposit of sand was observed c. 8.0 m south of the charcoal. This concentration is c. 1.8 m long (NE/SW) and 1.2 m wide.

There are several narrow passages extending to the east of this chamber. These passages range in length from 2.3 to 15.5 m, in width from 0.7 to 2.8 m, and in height from 0.4 to 1.4 m. No soil or cultural remains were present in these passages.

The western end of this chamber opens onto a large, irregularly-shaped chamber with another entrance. This entrance is c. 3.6 m long (NE/SW) by 3.0 m wide. It is ramp-like, sloping down from the ground surface into the cave to the southwest. There is a stone mound located outside this entrance on the northwestern side. This mound is 1.5 m long (NE/SW), 1.0 m wide and 0.65 m tall, and is built of piled pahoehoe cobbles and boulders (*Figure 26*).

The cave extends to the east and southwest from this second entrance. A large rubble pile of roof fall is located below the entrance to the southwest. An area of shallow soil with surface marine shell is situated on the southwestern side of this rubble, measuring c. 5.4 m long (E/W) by 4.1 m wide. A 0.5 by 0.5 m test unit (TU-3) was excavated in the center of this soil area. The excavation revealed a single soil layer overlying bedrock. Layer I consisted of a c. 0.04 to 0.06 m thick deposit of very dark grayish brown (10YR 3/2) silt loam over the floor of the cave. Cultural remains consisted of marine shell, fish bone, *kukui* nut shell, charcoal and land snail. These cultural remains are summarized in *Table 5*. A sample of charcoal was submitted for radiocarbon dating. The sample yielded multiple calibrated age ranges of 1445-1680 AD, 1740-1805 AD and 1930-1950 AD (see Appendix A). The soil stratigraphy noted in this unit is presented in *Figure 27*.

A low, roughly rectangular-shaped mound is situated against the southern cave wall, adjacent to the soil area to the southeast. This mound is 1.9 m long (NE/SW), 1.0 m wide, and 0.45 m tall, built of stacked and piled roof fall material. No cultural remains were observed on the surface. A 0.5 by 0.5 m test unit (TU-2) was excavated into this mound to test for the presence of human remains. The excavation of this unit revealed a layer of loosely packed subangular pahoehoe cobbles and small boulders. This layer varied in thickness from 0.40 to 0.45 m. The base of this stone layer rested on the bare pahoehoe lava floor of the cave. No cultural remains were present in this layer. *Figure 28* illustrates the stratigraphy of TU-2.

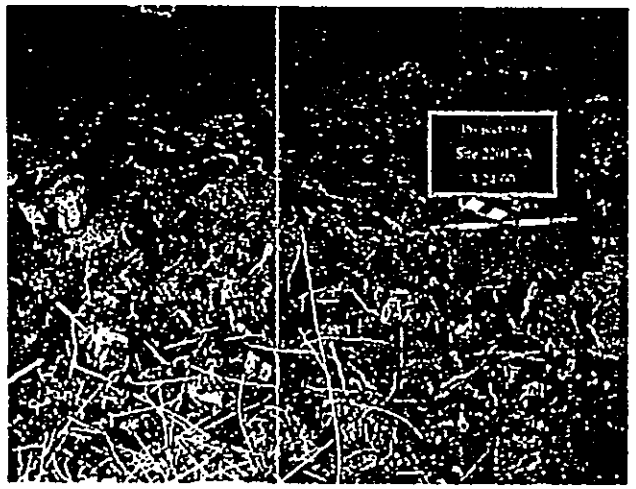

Figure 25. Site 22017, Feature A Pavement, view to west

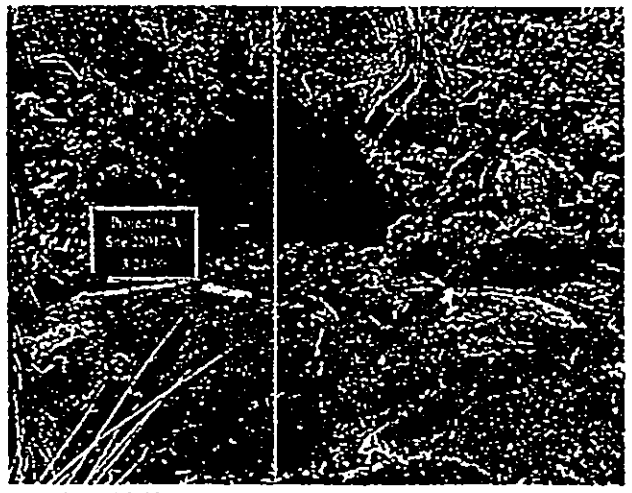

Figure 26. Site 22017, Feature A wall, view to east

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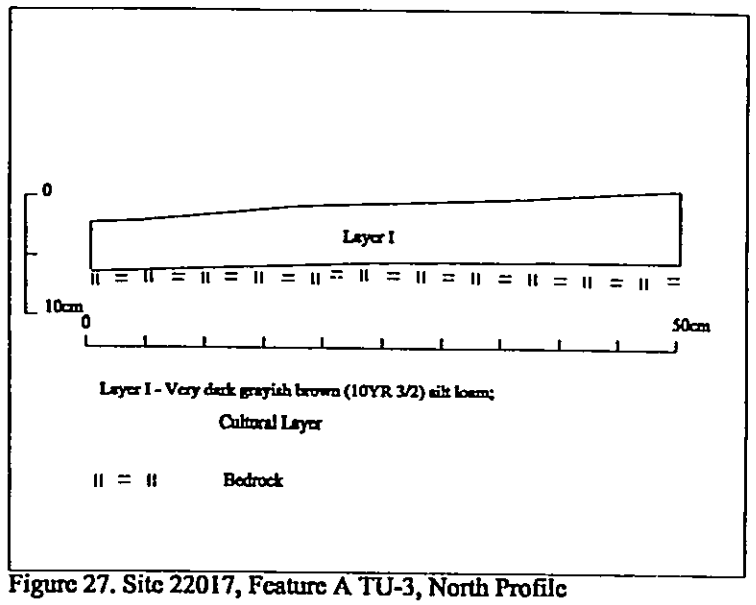

Figure 27. Site 22017, Feature A TU-3, North Profile

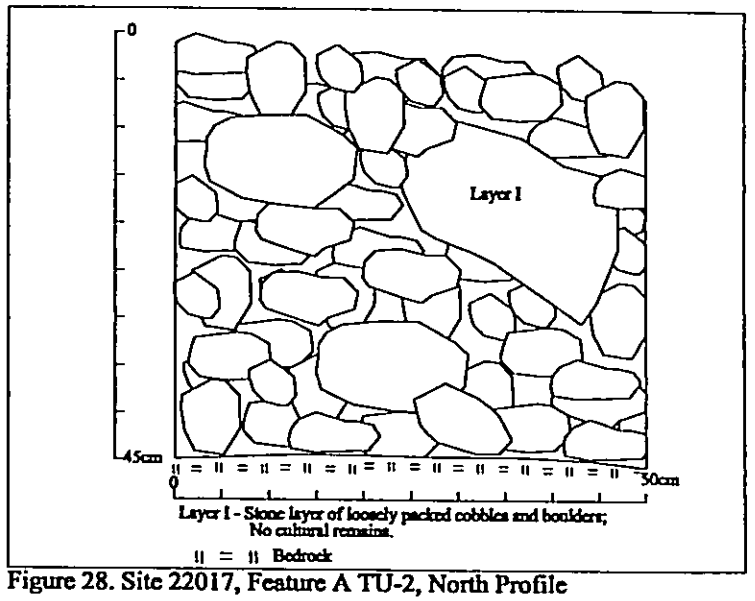

Figure 28. Site 22017, Feature A TU-2, North Profile

Table 5. Summary of Cultural Remains from Site 22017, Feature A, TU-3

Family	Genus/Species	NISP	MNI	Wt.
Isognomonidae	*Isognomon perna*	343	107	108.85
Cypraeidae	*Cypraea mauritiana*	55	8	72.50
Conidae	*Conus (sp.)*	1	1	11.55
Neritidae	*Nerlina tahitensis*	2	2	1.75
	Narita picea	1	1	0.50
Echinoidea		14	1	1.60
Muricidae		1	1	0.75
Kukui Shell Frag.		1		0.70
Landsnail		1	1	0.40
Fishbone	one vertebrae	1	1	0.30
Crustacea		1	1	0.30

The eastern extent of this chamber is roughly U-shaped with one passage on the northern side of the entrance and one on the southeastern side. The northern passage extends to the north for c. 5.3 m and then angles to the east for c. 14.0 m. A pile of recent goat bone is located in this area. At the eastern end of the passage, the tube opens on to an irregularly-shaped chamber that is 20.3 m long (NW/SE), from 2.0 to 9.4 m wide with ceiling heights ranging from 1.0 to 3.0 m. There is a small passage at the southwestern end that leads back towards the entrance.

The cave continues to the southwest from the second entrance a distance of c. 26.5 m. This chamber is from 3.3 to 11.2 m wide with ceiling heights from 1.5 to 2.35 m. A large pile of roof fall is located at the southwestern end. The floor throughout this area is bare lava with no cultural remains present.

A third entrance is located at the southwestern end of this chamber. This entrance is 3.8 m long (NE/SW), 2.4 m wide, and 3.0 m below the surrounding ground surface. The cave continues to the southwest from this entrance, a distance of c. 55.2 m where it terminates. This passage is from 1.0 to 8.6 m wide and from 0.75 to 2.0 m tall. The floor in this area is bare lava with a large roof fall pile near the southwestern end. Several pig bones were noted on a raised shelf on the south side of the cave, c. 4.9 m southwest of the entrance. This shelf is c. 1.7 m above the cave floor.

Feature A is interpreted as a temporary habitation site. This interpretation is based on the feature type and cultural remains.

Feature B is a cave located c. 42.0 m east-northeast of the *mauka* end of Feature A. There is a sinkhole at the southwest end of the feature, measuring c. 11.3 m long (NW/SE), 9.4 m wide, and 1.7 m deep. The floor of the sinkhole is partially filled with collapsed boulder rubble, and is covered in tall grass. No cultural remains were noted inside the sinkhole.

The cave extends to the northeast from the sinkhole. The entrance is 10.1 m wide (NW/SE) with a dripline height of 1.05 m. The interior of the cave is oval in shape and is c. 21.5 m long (NE/SW) by 17.0 m wide with a domed ceiling that is 1.2 m tall in the center. The floor in this cave is covered with a thin (0.05 m thick) layer of brown silt loam overlying bedrock. Marine shell (cowrie and *pipipi*) and *kukui* nut shells were observed on the surface. Feature B is also assigned a temporary habitation function based on its formal type and the presence of cultural remains.

Feature C is a modified outcrop located on top of a ridge north of the middle entrance to the Feature A lava tube. The feature consists of an irregularly-shaped pile of subangular pahoehoe cobbles and boulders located on top of a pahoehoe outcrop. It is c. 2.8 m long (NE/SW), 1.9 m wide and 0.45 m tall. No

cultural remains were present. Feature C is interpreted as an agricultural feature based on its informal construction and lack of cultural remains.

Feature D is a pahoehoe excavation situated on the same ridge as Feature C, c. 22.0 m to the east. This feature is comprised of a small pahoehoe lava blister that has been broken open and the removed stones piled informally around the edges. The hole is irregularly-shaped, measuring c. 1.4 long (N/S), 1.03 m wide, and 0.53 m deep. No cultural remains were observed. Feature D is interpreted as a resource procurement feature based on its nature.

Site 22018

Site 22018 is a complex of seven features located in the eastern portion of the project area *makai* of the Site 22019 steppingstone trail. The site is situated at elevations ranging from 285 to 294 ft elevation, in an area of uneven pahoehoe ridges sloping to the west. The features include five modified outcrops (Features A-C, E and F), a mound (Feature D) and a cave (Feature G). The features are all unaltered and in good condition. Features A through F are interpreted as agricultural features based on their informal construction and lack of cultural remains. These features are summarized in *Table 4*. The Feature G cave is assigned a temporary habitation function based on its formal type and associated remains. The distribution of these features is presented in *Figure 3*. The Site 22018 features are described below.

The five modified outcrops are constructed of piled, subangular pahoehoe cobbles and small boulders located on the surface of pahoehoe outcrops. They range in length from 1.05 to 5.0 m (averaging 2.92 m), in width from 0.4 to 3.2 m (averaging 1.54 m), and in height from 0.25 to 0.58 m (averaging 0.41 m). Four of the five modified outcrops are irregularly-shaped, and one is linear. No cultural remains were present at these features.

Feature D is a mound measuring c. 4.4 m long, 1.3 m wide and 0.42 m in length. The feature is linear in shape and is constructed of piled subangular pahoehoe cobbles and boulders. No cultural remains were present at Feature D.

Feature G is a small lava tube cave located at the southwestern corner of the site. There are two entrances into the cave. The first is a vertical hole located at the northern end of the cave. It is oval in shape and is 1.1 m long (N/S) by 0.6 m wide and 1.5 m below ground surface. The second entrance is located c. 1.6 m to the south from the first. This entrance consists of an opening in the side of the outcrop. It is c. 1.5 m long (NE/SW), 0.7 m wide, and 0.85 m deep. The interior of the cave is L-shaped, with overall dimensions of 17.8 m long (NNE/SSW) by 11.9 m (E/W) (*Figure 29*). The cave ranges in width from 1.1 to 2.35 m, with ceiling heights varying from 0.2 m at the southwest and eastern ends, to 1.4 m near the entrances. The floor of the cave is comprised of bare pahoehoe lava and roof fall.

There are two pockets of thin (0.03m) brown silt loam soil located between the two entrances. The first is located west of the northern entrance. It is c. 0.85 m long (E/W) by 0.7 m wide. The second soil area is situated c. 0.7 m southeast of the first. It is 0.82 m long (E/W) by 0.5 m wide. Cultural remains noted in these areas include cowrie and *pipipi* shells, sea urchin spines, flecks of charcoal, and *kukui* nut shells. Recent goat bones were also present in the southern soil area.

Table 6. Summary of Site 22018 Agricultural Features

Feature	Type	Length	Width	Height	Shape
A	Modified outcrop	1.05	0.40	0.35	Irregular
B	Modified outcrop	4.10	3.20	0.25	Irregular
C	Modified outcrop	5.00	0.55	0.30	Linear
D	Mound	4.40	1.30	0.42	Linear
E	Modified outcrop	2.25	1.45	0.53	Irregular
F	Modified outcrop	1.96	1.56	0.58	Irregular

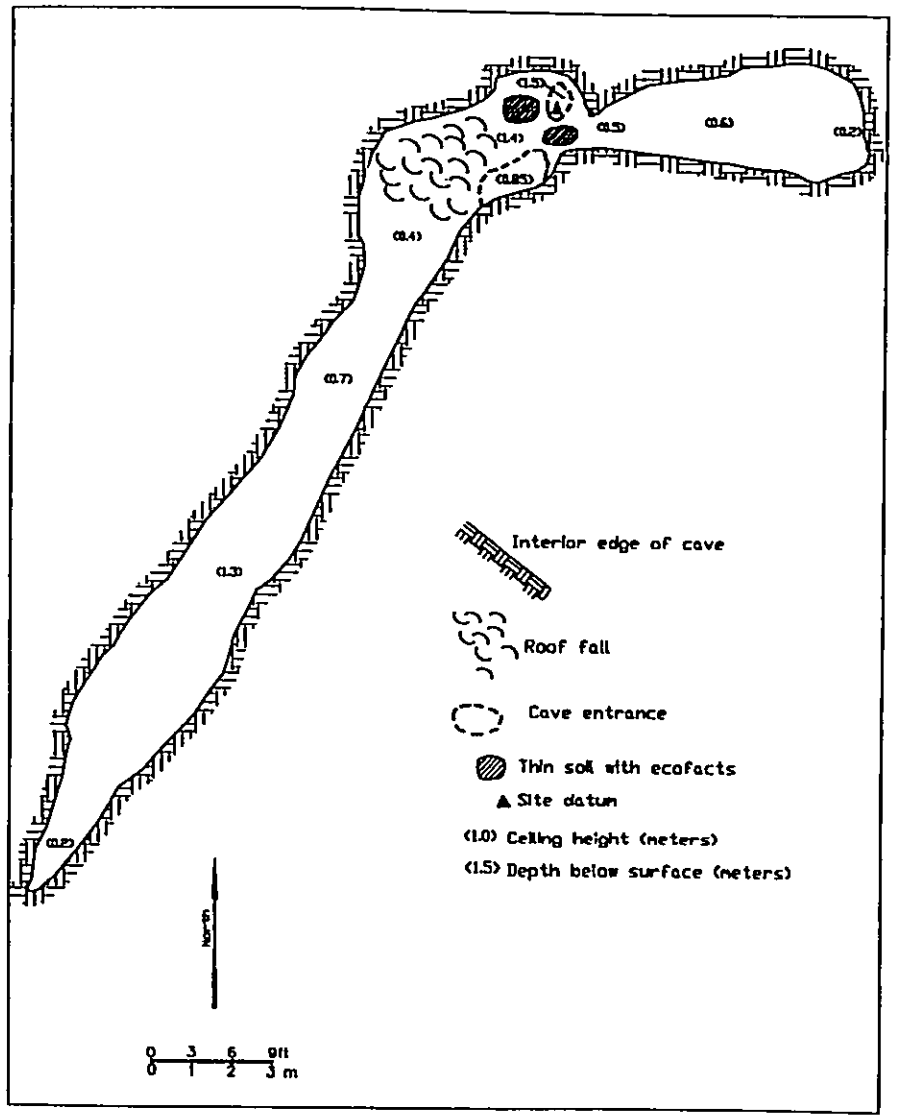

Figure 29 - Site 22018, Feature G Plan Map

Site 22023

Site 22023 is a complex of two features located near the western project area boundary at elevations ranging from 222 to 228 ft elevation. The site is situated in an area of uneven pahoehoe and a'a lava. An a'a ridge abuts the site on the southeastern side. The features include an enclosure (Feature A) and a cave (Feature B). Both features are in relatively good condition though both have been impacted by recent bulldozing activity. The Site 22023 features are illustrated in *Figure 30*.

Feature A consists of the remnants of an enclosure that forms the eastern and northern boundary of the site. It originates against the northern side of a high a'a ridge and extends to the north-northeast for 5.5 m. It then angles to the west-southwest for 6.0 m and then turns to the northwest for 10.0 m. The wall continues from this point to the north-northwest for 19.9 m where it makes a right angle turn to the west-southwest. This final wall section extends for 24.1 m where it has been truncated by recent bulldozing activity.

The enclosure walls are built of stacked and piled subangular pahoehoe cobbles and small boulders. The walls are unfaced and are not core-filled. They range in width at the base from 1.0 to 1.4 m and at the top from 0.7 to 0.9 m. The height of the walls varies from 0.3 to 0.64 m (*Figure 31*). No cultural remains were observed in association with the wall. Feature A is interpreted as a garden boundary based on the nature of the enclosure and its method of construction.

Feature B is a cave located within the Feature A enclosure. There are two entrances into the cave, one at the northeastern end and one to the southwest. The northeastern entrance is oval-shaped and is 1.7 m long (N/S) by 0.85 m wide, and 1.15 m in depth below the ground surface. The second entrance is situated c. 9.8 m to the southeast. This entrance is also oval in shape. It is c. 1.9 m long (NW/SE) by 1.1 m wide and 0.9 m deep.

The interior of the cave is oriented in a NE/SW direction, measuring c. 34.1 m long and from 2.4 to 5.5 m wide. The ceiling heights vary from 0.5 to 1.0 m. There are two passages extending from the main chamber, one to the north-northwest and one to the south. The northern passage is c. 4.8 m long (NNW/SSE), 1.45 m wide, and 0.6 m in height. The southern passage is 12.1 m long (N/S) and 1.75 to 2.1m wide with a ceiling height averaging 0.5 m.

The floor of the cave is comprised of bare pahoehoe lava. There are three surface concentrations of a thin (0.02 m) dark brown silt loam soil located in the eastern portion of the cave. The first is located on the eastern side of the first entrance. This concentration is 2.2 m long (E/W) by 1.9 m wide. *Kukui* nut shells and several sea urchin spines were observed in this area. The second concentration is situated on the western side of the first entrance. It is c. 2.5 m long (NE/SW) by 1.8 m wide and contains *cowrie* shells, waterworn basalt cobbles, flecks of charcoal, and *kukui* nut shells. The third concentration is located c. 1.2m west of the second. It is 2.35 m long (N/S) by 1.4 m wide and contains sea urchin spines and gourd fragments.

Two groundstone tools were also collected inside the cave during the survey. Both artifacts were recovered from just inside the eastern most entrance. They consist of shaped basalt abraders illustrated in *Figure 32*. The first is c. 0.18 m long with a squared off base and an angled top. It is c. 0.126 m wide at the base, tapering to 0.04 m at the top. The tool is 0.005 to 0.025 m thick. The second abrader is c. 0.088 m long, tapering to a 0.003 m point. It is 0.003 to 0.005 m thick and has a broken base.

Feature B's formal type and the presence of cultural remains indicate the cave was utilized as a temporary habitation shelter. *Figure 33* illustrates Feature B. It is possible that this site may correspond to Site 15351, initially identified by Fager and Graves (1993) and previously discussed in this section.

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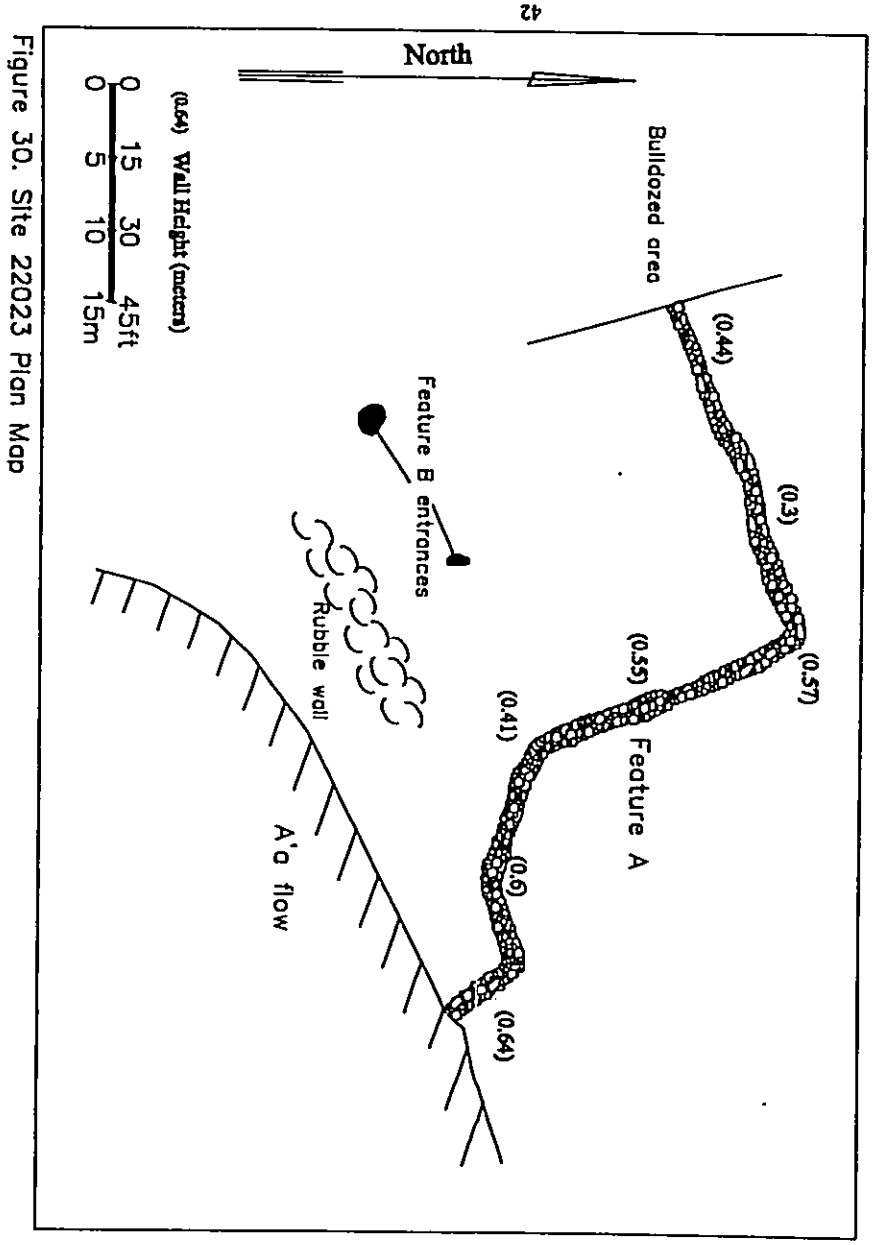

Figure 30. Site 22023 Plan Map

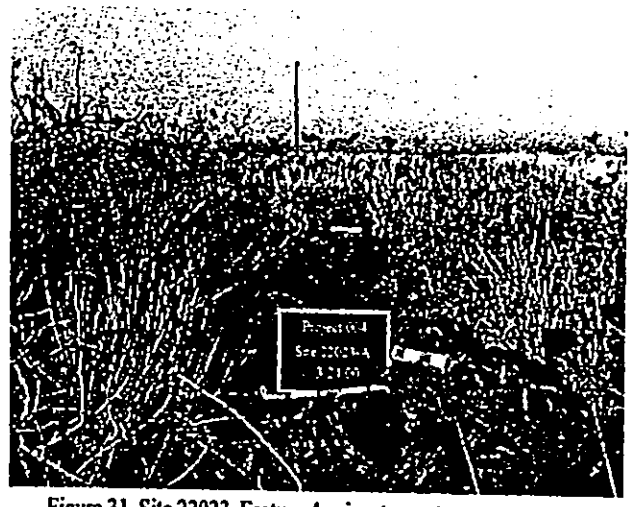

Figure 31. Site 22023, Feature A, view to west

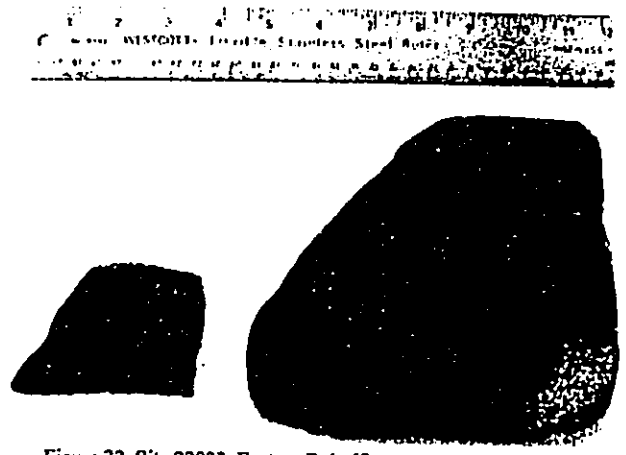

Figure 32. Site 22023, Feature B Artifacts

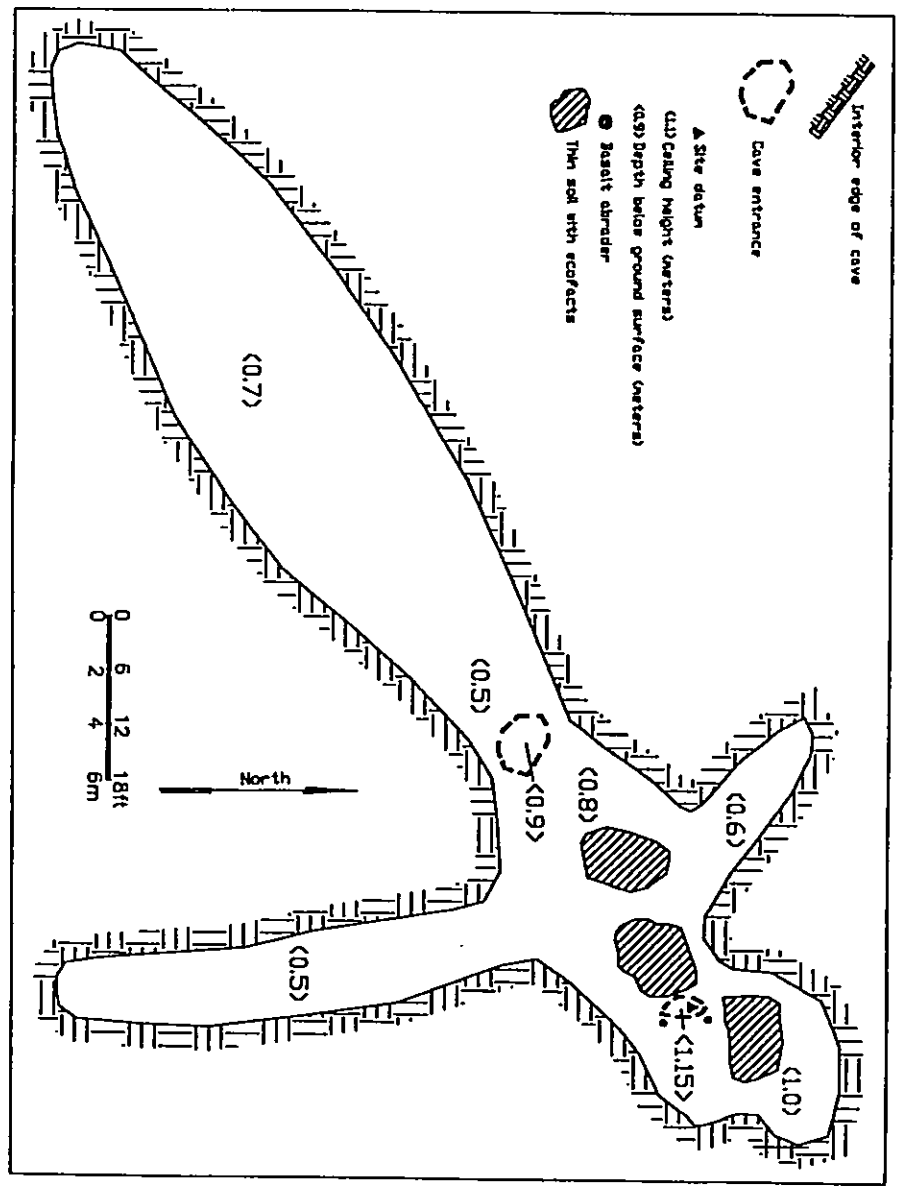

Figure 33. Site 22023, Feature B Plan Map

Site 22031

Site 22013 is a complex comprised of two features located in the southwestern corner of the project area. The site is situated in an area of uneven a'a and pahoehoe lava that slopes slightly to the west at 170 to 175 ft elevation. The features consist of a wall (Feature A) and a mound (Feature B). Both features are unaltered and in good condition. The site is located adjacent to Site 15335 to the south (see *Figure 12*).

Feature A is a linear wall oriented in a northeast-southwest direction(*Figure 34*). The wall originates on the northern side of a pahoehoe ridge and extends to the northwest for 8.2 m where it terminates against a weathered a'a flow. The wall is constructed of piled pahoehoe and a'a cobbles and small boulders measuring c. 0.5 to 0.52 m wide at the base and 0.45 to 0.48 m wide at the top. The wall ranges in height from 0.44 to 0.49 m. No cultural remains were associated with the feature. Feature A is interpreted as a garden boundary wall based on its method of construction and location.

Feature B is an irregularly-shaped mound located c. 8.0 m southwest of the southern end of Feature A. It is 2.39 m long (N/S), 1.34 m wide, and 0.36 m in height. It is constructed of crudely piled subangular pahoehoe cobbles and small boulders (*Figure 35*). No cultural remains were present. Feature B is assigned an agricultural function based on its informal method of construction, lack of cultural remains, and association with the Feature A and Site 15335 garden plots.

Isolated Object

One isolated object was identified during the survey. IO-1 is a large waterworn cobble found in an area of rough a'a in the southern portion of the project area at 250 ft elevation. The cobble is cylindrical in shape, measuring c. 0.4 m in length and 0.15 to 0.2 m in diameter. The cobble was lying on its side. No additional cultural remains were found in association with this stone.

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Figure 34. Site 22031, Feature A, view to northwest

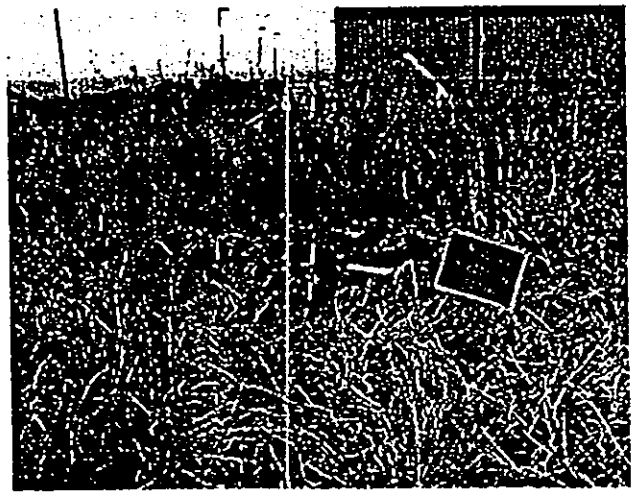

Figure 35. Site 22031, Feature B wall, view to west

CONCLUSION

Discussion

The identified site and component features, except agricultural features, conform to the traditional Hawaiian site/feature types expected in the Middle Zone (Cordy et al. 1991) based on previous archaeological work and historic documentary research. As expected, temporary habitation sites and trails were identified. The trails all appear to be "branch" trail segments as defined by Cordy et al. (1991). These trails were distinguished from major *mauka-makai* and coastal transportation routes because the branch trails facilitated access to resource and subsistence areas in the immediate vicinity of habitation sites. The temporary habitation sites contained very limited amounts of cultural material. Cultural deposits were uncommon, and where present, very shallow. These characteristics, and the limited evidence for structural modifications to the caves, indicate the temporary habitation use was of very limited duration. Also as expected, historic remains consisted of ranch walls.

Previous radiocarbon age determinations from temporary habitation sites in the Middle Zone are relatively late with most spanning the 1700s to historic period (Cordy et al. 1991, Kennedy 1984, Fager and Graves 1993). Despite the late dates, Cordy et al. (1991) postulated earlier use of the Middle Zone. The two radiocarbon dates from the present project confirm use in the 1400s to 1500s.

An important finding of the survey is the identification of numerous informal agricultural features. Fager and Graves (1996) and Colin et al. (1996) also found agricultural features inland of the Queen Kaahumanu Highway at similar elevations. Cordy et al. list 47 sites in the Middle Zone (1991:344-345). Thirty were situated seaward of the Queen Kaahumanu Highway and 17 were inland of the highway. An agricultural function was assigned to 33% of the seaward sites and none of the inland sites. Nearly all of the agricultural features were small enclosures with soil. The sample inland of the highway consisted primarily of sites identified by Kennedy (1984), whose survey area extended from 250 ft to 500 ft elevation.

Nearly 15% of the sites identified by Colin et al. (1996) inland of the highway were assigned an agricultural function (8 sites with 9 agricultural features). Six of the eight sites were situated between c. 200 ft and 340 ft elevation. The other two sites were located at approximately 100 ft elevation. The agricultural features consisted of cleared depressions on pahoehoe lava, and small enclosures on pahoehoe abutting a'a lava flows.

Over 76% of the features identified by Fager and Graves (1993) inland of the highway between 150 ft and 250 ft elevation were assigned an agricultural function (46 features at 8 sites). The agricultural features consisted of terraces, modified outcrops, enclosures, excavated depressions, and mounds on pahoehoe lava near, or abutting a'a lava flows. The identified agricultural features only represent a sample of the ones actually present because the "ubiquitous agricultural features...were formally identified and recorded only when they were found in association with other [non-agricultural] feature types...or if they were representative agricultural types" (1993:8).

Fifty-two percent of the features identified during the current survey were interpreted to be agricultural in function (42 features at 21 sites). The agricultural features consist of modified outcrops, terraces, mounds, excavated depressions, and several probable garden enclosures. The features are scattered throughout pahoehoe lava-covered portions of the project area between 170 ft and 300 ft elevation. Approximately 30% of the features are situated near a'a lava flows.

Sweet potatoes were probably the primary crop grown in the agricultural features. Handy and Handy (1972) describe the cultivation of sweet potatoes in arid, lava-covered areas of Hawaii. The cultivation used a mixture of stones, gravel, and mulch. The mulch was made with weeds and grass, which were piled in excavations in the lava several months before cultivation. Cultivation began with the onset of the winter rains. Pre-rooted cuttings were used for planting. After the cuttings began to grow, the mulch and gravel mixture was stirred with a stick to promote the development of tubers. Mulch and stones were periodically added to the plots to further encourage growth. After a month or so, the tubers were thinned by hand. The smaller tubers were removed to permit the larger ones to fully develop. Using this labor-intensive method, suitable crops were produced in a few months.

The current survey area, and the survey areas of Colin et al. (1996) and Fager and Graves (1993), are all situated at the seaward end of the moderately sloping flanks of Hualalai Volcano, immediately inland of the more gently sloping terrain that characterizes the area between 50-100 ft elevation and the shoreline. The agricultural features documented by the surveys support a modification of the Cordy et al. (1991) settlement model as it pertains to agricultural use of the Middle Zone. The model proposed by Cordy et al. (1991) indicates that agricultural features were limited to the lower-most portion of the Middle Zone, immediately inland of the Coastal Zone. Here the agricultural features probably functioned as "household gardens" that could be readily accessed from the nearby permanent habitation sites. Inland of the seaward band of agricultural use in the Middle Zone, agricultural features are rare according to the model.

The surveys subsequent to Cordy et al.'s research (1991) in the lower portion of moderately sloping terrain inland of the Queen Kaahumanu Highway have documented a second band of agricultural use. This band extends between 100 ft and 350 ft elevation. Above this band, agricultural features again become rare, or absent, until the lower limits of the upland agricultural region is reached above 800-900 ft elevation. The surveys of Soehren (1979), Kennedy (1984), Rosendahl and Haun (1987), and Rosendahl and Walker (1991) did not identify agricultural features between 350 ft and 910 ft elevation. The surveys by Barrera (1985, 1988) document the presence of agricultural features above approximately 900 ft elevation.

Significance Assessments and Recommended Treatments

Pursuant to DLNR (1998) Chapter 275-6 (d), the initial significance assessments provided herein are not final until concurrence from the DLNR has been obtained. Sites identified and relocated during the survey are assessed for significance based on the criteria outlined in the Rules Governing Procedures for Historic Preservation Review (DLNR 1998:Chap 275). According to these rules, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criteria:

1. Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;
2. Criterion "b". Be associated with the lives of persons important in our past;
3. Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
4. Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history; and
5. Criterion "e". Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts--these associations being important to the group's history and cultural identity.

Based on the above criteria, all sites are assessed as solely significant under Criterion "d". These sites have yielded information important for understanding late prehistoric to historic land use in project area. The mapping, written descriptions, photography, and test excavation at 32 of the 40 sites adequately documents them and no further work or preservation is recommended.

Eight sites, 21999, 22010, 22014, 22016, 22017, 22018, 22023, and 22032 retain the potential to yield information important for understanding prehistoric and historic land use. These sites consist of caves containing portable remains and shallow cultural deposits, or surface scatters of food remains. If these sites are not preserved, then limited data recovery is recommended. Data recovery at these sites would entail surface collection and excavation where deposits are present. The data recovery work should be guided by a Data Recovery Plan prepared for DLNR-HPD review and approval.

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APPENDIX A – RADIOCARBON CALIBRATION

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-10.3:lab. mult=1)

Laboratory number: Beta-142119

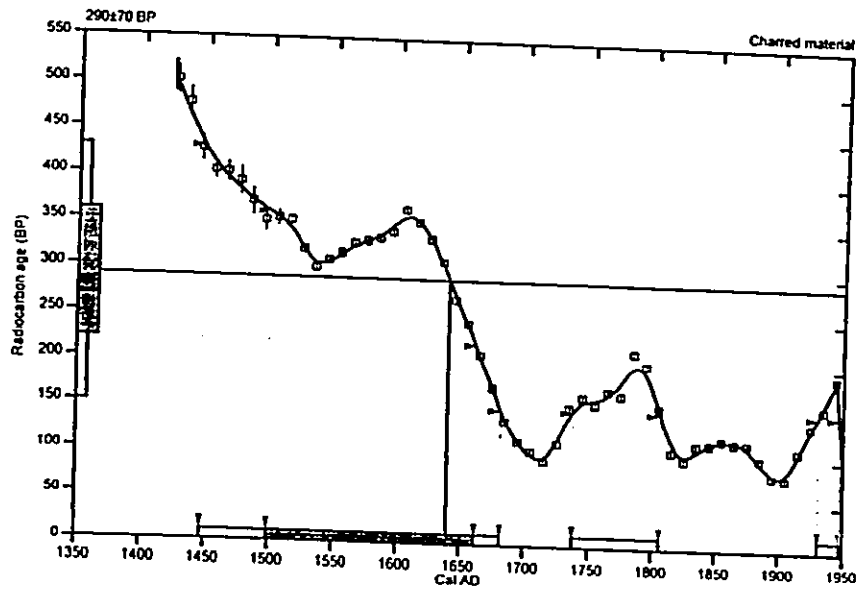
Conventional radiocarbon age: 290±70 BP

2 Sigma calibrated results: (95% probability) Cal AD 1445 to 1680 (Cal BP 505 to 270) and Cal AD 1740 to 1805 (Cal BP 210 to 145) and Cal AD 1930 to 1950 (Cal BP 20 to 0)

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1640 (Cal BP 310)

1 Sigma calibrated result: (68% probability) Cal AD 1500 to 1660 (Cal BP 450 to 290)



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Calibration Database
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Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-mail: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23.7:lab. mult=1)

Laboratory number: **Beta-142120**

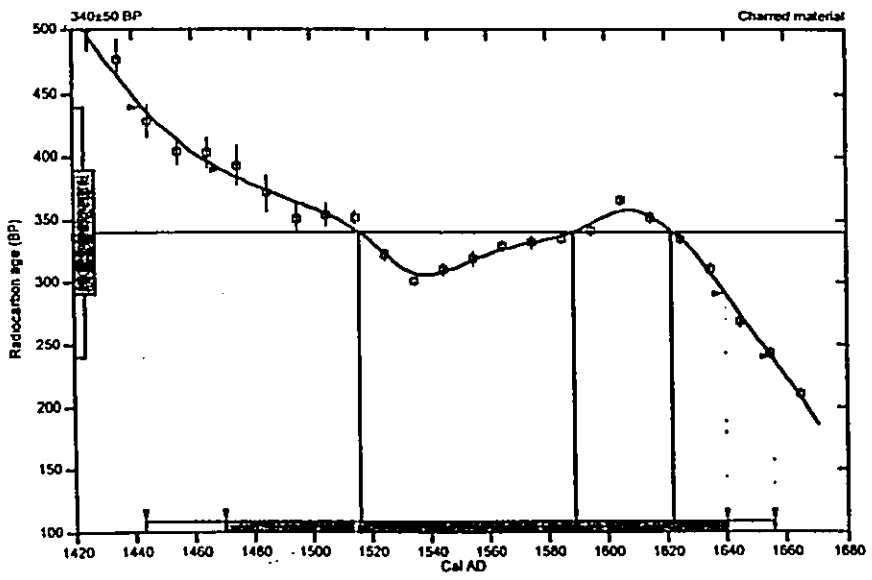
Conventional radiocarbon age: **340±50 BP**

2 Sigma calibrated result: **Cal AD 1445 to 1655 (Cal BP 505 to 295)**
(95% probability)

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal AD 1515 (Cal BP 435) and
Cal AD 1590 (Cal BP 360) and
Cal AD 1620 (Cal BP 330)

1 Sigma calibrated result: Cal AD 1470 to 1640 (Cal BP 480 to 310)
(68% probability)



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Appendix F

Cultural Impact Assessment

Wilson Okamoto & Associates, Inc.

CULTURAL IMPACT ASSESSMENT

Kaloko Industrial Park, Phases III and IV
Kaloko, North Kona, Hawai'i

Prepared by
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawai'i 96826

July 2000

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1. INTRODUCTION

This cultural impact assessment was prepared in conjunction with an environmental assessment for the proposed development of Kaloko Industrial Park, Phases III and IV to assess the potential impacts of the proposed project on native Hawaiian cultural resources, practices and beliefs.

2. METHODOLOGY AND TASKS

This cultural impact assessment was prepared from a native Hawaiian perspective and generally in accordance with the methodology and content protocol provided in the November 19, 1997 *Guidelines for Assessing Cultural Impacts* from the Office of Environmental Quality Control. This included examining cultural practices and beliefs within the ahupua'a - an area larger than the project site, conducting documentary research, and identifying and consulting with individuals and/or organizations with knowledge of the area, cultural resources, practices and beliefs.

A literature review was conducted which included previously published and recorded ethnographic interviews and oral histories, archaeological and anthropological studies and reports, historical and anthropological texts, old maps, and environmental and cultural assessments prepared for surrounding properties. Due to the extensive network of historic and cultural resources and sites, documentary material on the ahupua'a is voluminous. Materials available at the Bishop Museum Archives and Library, University of Hawaii Mānoa Hamilton Library Hawaiian Collection, State Survey Office, State Department of Land and Natural Resources Land Division, and State Historic Preservation Division were reviewed. A listing of materials reviewed is provided in the bibliography at the end of this report.

Individuals and organizations knowledgeable of the area, cultural resources, practices and beliefs were identified through personal contacts and a review of the published materials. Some of these individuals have been interviewed and asked to share their knowledge numerous times since the early 1970s. These previously published and recorded oral interviews are an invaluable record of the histories of the kupuna, some of whom have since passed on. Since a native Hawaiian

perspective is used for this cultural impact assessment, a native Hawaiian protocol was employed to contact additional individuals for possible interviews. This involved making connections with these individuals through personal contacts that would ensure that the interviewees were as comfortable as possible with the interview process.

Two site visits were conducted to the project site and surrounding areas, to gain familiarity with and to examine the landscape of the ahupua'a as well as the relationship between the project site and the larger region.

3. PROJECT AREA AND GEOGRAPHICAL EXTENT

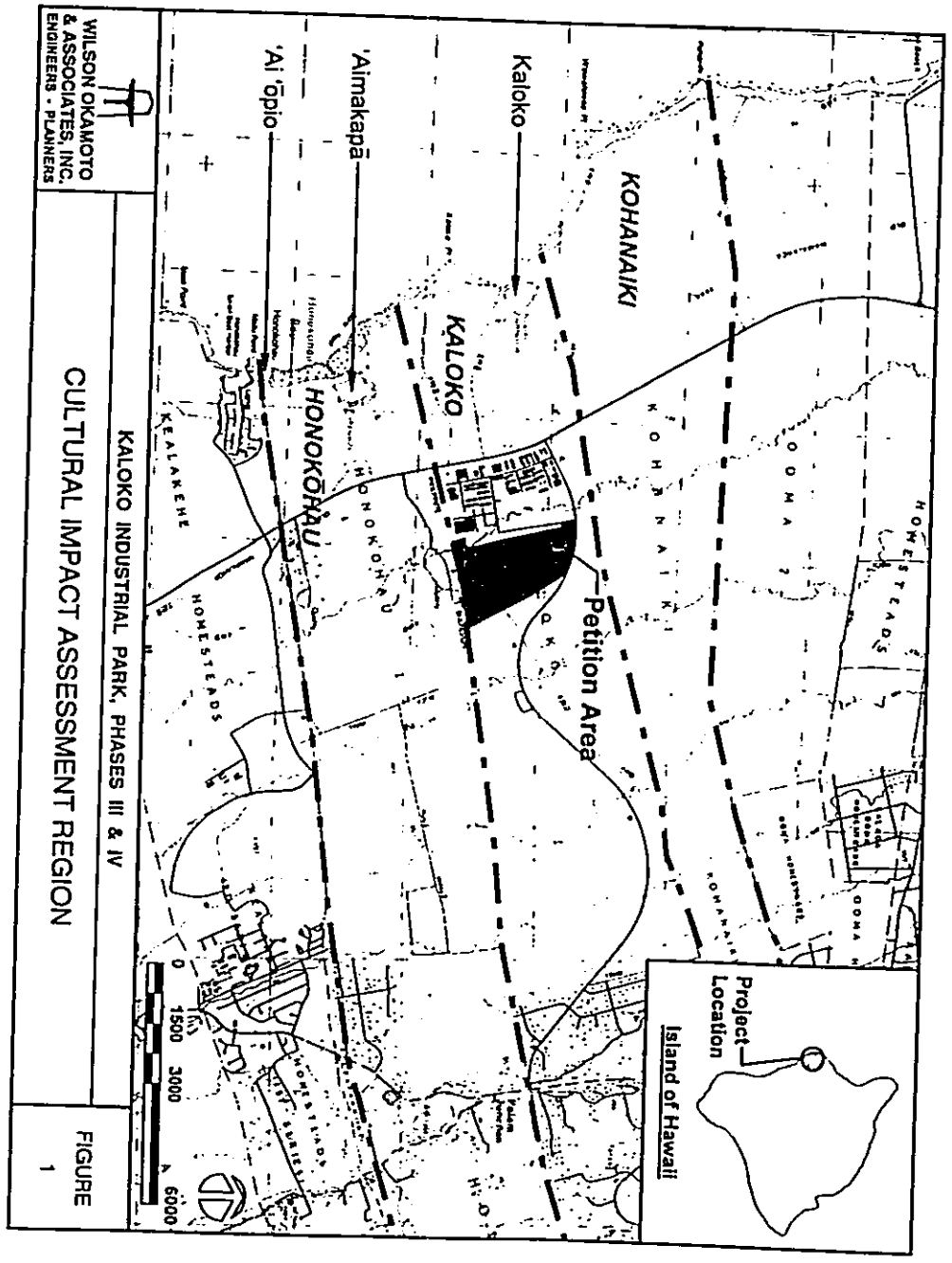
This cultural impact assessment was prepared for Phases III and IV of the Kaloko Industrial Park encompassing 102.3 acres located at Kaloko, North Kona, Hawai'i Island and identified as Tax Map Key parcel 7-3-51: 60. The parcel is a portion of Land Patent No. 8214 to Lot Kapuaiwa Kamehameha in confirmation of Land Commission Award No. 7715, 'āpana 11. The project site is located approximately one mile mauka of the coastline, 3 miles south of the Kona International Airport at Keahole, and 3.4 miles north of the town of Kailua-Kona.

The ahupua'a of Kaloko located on the northwestern slope of Hualālai was the focus of this assessment, however, information from the ahupua'a of Kohanaiki which adjoins the northern boundary of Kaloko, and the ahupua'a of Honokōhau which adjoins the southern boundary of Kaloko was also included (see Figure 1).

4. KEKAHA AND KALOKO– LANDS OF HISTORICAL IMPORTANCE

"Kekaha wai 'ole o na Kona.
Waterless Kekaha of the Kona district.

Kekaha in Kona, Hawai'i is known for its scarcity of water but is dearly loved by its inhabitants." (Pukui, 1983.)



The ahupua'a of Kaloko, Honokōhau and Kohanaiki are situated at the southern end of Kekaha; the general name given to the arid, lava-covered lands of the North Kona district extending to 'Anaeho'omalu in the South Kohala District. Considered to be the highest form of cultural expression in old Hawai'i, the 'ōlelo no'eau above offers a basis for understanding traditional Hawaiian values in relation to their homeland.

Although arid, the mild climate and productivity of the Kona district was attractive to many ali'i and the locale of chiefly residences. In describing the agreeable weather conditions of Kamehameha's court at Kamakahonu, John Papa Ii names the Ho'olua wind of Kekaha.

> "The Kuhonua winds blew for only a few hours at a time, after which the customary calm of the land returned. A little more frequent was a cold wind from Kekaha, the Hoolua. Because of the calm of that land, people often slept outside of the tapa drying sites at night." (Ii, 1959.)

Ii also makes reference to Kekaha (Kaha lands) and Kaloko in describing Kamehameha's return to Hawai'i traveling along the Hawai'i coast as follows:

> "The gentle Eka sea breeze of the land was blowing when the ship sailed past the lands of the Mahaiulas, Awalua, Haleohiu, Kalaoas, Hoona, on to Oomas, Kohanaiki, Kaloko, Honokohaus, and Kealakehe..."

The lands of Kekaha, and more specifically Kaulana fishpond, are also identified by Ii as gift to a paddler of great skill and strength as follows:

> "Because of this ability he became a favorite of the king, it was thus that he received the whole of Puuwaawaa and the fish ponds Paaiea in Makaula and Kaulana in Kekaha."

These references, along with the following portrayal by Samuel M. Kamakau of Kekaha as lands held by the kahuna class, solidifies the prominence of the Kekaha lands.

> "Waimea was given to the Pa'ao kahuna class in perpetuity and was held by them up to the time of Kamehameha III when titles had to be obtained. But there was one land title held by the kahuna class of Pa'ao for many years and that was Pu'uepa in Kohala. In the same way the land of Kekaha was held by the kahuna class of Ka-uahi and Nahulu." (Kamakau, 1992.)

Kaloko as a notable region in the Kekaha landscape is described as follows by Kamakau in Kamalalawalu's preparations for war with the chiefs of Kohala, Kona and Ka'ū.

> "When Ka-uhi-o-ka-lani returned his fellow spies and hosts asked, 'Where did you go?' 'I went visiting from here to the lava bed and the pond that lies along the length of the land.' 'Kaniku is the lava bed and Kiholo, the pond. Then did you turn back?' 'No, I went on to the long stretch of sand, to the small bay with a point on that side and one on this side. There are large inland ponds.' 'The sandy stretch is 'Ohiki, and the walled-in ponds are Kaloko and Honokohau."

Kaloko more prominently plays in recorded history as the burial place of Maui and Hawai'i ali'i. Regarding Kahekili, the ruling chief of Maui, Kamakau writes:

> "His bones were carried away by Ka-me'e-ia-moku and Ka-manawa and hidden in a secret cave, perhaps at Kaloko in North Kohala."

Marion Kelly clarifies that this reference to Kaloko in North Kohala was probably a typographical error. Kamakau later makes reference to Kekaha as the lands of Kame'eiamoku and his brother Kamanawa as follows:

> "... those of Kame'e-ia-moku and his brother under Ka-lani-'opu'u were Kekaha and the lands of that section."

Kaloko is again recounted by Kamakau as the place where Kahekili's bones were secreted in describing the care of Kamehameha's bones. Before his death,

Kamehameha gave Ulumaheihei the name Hoapili, and entrusted him with his bones, commanding him to secrete his bones in a place where they could not be found. Kamakau describes Ulumaheihei Hoapili's efforts to carry out the command as follows:

> "At midnight, therefore, when black darkness had fallen and no one was likely to be on the road and the rough lava plains of Pu'uokaloa lay hushed, Hoa-pili sent his man, Ho'olulu, to bring the container of wicker work in which the bones of Kamehameha were kept to Kaloko in Kekaha. ... The next morning Hoa-pili and Ke-opu-o-lani took canoe to Kaloko where Hoa-pili met the man who had charge of the secret cave and together they placed the bones there. ... It is said that the bones of Hono-ka-wai-lani's daughter, Kalola Pupuka, and those of Ka-hekili-nui 'Ahu-manu were secreted in this same cavern by Ka-me'e-ia-moku and Ka-manawa."

In another account, Kamakau again makes reference to the chiefly burials at Kaloko as follows:

> "Kaloko (pond) is another famous burial pit; it is at Kaloko, in Kekaha, Hawaii. (In a cave that opens into the side of the pond) were laid Kahekili, the ruler of Maui, his sister Kalola, and her daughter, Keku'iapoiwa Liliha, the grandmother of Kamehameha III. This is the burial cave, *ana huna*, where Kame'eiamoku and Hoapili hid the bones of Kamehameha I so that they would never be found." (Kamakau, 1991.)

The lands of Kaloko were reserved to Lot Kapuaiwa Kamehameha V in the Mahele of 1848, a clear indication of the productivity of the fishponds and the importance of the ahupua'a, as only the most significant lands were reserved by the ali'i for themselves.

5. HAWAIIAN PERSPECTIVE

Within this historical context, and based on the sentiment of consulted informants, the native Hawaiian concepts and values associated with 'āina and iwi have direct relevance to this cultural impact assessment.

There exists a deep relationship between the kama'āina and the land of their birth; one hānau or kulāiwi. This intimate knowledge and history of their 'āina is passed from one generation to the next ensuring the proper management of the land and resources, and the survival of the people. As expressed by one informant, this invaluable traditional knowledge is becoming recognized by others as holding the key to sustainable resource management.

A number of reciprocal relationships are incorporated into the native Hawaiian perspective of land management and tenure. The 'āina is the provider of food, shelter and clothing; the people are the caretakers. If properly cared for the land will continue to feed, clothe and protect for generations to come. The use or domination of land and natural resources as commodities is not a Hawaiian concept.

Mauka-Makai Connection

The ahupua'a as a land division extending from the mountains to the sea is the backdrop for the ko kula uka, ko kula kai concept. The extended family living in the uplands share the fruits of the earth with family members living in the coastal areas who shared the bounties of the sea. Proper use of the land in the mauka region was required to protect the coastal community (i.e. fishponds and reefs) from degradation.

Offshore activities such as surfing and deep-sea fishing also relied on the knowledge of the mauka regions, more specifically the landscape or terrain of the land. Generally termed ko'a, or ko'a lawai'a these deep-sea fishing grounds where certain fish were known to frequent are so deep under water that the exact location can not be seen by looking down into the ocean. The location of the ko'a is found by using at least two reference points from the land which can include erected monuments or landmarks, natural features like a rock outcrop or grove of trees, or changes in the

landscape or terrain such as hills and mounds. The ko'a is located when the two landmarks intersect.

The following 'ōlelo no'eau makes direct reference to this practice in Kekaha.

> "Ola aku la ka 'āina kaha, ua pua ka lehua i kai
> *Life has come to the* [kaha] *lands for the lehua blooms are seen at sea.*
>
> 'Kaha lands' refers to Kekaha, Kona, Hawai'i. When the season for deep-sea fishing arrived, the canoes of the expert fishermen were seen going and coming." (Pukui, 1983.)

Ancestor Burials

By looking at the definition of the Hawaiian word iwi, the importance of the iwi, the moepū, and the cultural beliefs and practices surrounding burials begin to be revealed. These beliefs and practices include the responsibility of descendants to care for the ancestors even in death. Iwi, in addition to being defined as "bone, carcass; core," is further explained as,

> "the bones of the dead, considered the most cherished possession, were hidden, and hence there are many figurative expressions with *iwi* meaning life, old age: *Na wai e ho'ōla i nā iwi?* Who will save the bones? [Who will care for one in old age and in death?]"

Beliefs and practices surrounding moepū (ho'omoepū) are defined and illustrated as "to place artifacts with the dead. *Mai lawe wale i nā mea i ho'omoepū 'ia,* don't wantonly take things placed with the dead." (Pukui and Elbert, 1986)

6. INTERVIEWS AND CONSULTATION

Since the National Park Service's initial interest in the ahupua'a of Kaloko and Honokōhau in the late 1950s - early 1960s, a considerable amount of data has been

collected for the ahupua'a including interviews and oral histories. In the early 1970s efforts to establish a national cultural park gained momentum and two important research projects were conducted which provided a historical background and recorded valuable oral histories. *Kekaha: 'Aina Malo'o Historical Survey and Background of Kaloko & Kuki'o Ahupua'a, North Kona, Hawai'i* by Marion Kelly documents the early land tenure and traditional history of the ahupua'a. *Ka Mo'olelo Ha'i Waha o Honokōhau – Kaloko* was prepared by L. 'A'alaonaona Roy and J. Ku'ualoha Nahale to supply the social history behind the archaeological sites by recording the oral history of kama'āina of the area. While both of the projects centered on the fishponds makai of Queen Ka'ahumanu Highway informants shared their knowledge of traditional beliefs and practices relating to the ahupua'a. Although plans for developments in the Kaloko and Honokōhau ahupua'a increased in the early 1980s, it was not until the mid 1990s that environmental disclosure documents included consultation and interviews relating to cultural resources.

As a result of this extensive data collection some of the individuals identified as having knowledge of cultural practices and beliefs have provided interviews on more than one occasion. For this reason, general information of the history and traditional way of life in the ahupua'a can be learned from these previous reports. Consultation conducted through this assessment attempted to concentrate on contemporary beliefs and practices as related to the project site and mauka region. A combination of informal consultations and more formal, in-depth interviews were used during this consultation phase. Consultation and interview summaries are included in the Appendix.

The informal consultation process helped to identify potential informants, known cultural resources and likely concerns. The following individuals were consulted:

Mr. Gene Leslie, Kona Hawaiian Civic Club
Ms. Ruby McDonald, Office of Hawaiian Affairs – Kona Office
Mr. Stan Bond, Kaloko-Honokōhau National Historical Park

A native Hawaiian approach was used during the formal interview portion of the consultation process whereby connections with potential informants were initiated

through personal contacts by respected community members to ensure that interviewees were as comfortable as possible with the interview process. Using this approach, interviews were conducted with patience and humility, respecting that interviewees had given of their time to share valuable family knowledge and traditions. It was intended that the interview flow from one subject to another as the interviewee wished without being too intrusive, and without overly taxing or asking the interviewee too many questions. To make the situation seem more like "talking story" a tape recorder was not used. Through this format the following questions are answered:

1. What is your connection to the Kaloko and/or Honokōhau ahupua'a?
2. What type of traditional or contemporary practices do/did you or your family practice? What type of traditional or contemporary practices occur/occurred in the ahupua'a
3. How do the area's sites, features or land affect these cultural practices or beliefs?
4. How does the proposed project affect these practices?
5. Do you have any other thoughts regarding the proposed project?

After providing a description of the proposed project, identifying the project site, and the impetus for the preparation of the environmental assessment and cultural impact assessment, interviewees could ask any questions they felt necessary. Interviewees were then asked to share their connection with the ahupua'a and any mana'o they had regarding the project site and proposed project. Interviews were conducted with the following individuals:

Mr. Mauna Roy, Commissioner, Kaloko-Honokōhau National Historical Park Advisory Commission, lifetime resident
Mr. Mahealani Pai, Fisherman, lifetime resident
Mr. Fred Cachola, Commissioner, Kaloko-Honokōhau National Historical Park Advisory Commission

7. IDENTIFIED CULTURAL RESOURCES, PRACTICES AND BELIEFS

The cultural resources, practices and beliefs that were identified through the consultations and interviews are associated with the larger region of Kaloko and Honokōhau. No resources, practices and beliefs specific to the project site were identified. The following resources, practices and beliefs generally apply to the entire ahupua'a of Kaloko and are not exclusive to the project site. These responses, however, relate the project site to the landscape of the ahupua'a and exhibit the interconnectedness of the mauka and makai regions. In identifying these resources, practices and beliefs, the interviewees also voiced concerns they have regarding the affects of the proposed development on current and future practices.

Traditional resources, beliefs and practices

The following traditional resources, beliefs and practices were cited by interviewees:

- The Kona coast of Hawai'i Island was important to the ali'i as evidenced by ali'i burials and residences.
- Kaloko is known as the burial place for the ali'i Kamehameha I, Kahekili, and Kahekili's family.
- The lands surrounding the Kaloko Industrial area are known to have caves that contain burials. It is possible that burial caves are present on the project site.
- Gathering of plants including ko'oko'olau, 'uhaloa, pili (grass), noni, pua kala (Hawaiian poppy), māmaki, uhi and 'ūlei was common in the general mauka region.
- The Kaloko and Honokōhau region traditionally supported a large population settlement as evidenced by the abundance of cultural resources. Kaloko and 'Aimakapā fishponds and 'Ai'ōpio fishtrap are three important components of the productive fishpond industry. Other resources include ocean production activities such as salt making, and off-shore fishing, numerous traditional planting areas, habitation areas, anchialine ponds, ahu, and a hōlua course.
- Kaloko provides examples of the important ocean-land connection including the reciprocal ko kula uka, ko kula kai 'ohana tradition. 'Ōpelu ko'a were also

used by fishermen offshore to locate traditional fishing grounds by reading the mauka landscape and aligning landmarks and reference points.

Contemporary cultural practices

The following regarding contemporary cultural practices was provided by interviewees:

- There are no continuing cultural practices occurring today on the project site.
- Mauka-makai trails have been paved over in some areas and blocked by developments.
- Fishermen continue to use the traditional 'ōpelu ko'a as passed down for generations. This practice and skill is being passed on to their children. In the future this practice may be incorporated as an interpretative and educational program at the National Park.
- The makai wall and mākāhā at Kaloko fishpond is being repaired/rebuilt and will be incorporated into the National Park program as a productive fishpond.

Project related concerns

The following project related concerns were cited by interviewees:

- If cultural sites are identified on the project site, they should be preserved.
- Burials should not be disturbed.
- Surface runoff and wastewater disposal either through cesspools or septic tanks could affect the water quality in the anchialine ponds and Kaloko and 'Aimakapā fishponds. The future plans to raise fish in Kaloko fishpond may be affected.
- The visual impact of the intensification of buildings mauka of Queen Ka'ahumanu Highway will affect fishermen who use 'ōpelu ko'a to locate traditional fishing grounds. They regret the change in the landscape as it changes the significance of the knowledge and how it is used. The ability to pass on this knowledge to future generations may be jeopardized if buildings obstruct traditional landmarks.
- The intensification of development on the Hualālai slopes will affect the mauka view plane from the National Park. This intensification will decrease

the park user's ability to envision the network of mauka-makai ahupua'a activities.

- The existing and proposed developments in the Kaloko-Honokōhau region are occurring independently of each other. A regional West Hawai'i master plan prepared by landowners and developers would reveal tangible and intangible returns while identifying the highest and best use for the individual properties.

8. FINDINGS AND ASSESSMENT

On every island, native Hawaiian cultural beliefs and practices are continually affected by the loss of land to development that intrudes into the natural setting, disturbs traditional sites, cuts off the traditional access network, and changes the landscape. Kona as a growing region with many established and proposed residential, business, and industrial developments is no different. The intensification of buildings is changing the landscape of the ahupua'a of Kaloko, Honokōhau and Kohanaiki; a result of existing and proposed developments. When taken in pieces, each of the developments does not pose a significant cultural impact, especially when concentrated mauka of Queen Ka'ahumanu Highway. Eventually, however, the transformation of the Kona plain and the lava fields will result in the loss of this traditional Kona landscape. Some may see these barren lava fields as inhospitable, but this land is loved by the kama'āina. The ingenuitive dry-land planting techniques and productive ocean related activities that historically supported a large population settlement is a source of pride for the kama'āina.

Based on an assessment of the impacts of the proposed project on the resources, beliefs and practices identified, the proposed Phases III and IV of the Kaloko Industrial Park will have a minimal negative cultural impact upon native Hawaiian cultural resources, beliefs and practices.

Regarding possible burial sites

No evidence of burials was identified in the archaeological surveys encompassing the project site (Haun, 2000 and Soehren, 1979) and no burial locations were

revealed during the consultation and interview process. Other interviews conducted for developments on surrounding properties have identified burials on those properties. Informants did express that it is possible that burials are present on the site.

Assessment

The proposed development has the potential to affect traditional burial sites should any be present on the project site. Any burials found on the project site should not be disturbed pending consultation with the Department of Land and Natural Resources State Historic Preservation Division (SHPD). The treatment of any remains should be in accordance with procedures approved by the Hawaii Island Burial Council and the SHPD. Since burial sites were not identified through the archaeological survey and consultation/interview process additional interviews are not recommended.

Regarding water quality in ponds at the National Park

The fishponds and anchialine ponds at the National Park are supplied by ground water moving in a coastal direction through the highly permeable lava. Wastewater and stormwater discharged from surrounding businesses and industrial activities into cesspools and dry wells have the potential to affect ground water resources and ultimately the fishponds and anchialine ponds. Water quality samples and surveys have not shown that ground water has been affected however, informants expressed that water quality has been affected by existing developments. Informants also expressed that cumulative impacts to the regional ground water system from various residential, business and industrial developments occurring and planned in the ahupua'a of Kaloko, Honokōhau, Kealakehe and Kohanaiki has not been adequately addressed by a regional plan. One informant suggested that impacts to the regional ground water system could be mitigated by requiring new developments to connect to the municipal sewer system.

Assessment

The storm water runoff and wastewater disposal for the proposed development has the potential to affect water quality in the ponds at the National Park. The County of Hawai'i plans to extend municipal sewer lines to Kaloko industrial Park, eventually. In the interim however, the County supports the disposal of storm water runoff within the area in which it is generated through infiltration into the ground by drywells and/or seepage areas. Storm water drainage and wastewater disposal systems should be designed to remove contaminants prior to entering the ground water system.

Regarding changes to the landscape affecting the view plane

Residential, business and industrial developments on the slopes of Hualālai may alter the terrain and obstruct or destroy landmarks used by fishermen in a traditional fishing method whereby 'ōpelu ko'a or fishing grounds are located by aligning known reference points. Existing developments on the slopes of Hualālai, and the potential intensification of built structures by proposed developments will continue to affect the experiential activities at the National Park.

Assessment

The proposed project has the potential to affect the terrain and landscape at the project site. Built structures on the project site could potentially obstruct natural features or landmarks. Although none of these features or landmarks have been identified within the project site, the development should be designed to mitigate such visual impacts which may include ensuring a low building profile, appropriate building materials, and suitable plantings and landscaping. The possible mitigation of visual impacts through appropriate building materials and landscaping is evidenced through the comparison of the Costco building to the other structures in Phases I and II. Visual impacts are minimized by Costco's low profile, building materials and color which is in sharp contrast to the light colored, metal structures along Queen Ka'ahumanu Highway.

9. RECOMMENDATIONS

A. Since the County of Hawai'i supports the on-site disposal of storm water runoff through infiltration into the ground, and since there are no immediate plans to extend municipal sewer lines to Kaloko Industrial Park, storm water drainage and wastewater disposal systems should be designed to remove contaminants prior to entering the ground water system.

B. The National Park Service should continue to monitor ground water resources and conduct water quality testing for the fishponds and anchialine ponds on their property. Samples should be specifically tested for contaminants that are typically associated with residential, business and industrial activities.

C. Fishermen knowledgeable of traditional reference points used in locating fishing grounds, and National Park Service personnel should be afforded the opportunity to consult on the development of building and landscaping design guidelines.

D. If native plants on the project site cannot be incorporated into the landscaping plan for the proposed development, local native Hawaiians, the Amy B.H. Greenwell Botanical Garden, other local ethnobotanical groups, and interested educational institutions should be afforded the opportunity to gather seeds and cuttings or to rescue the plants.

GLOSSARY

Ahu	Alter, shrine, cairn
Ahupua'a	Land division usually extending from the uplands to the sea
'Āina	Land, earth
Ali'i	Chief, chieftess, ruler
'Anae	Full-sized mullet fish
'Āpana	Land parcel, lot, district
'Aumakua	Family or personal gods, deified ancestors
Heiau	Pre-Christian place of worship, shrine
Hōlua	Sled, sled course
I'a	Fish or any marine animal
Ipu	Bottle gourd, wide-spreading vine
Iwi	Bone, bones of the dead
Kahuna	Priest
Kama'āina	Native-born, one born in a place
Kapu	Prohibited, sacred, forbidden

Ko'a, or ko'a lawai'a	Fishing grounds, usually identified by lining up with marks on shore
Kō kula kai	Lowland dweller, belonging to the lowlands
Kō kula uka	Inland dweller, belonging to the uplands
Kulāiwi	Native land, homeland, native
Kupuna	Ancestor, grandparent
Limu	A general name for all kinds of plants living under water, both fresh and salt
Mākāhā	Sluice gate, as of a fishpond
Mana'o	Thought, idea, belief, opinion
Moepū (ho'omoepū)	To place artifacts with the dead
'Ohana	Family, relative, kin group
'Ōlelo no'eau	Proverb, wise saying, traditional saying
One hānau	Birthplace, homeland
'Ōpaehuna	An indigenous shrimp
'Ōpaelōlō	Brackish-water shrimp
'Ōpae'ula	Small, endemic reddish shrimp used for 'ōpelu bait
'Ōpelu ko'a	Mackerel fishing grounds

Pipipi	General name for small mollusks
'Uala	Sweet potato
Wiliwili	A Hawaiian leguminous tree

Definitions from the *Hawaiian Dictionary* by Mary Kawena Pukui and Samuel H Elbert, 1986.

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APPENDIX

The following individuals were consulted and interviewed during the preparation of this cultural impact assessment. A summary of each of the interviews is included below.

Mr. Mauna Roy, Kaloko-Honokōhau National Historical Park Advisory Commission, Lifetime resident, North Kona, Hawai'i

In 1973, Mr. Roy and other community members with knowledge of the valuable cultural and historical resources in the Kaloko and Honokōhau ahupua'a visualized a national cultural park for the preservation of these cultural and historic sites with interpretation and education components. Some may question how people can have aloha for, or make a living in a dry place like that? The park was visualized to show the productive fishponds and the Hawaiian way of life. They knew that Kaloko fishpond was traditionally very productive and they knew of the chiefly burials of Kamehameha I, Kahekili and Kahekili's family with the associated ali'i moepū. Burials are undoubtedly present on lands mauka of Queen Ka'ahumanu Highway. Burials should be left alone and development activity should be restricted in burial places

Water quality in the National Park, is affected by the developments in the surrounding area and could affect future interpretive and educational programs planned for Kaloko fishpond. Regarding these water quality concerns, Mr. Roy made the following suggestions:

1. Utilize a sewerage system to prevent wastewater from going to underground water. There is a sewerline nearby, so property owners need to hook up to the system to prevent contamination.
2. Every effort should be made by property owners in the areas surrounding the National Park to prevent contamination of the water supply from on-site activities.

Mr. Mahealani Pai, Fisherman, Kohanaiki, Kaloko, Honokōhau, North Kona, Hawai'i

Mr. Pai continues to use traditional deep-sea 'ōpelu ko'a; a traditional fishing method taught to him by his father. The location of the ko'a is found by using at least two reference points from the land which can include erected monuments or landmarks, natural features like a rock outcrop or grove of trees, or changes in the landscape or terrain such as hills and mounds. The value of this practice is that it has been passed down through the 'ohana that come from that area. It is an example of the traditional concept that there is a connection between the ocean and the land. Altering the landscape prevents this practice from continuing in the way that it has been taught over the generations.

He expressed that in the future they want to raise 'anae in the fishponds. They know that the water in the fishponds is affected by activities on the surrounding lands. The well-being of the limu, 'ōpae'ula, 'ōpaelōlō, 'ōpaehuna, pipipi and i'a are affected by the quality of the water in the ponds. Future plans to rebuild the fishponds and raise fish would be affected.

Regarding the history of Kaloko, he shared that Kaloko is sometimes referred to as Kōloko. This referred to the sharing of fish from Kaloko fishpond with neighboring ahupua'a during the high tide. At low tide the fish were reserved to the people of the Kaloko ahupua'a and was therefore referred to as Kōloko. (Kō is a possessive form in this case meaning belonging to that place.) The responsibility of the fishpond has been in his family for generations. His mother shared with him that during storms or times of high surf, her uncle living in the mauka area would come down to the fishpond and make sure that the makai wall wouldn't fall down.

The value of this knowledge and these practices is that they have been passed down in the family for generations. This knowledge is irreplaceable, but, as components of this way of life are removed, the value of, and the ability to continue these practices is extinguished.

Mr. Fred Cachola, Kaloko-Honokōhau National Historical Park Advisory Commission

Mr. Cachola stated that while he is not from the Kaloko ahupua'a, he first became connected with the Kaloko ahupua'a in 1972 when he was appointed to the Kaloko-Honokōhau Study Advisory Commission. At that time those appointed to the Commission needed to be at least 50% Hawaiian. Over the next 25 years he learned about the Kaloko-Honokōhau region from "old timers" like, Mr. George Keoki Pinehaka, Miss 'Iolani Luahine, Mr. Homer Hayes, and Mr. David Roy. Mr. Pinehaka and Miss Luahine were very knowledgeable, but they have since passed away. Mr. Pinehaka was a valuable resource, someone who lived as a Hawaiian, and thought Hawaiian. He provided many of the place names and their meanings for the Kaloko-Honokōhau region.

He mentioned that a report done in the early 70s by 'A'ala Roy, daughter of Mauna Roy, documented the oral histories of many of the area's long-time residents. Mr. Mauna Roy is knowledgeable on the cultural resources and uses in the ahupua'a and would be a good person to contact for additional information.

The Commission primarily researched/studied the makai portions of the ahupua'a, however, since the ahupua'a were undeveloped, they looked at the history and resources of the whole ahupua'a.

There are many known cultural resources in the makai portion of the ahupua'a including burials and ocean production activities such as salt making, off-shore fishing and fishpond development. Historically, these fishponds were a major source of food. People would be needed to support and maintain the fishponds, especially during times of heavy work to clean and repair the fishponds, congregating in the mauka area.

Some of the fishponds were considered kapu, reserved for the ali'i class. We know that there are chiefly burial grounds located on the makai portions of the ahupua'a. We also know that Kamehameha III was raised in 'O'oma (ahupua'a to the north of Kaloko beyond Kohanaiki). So who knows what

was happening on the mauka lands, but these lands were important. There would need to be a sufficient population and villages to support the ali'i fishponds and to raise a royal child.

Activities in the mauka portions were probably characteristic of leeward or Kona ecology and culture. Since it is a dry area, the mauka portions may have had some dry land forest with plants like wiliwili. Dry land farming would have consisted of ipu and 'uala and other dry land produce to support the activity at the ponds.

Concerning the proposed project, Mr. Cachola was informed that the cultural impact assessment was being prepared by Wilson Okamoto & Associates, Inc. for the property owner who plans to complete development of the Kaloko Industrial Park. Intended uses in Phases III and IV of the Kaloko Industrial Park would be similar to the existing light industrial uses in the developed Phases I and II which are makai of the project site.

Regarding the proposed project, Mr. Cachola commented that assessing impacts is more complex than isolating a project site or the activities that occurred within a specific acreage. Based on the project location as described to him, the site is located mauka of Mamalahoa Trail and the known historic and cultural sites in the makai portion of the ahupua'a. Without precise data on the mauka activities, by looking at "Kona culture" and the representative types of activities that occurred in the leeward areas, statements could be made regarding traditional activities in the mauka area of the ahupua'a.

Mr. Cachola consented to having his interview included in the cultural impact assessment. He expressed that he was pleased that a cultural impact assessment was being done for the project and stated that developers should be encouraged to perform cultural impact assessments. By remaining anonymous, or by not participating in the cultural impact assessment process, developers may be discouraged from conducting thorough assessments.

In a later discussion Mr. Cachola commented that there are a number of individual developments proposed and being constructed in the Kaloko-Honokōhau area. He suggested that this would be an excellent opportunity for all landowners and developers (i.e., Lanihau, Greenwell, Nansay) to voluntarily get together and develop a master plan for West Hawai'i. Instead of acting independently of each other, a collective model plan could be developed whereby the highest and best use for the properties and region would be identified. They may discover that there are other tangible and intangible returns based on the history and resources of the area besides money and profit. There are other concerns that need to be addressed on a regional level like drainage and the historical/cultural landscape. If the landowners don't do it who will? Maybe the County of State will mandate that no further developments will be looked at independently until there is a master plan to address all the developments in the region.

Ms. Ruby McDonald, Office of Hawaiian Affairs – Kona Office

Ms. McDonald was contacted primarily to provide the names of individuals and organizations with knowledge of cultural resources and practices in Kaloko. She suggested the Kaloko-Honokōhau National Historical Park and Mr. Gene Leslie of the Kona Hawaiian Civic Club as potential contacts. Being from the area, she commented that there are no continuing cultural practices occurring in the mauka area. She also added that mauka-makai trails have been blocked by existing development.

Mr. Gene Leslie, Kona Hawaiian Civic Club

At the suggestion of Ms. McDonald, Mr. Leslie was contacted. During informal consultation Mr. Leslie commented that the area mauka of Costco has some caves with possible cultural resources which would be located through the archaeological survey.

Mr. Stan Bond, Kaloko-Honokōhau National Historical Park

During a visit to the park Mr. Bond identified some of the cultural resources on the National Park property including the cleared planting areas, habitation areas, anchialine ponds, ahu, and the hōlua course. Restoration work to the makai wall at Kaloko fishpond was in progress and one mākāhā has been

restored. At 'Aimakapā fishpond some ae'o (Hawaiian stilt) and a number of 'alae ke'oke'o (Hawaiian coot) were identified. The National Park Service plans to clear the vegetation growth in 'Aimakapā and create more of a nesting habitat for the waterbirds.

Mr. Bond reiterated that the National Park Service has the following two concerns regarding the developments in the surrounding area:

- Developments in the surrounding area may affect the water quality in the fishponds. In addition to being a waterbird habitat, the National Park Service is restoring the fishponds so that fish can once again be raised in the ponds.
- The buildings in Phases I and II of Kaloko Industrial Park are very visible from the National Park and detract from a natural, cultural experience. Development of Phases III and IV will intensify this visual impact. The National Park is willing to work with the developer to formulate design and landscape guidelines to help mitigate this impact.

Appendix G

Traffic Impact Report

Wilson Okamoto & Associates, Inc.

TRAFFIC IMPACT REPORT

FOR THE

KALOKO INDUSTRIAL PARK,

PHASES III AND IV

Prepared for:

TSA International, Ltd.
1441 Kapiolani Boulevard, Suite 1905
Honolulu, HI 96814

Prepared by:

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

July 2000

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LIST OF EXHIBITS AND APPENDIX

I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to identify and assess the traffic impacts resulting from the proposed Kaloko Industrial Park, Phases III and IV, which will be located approximately 3 miles south of the Kona International Airport at Keahole and 3.4 miles north of the town of Kailua-Kona in North Kona, Island of Hawaii.

B. Scope of Study

This report presents the findings and conclusions of the traffic study, the scope of which includes:

1. Description of the proposed project.
2. Evaluation of existing roadway and traffic operations in the vicinity.
3. Analysis of future roadway and traffic conditions without the proposed project.
4. Analysis and development of trip generation characteristics for the proposed project.
5. Superimposing site-generated traffic over future traffic conditions.
6. The identification and analysis of traffic impacts resulting from the proposed project.
7. Recommendations of improvements, if appropriate, that would mitigate the traffic impacts resulting from the proposed project.

II. PROJECT DESCRIPTION

A. Location

The project site is located mauka of the existing Kaloko Industrial Park, Phases I and II, in the North Kona District on the Island of Hawaii (see Exhibit 1). The project site is further identified as Tax Map Key 7-3-51: 60 (see Exhibit 2). Main access to the proposed project will be via Kamanu Street located off of Hina Lani Street mauka of Queen Kaahumanu Highway.

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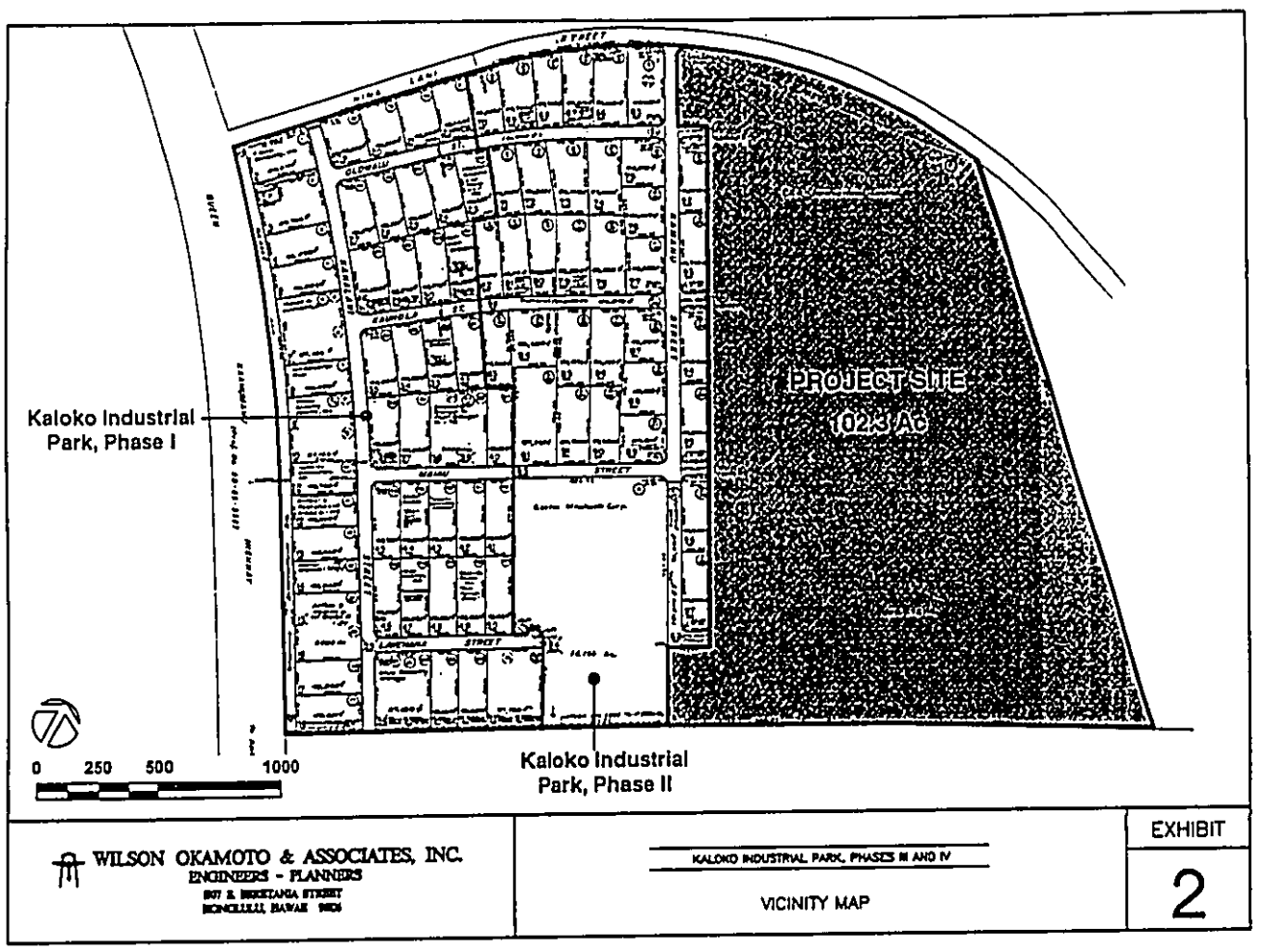

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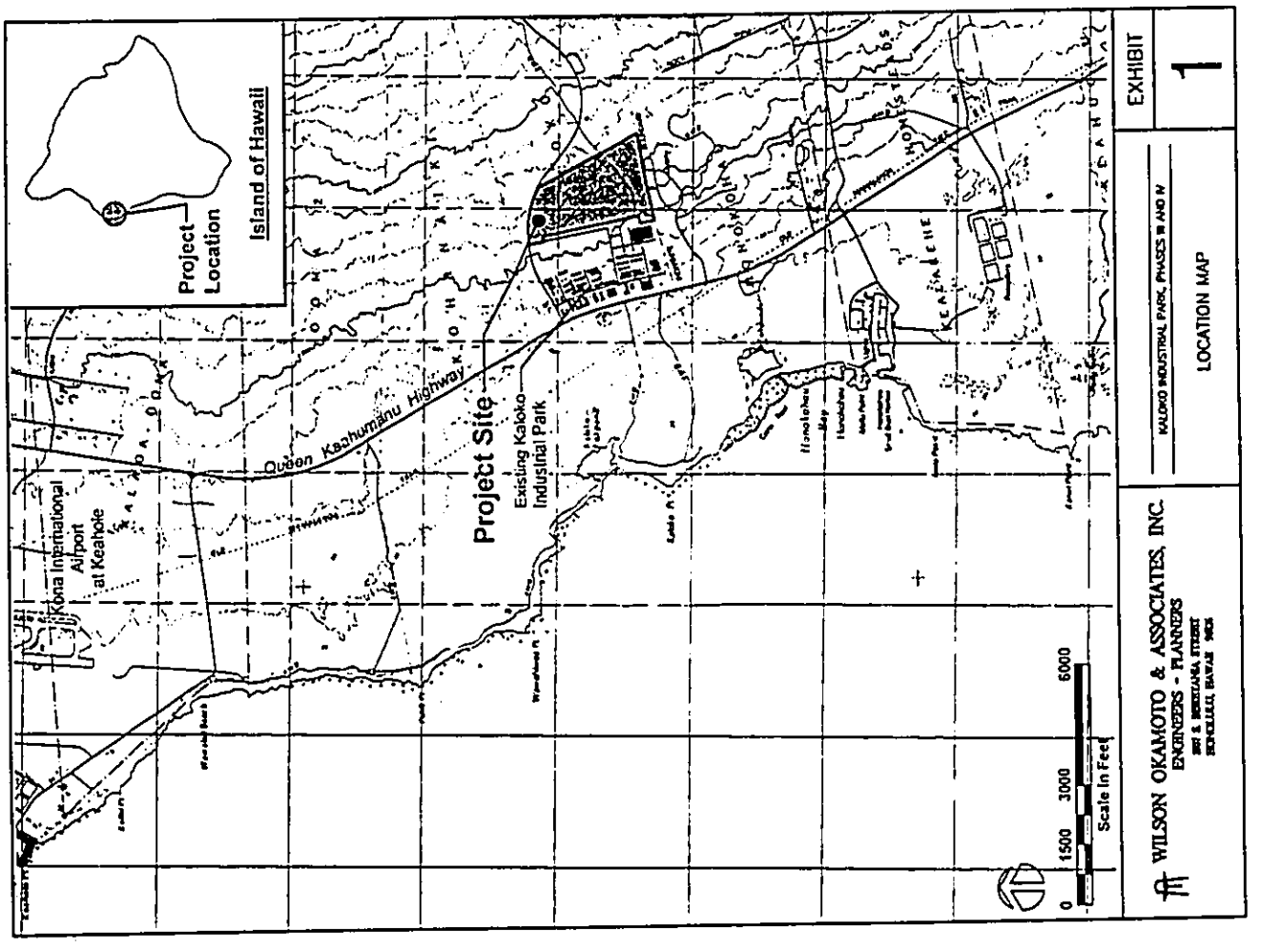
ENGINEERS - PLANNERS

KALOKO INDUSTRIAL PARK, PHASES III AND IV

VICINITY MAP

EXHIBIT 2



WILSON OKAMOTO & ASSOCIATES, INC.
ENGINEERS - PLANNERS

KALOKO INDUSTRIAL PARK, PHASES III AND IV

LOCATION MAP

EXHIBIT 1

B. Project Characteristics

The proposed Kaloko Industrial Park, Phases III and IV, project site encompasses approximately 102.3 acres and will be developed into approximately 82 improved one-acre lots (see Exhibit 3). The proposed project is expected to be completed and occupied by the Year 2010 and will consist of light industrial use and industrial-commercial mixed use which include:

- Trucking and touring companies
- Plant nurseries
- Storage companies
- Gas stations and vehicular repair shops
- Automobile dealerships
- Restaurants
- Utility company yards
- Lumberyards and building material yards
- Heavy equipment sales
- Car washing facilities
- Retail establishments

The project proposed site plan is shown as Exhibit 3.

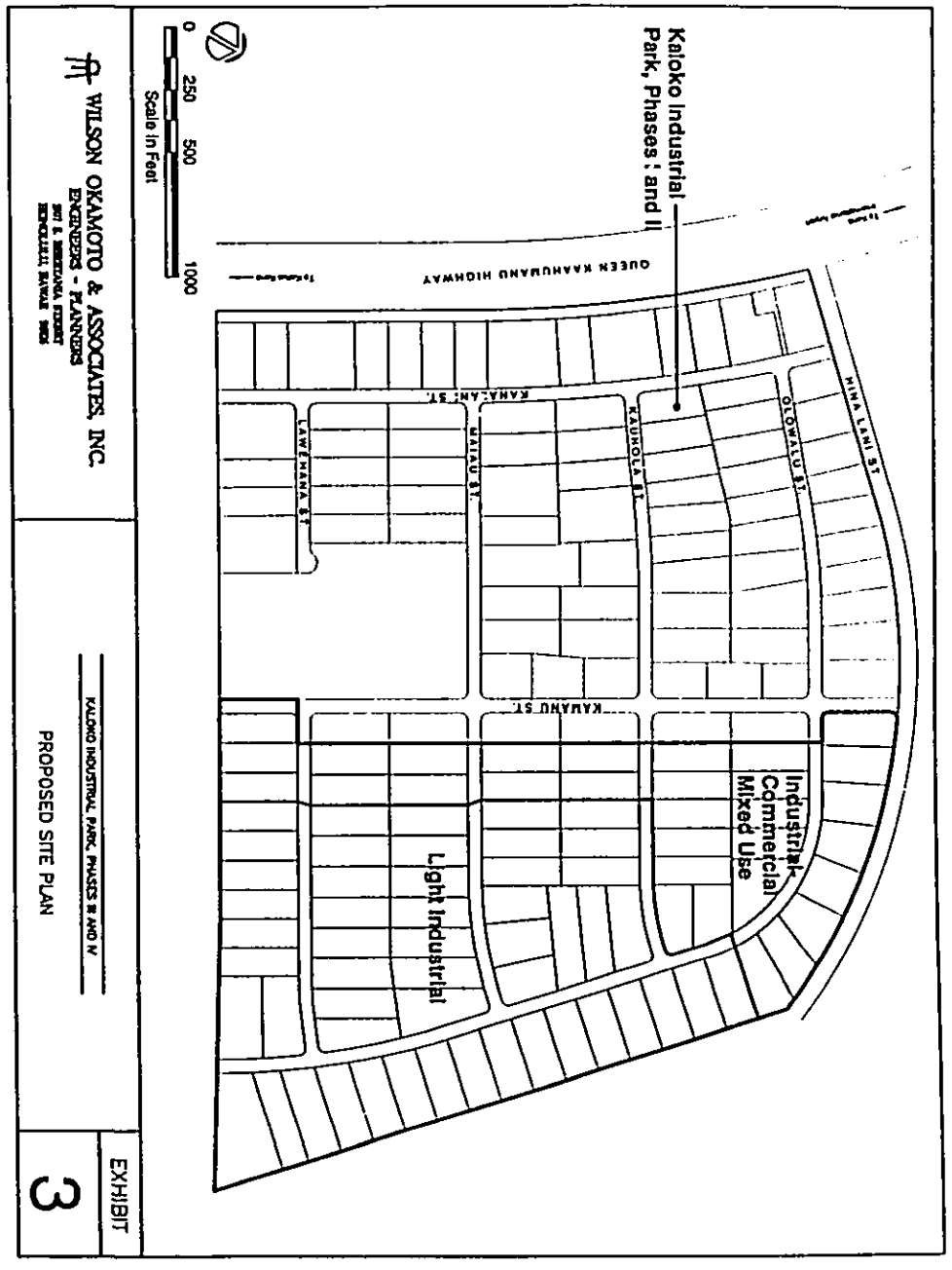
III. EXISTING CONDITIONS

A. General

The project site is located adjacent to Hina Lani Street which serves as a connector road between Queen Kaahumanu Highway and the Hawaii Belt Road (Mamalahoa Highway). Queen Kaahumanu Highway is located approximately 1,875 feet (0.35 miles) west of the project site and serves as the main access road along the North Kona coast. The traffic volumes on the highway have increased steadily over the years due to increased development along the coast.

B. Area Roadway System

In the vicinity of the project site, Queen Kaahumanu Highway is primarily a two-way, two-lane, undivided State highway with a posted speed limit of 35 mph. Approximately 1,875 feet (0.35 miles) west of the project site, the highway intersects with Hina Lani Street, a predominantly two-way, two-lane, County of Hawaii roadway



with an 80 foot right-of-way and a posted speed limit of 30 mph. At this unsignalized intersection, the northbound approach of Queen Kaahumanu Highway serves through and right-turn traffic movements and the southbound approach serves through and left-turn traffic movements. Hina Lani Street has two westbound lanes at this intersection that serve left-turn and right-turn traffic movements.

Approximately 375 feet (0.07 miles) east of the intersection with Queen Kaahumanu Highway, Hina Lani Street intersects with Kanalani Street, a two-way, two-lane, County of Hawaii roadway with a 60-foot right-of-way and a posted speed limit of 25 mph. At this unsignalized intersection, the westbound approach of Hina Lani Street serves through and left-turn traffic movements and the eastbound approach serves through and right-turn traffic movements. The Kanalani Street approach of this intersection serves left-turn and right-turn traffic movements.

Approximately 1,500 feet (0.28 miles) east from the intersection with Kanalani Street, Hina Lani Street intersects with Kamanu Street, a two-way, two-lane, County of Hawaii roadway with a 60-foot right-of-way and a posted speed limit of 25 mph. At this unsignalized intersection, the westbound approach of Hina Lani Street serves through and left-turn traffic movements and the eastbound approach serves through and right-turn traffic movements. The Kamanu Street approach of this intersection serves left-turn and right-turn traffic movements.

C. Traffic Volumes and Conditions

1. General

a. Field Investigation

The field investigation was conducted on March 14 and 15, 2000 and consisted of manual turning movement count surveys along Hina Lani Street. The traffic count surveys on March 14 and 15 were conducted between the morning peak hours of 6:30 AM and 8:30 AM, and the afternoon peak hours of 3:30 PM and 5:30 PM at the following intersections:

- Queen Kaahumanu Highway and Hina Lani Street
- Hina Lani Street and Kanalani Street

- Hina Lani Street and Kamanu Street

An additional manual turning movement count survey was conducted on March 25, 2000 at the intersection of Queen Kaahumanu Highway and Hina Lani Street. The traffic survey was conducted between 11:15 AM and 12:15 PM on Saturday to capture the peak traffic volumes generated by Costco which is located in the existing Kaloko Industrial Park.

b. Capacity Analysis Methodology

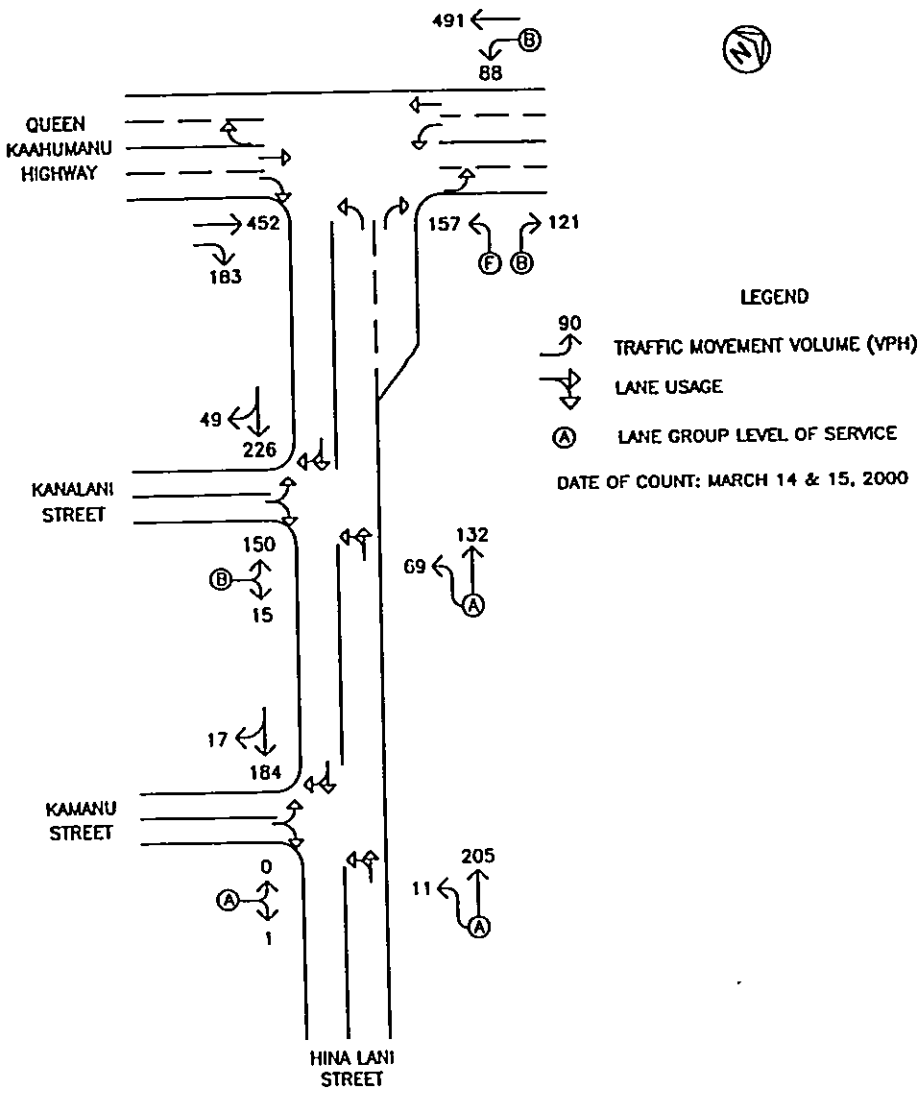
The highway capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, Third Edition, 1994, and the "Highway Capacity Software", developed by the Federal Highway Administration. The analysis is based on the concept of Level of Service (LOS).

LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F"; LOS "A" representing an ideal or free-flow operating conditions and LOS "F" unacceptable operating conditions. The LOS definitions are included in Appendix A.

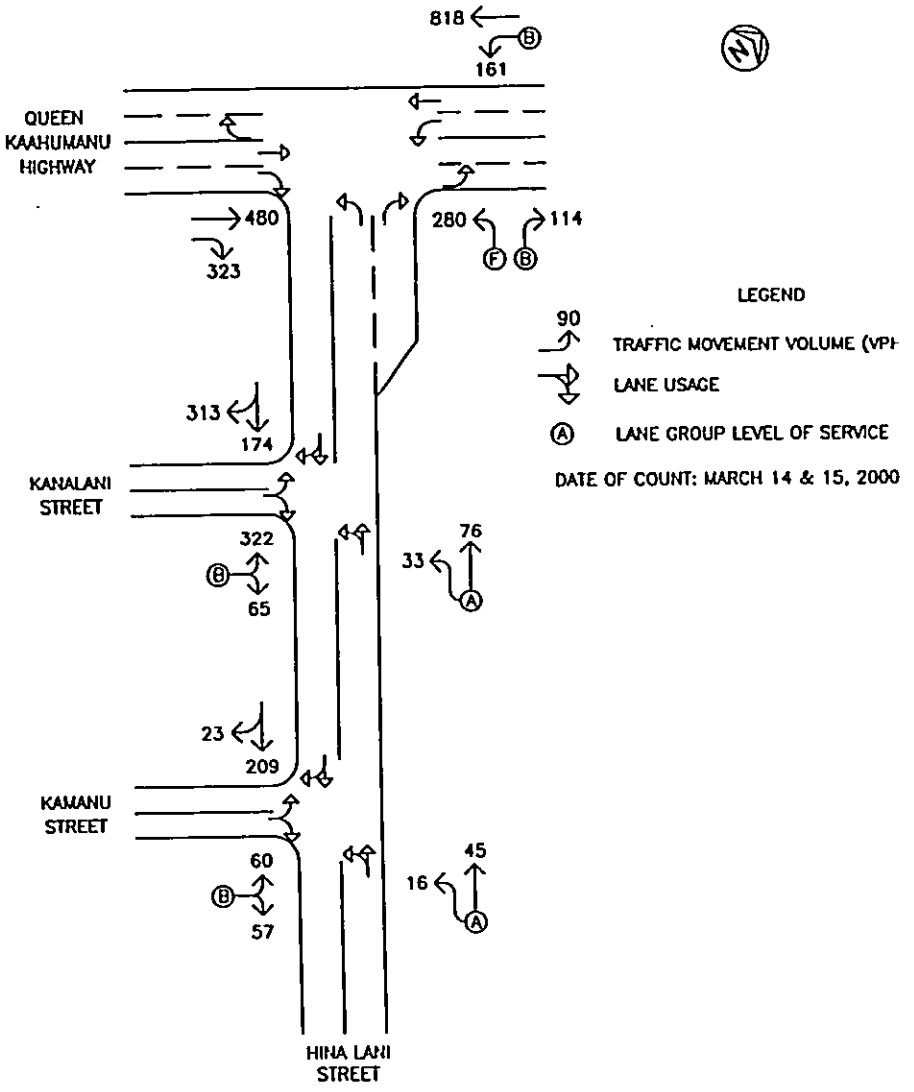
2. Existing Peak Hour Traffic

a. General

Exhibits 4 and 5 show the existing AM and PM peak hour traffic volumes and operating traffic conditions. The AM peak hour of traffic generally occurs between 7:00 AM and 8:00 AM along Queen Kaahumanu Highway in the proximity of the proposed project. In the afternoon, the PM peak hour of traffic generally occurs between the hours of 3:30 PM and 4:30 PM. The analysis is based on these peak hour time periods to identify the traffic impacts resulting from the proposed project.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	KALOKO INDUSTRIAL PARK, PHASES III AND IV EXISTING AM PEAK HOUR OF TRAFFIC	EXHIBIT 4



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	KALOKO INDUSTRIAL PARK, PHASES III AND IV EXISTING PM PEAK HOUR OF TRAFFIC	EXHIBIT 5

b. Queen Kaahumanu Highway and Hina Lani Street

At the intersection of Queen Kaahumanu Highway with Hina Lani Street, the highway carries 635 vehicles northbound and 579 vehicles southbound during the AM peak hour of traffic. Traffic volumes during the PM peak hour are heavier with 803 vehicles travelling northbound and 979 vehicles travelling southbound. The critical movement of the highway at this intersection is the southbound left-turn traffic movement. This movement operates at LOS "B" during the AM and PM peak hours of traffic.

During the AM peak hour of traffic, Hina Lani Street carries 278 vehicles westbound. Traffic volumes during the PM peak period are slightly heavier with 394 vehicles travelling westbound. The critical movement of this approach is the westbound left-turn traffic movement. During both peak periods, this movement operates poorly at LOS "F."

c. Hina Lani Street and Kanalani Street

At the intersection of Hina Lani Street and Kanalani Street, Hina Lani Street carries 201 vehicles westbound and 275 vehicles eastbound during the AM peak period. Traffic volumes during the PM peak hour are slightly heavier with 109 vehicles travelling westbound and 487 vehicles travelling eastbound. The critical movement of both approaches is the westbound left-turn and through traffic movement which operates at the free-flow condition of LOS "A" during the AM and PM peak hours.

The Kanalani Street approach carries 165 vehicles northbound during the AM peak hour of traffic. During the PM peak hour, traffic volumes are significantly higher with 387 vehicles travelling northbound. The critical movement of this approach is the northbound left-turn and right-turn traffic movement. This movement operates at LOS "B" during the AM and PM peak hours of traffic.

d. Hina Lani Street and Kamanu Street

At the intersection of Hina Lani Street with Kamanu Street, Hina Lani Street carries 216 vehicles westbound and 201 vehicles eastbound during the AM peak hour of traffic. Traffic volumes during the PM peak hour are significantly less with 61 vehicles travelling westbound and 232 vehicles travelling eastbound. The critical movement of both approaches is the westbound left-turn and through traffic movement which operates at the free-flow condition of LOS "A" during the AM and PM peak hours.

During the AM peak hour of traffic, Kamanu Street carries 1 vehicle northbound. Traffic volumes during the PM peak hour of traffic are significantly higher with 117 vehicles travelling northbound. The critical movement of this approach is the left-turn and right-turn traffic movement. This movement operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively."

IV. TRAFFIC SIGNAL WARRANT

The State Department of Transportation (DOT), Highways Division plans to install a traffic signal system at the intersection of Queen Kaahumanu Highway and Hina Lani Street by the Year 2001. The installation of a traffic signal may be justified by one or more of the eleven warrants outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways," 1988 Edition (MUTCD). Signal Warrant No. 11, the "Peak Hour Volume Warrant," consists of several conditions which could justify the installation of a traffic signal at an intersection where vehicles experience high traffic delay and impaired safety during the peak hour periods.

Under existing conditions, the traffic volumes entering the Queen Kaahumanu Highway and Hina Lani Street intersection satisfy Signal Warrant No. 11 (Peak Hour Volume Warrant) for minor street approaches with two lanes for high through traffic volumes on the major street. The AM peak hour traffic volumes are approximately equal to the minimum threshold while the PM peak hour volumes are significantly higher than the minimum volume for the minor street approach. In addition, the Saturday traffic volumes, primarily generated

by Costco, are also higher than the minimum threshold for the minor street approach. This intersection may also satisfy the remaining warrants for traffic signal consideration which take into account factors other than peak hour volumes such as delays, pedestrians, accidents, and volumes throughout the day. Therefore, for the purpose of this study, the intersection of Queen Kaahumanu Highway and Hina Lani Street is hereinafter assumed to be signalized.

V. PROJECTED TRAFFIC CONDITIONS

A. Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 6th Edition," 1995. The ITE trip generation rates are developed empirically by correlating the vehicle trip generation data with land use characteristics such as the number of vehicle trips generated per acre of development. Table 1 summarizes the project site trip generation characteristics applied to the AM and PM peak hours of traffic to measure the impact resulting from the proposed Kaloko Industrial Park, Phases III and IV.

Table 1: Peak Hour Trip Generation

INDEPENDENT VARIABLE:		ACRES OF DEVELOPMENT AREA = 102.3 ACRES
		PROJECTED TRIP ENDS
AM PEAK	ENTER	706
	EXIT	144
	TOTAL	850
PM PEAK	ENTER	171
	EXIT	641
	TOTAL	812

2. Trip Distribution

Access to the proposed Kaloko Industrial Park, Phases III and IV, would be via Kamanu Street. The directional distribution of all site-generated vehicular trips at the intersection of Kamanu Street with Hina Lani Street was

based upon the directional distribution of traffic along Hina Lani Street. During the AM peak hour of traffic, 49.5% of the vehicles were assumed to be travelling westbound and 50.5% of the vehicles travelling eastbound. During the PM peak hour of traffic, 68.8% of the vehicles were assumed to be travelling westbound and 31.2% of the vehicles travelling eastbound. At the intersection of Hina Lani Street and Kanalani Street, the site-generated traffic was assumed to be through traffic. The directional distribution of traffic at the intersection of Queen Kaahumanu Highway was assumed to remain the same as existing.

B. Through Traffic Forecasting Methodology

The travel forecast is based upon the average annual traffic growth rate as described in the Hawaii Long Range Land Transportation Plan (HLRLTP). Based upon statewide population, employment, and visitor forecasts for the Year 2020, the HLRLTP estimates that the average daily traffic on Queen Kaahumanu Highway would increase at an average rate of 3.5% per year. Using 2000 as the Base Year, a growth factor of 1.035 was applied to the existing traffic demands per year to achieve the projected Year 2010 traffic demands.

C. Other Considerations

The project site for the proposed Kaloko-Honokohau Business Park encompasses approximately 337 acres of land south of the Kaloko Industrial Park, Phases III and IV. The Business Park will consist of commercial-industrial mixed uses and will be developed in three phases, the first of which is to be completed by the Year 2010. As described in the "Traffic Impact Analysis Report for the Proposed Kaloko-Honokohau Business Park," Phase I of the proposed project is expected to generate 942 and 1,734 trips during the AM and PM peak hours of traffic, respectively. These trips were assigned to the street network in the study area and would influence the traffic operations in the vicinity of the Kaloko Industrial Park, Phases III and IV

In addition to the Business Park, there two other planned improvements that would affect the traffic operations in the project's vicinity The State Department of Transportation, Highways Division is planning to install a traffic signal system at the

intersection of Queen Kaahumanu Highway and Hina Lani Street to increase the carrying capacity of the facility and improve motorist safety. In addition, the Highways Division also plans to widen Queen Kaahumanu from a two-lane to a four-lane highway. For the purpose of this report, these modifications are assumed to have been completed by the Year 2010.

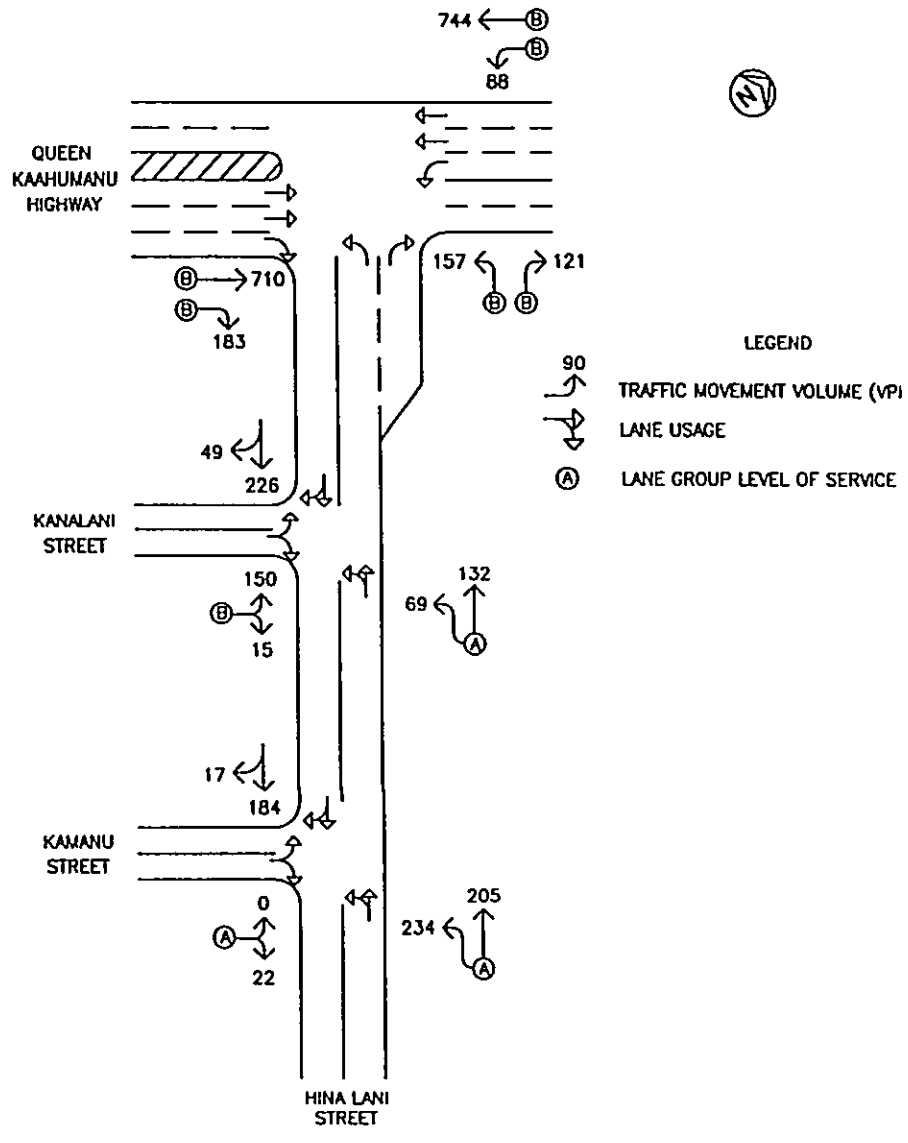
D. Total Traffic Volumes Without Project

Exhibits 6 and 7 show the projected AM peak hour and PM peak hour traffic volumes and operating conditions along Hina Lani Street without the development of the proposed Kaloko Industrial Park, Phases III and IV. A comparison of the existing and projected (without project) levels of service for the critical movements at the three study intersections are included in Table 2.

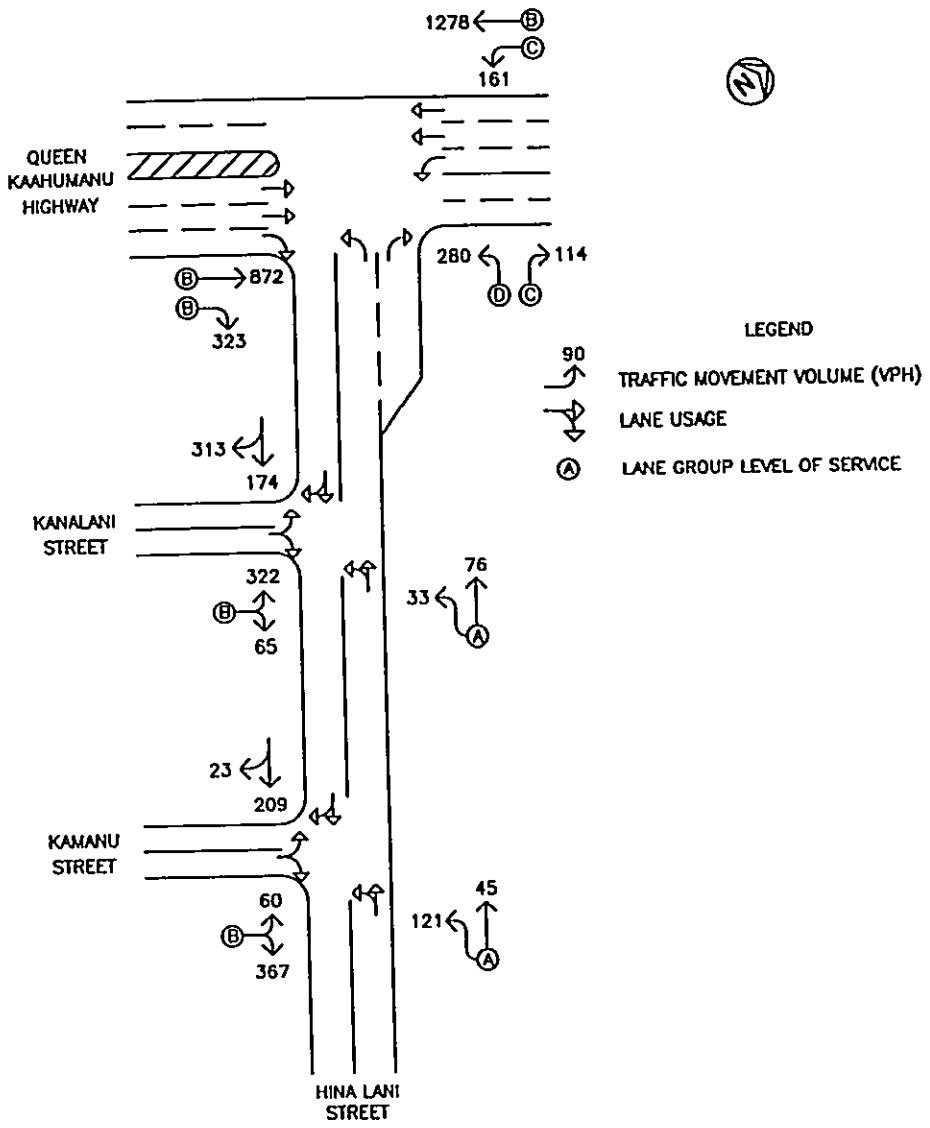
Table 2: Comparison of Existing and Projected (Without Project) Levels of Service

Intersection	Movement	AM		PM	
		Exist.	Year 2010 w/out Proj.	Exist.	Year 2010 w/out Proj.
Queen Kaahumanu Hwy./Hina Lani St.	Southbound (LT)	B	B	B	B
	Westbound (LT)	F	B	F	C
Hina Lani St./ Kanalani St.	Northbound (LT & RT)	B	B	B	B
	Westbound (LT & TH)	A	A	A	A
Hina Lani St./ Kamanu St.	Northbound (LT & RT)	A	A	B	B
	Westbound (LT & TH)	A	A	A	A

Traffic operations at the intersection of Queen Kaahumanu Highway and Hina Lani Street are expected to improve significantly for the Year 2010 without project conditions due to the installation of the planned traffic signal and the widening of the highway to four lanes. The left-turn traffic movement on the westbound approach of this intersection is expected to improve from LOS "F" to LOS "B" and LOS "C" during the AM and PM peak hours, respectively. The levels of service at the other



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	KALOKO INDUSTRIAL PARK, PHASES III AND IV YEAR 2010 AM PEAK HOUR OF TRAFFIC WITHOUT PROJECT	EXHIBIT 6



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	KALOKO INDUSTRIAL PARK, PHASES III AND IV YEAR 2010 PM PEAK HOUR OF TRAFFIC WITHOUT PROJECT	EXHIBIT 7

two study intersections are not expected to change since the traffic operations along Hina Lani Street should be similar to existing.

E. Total Traffic Volumes With Project

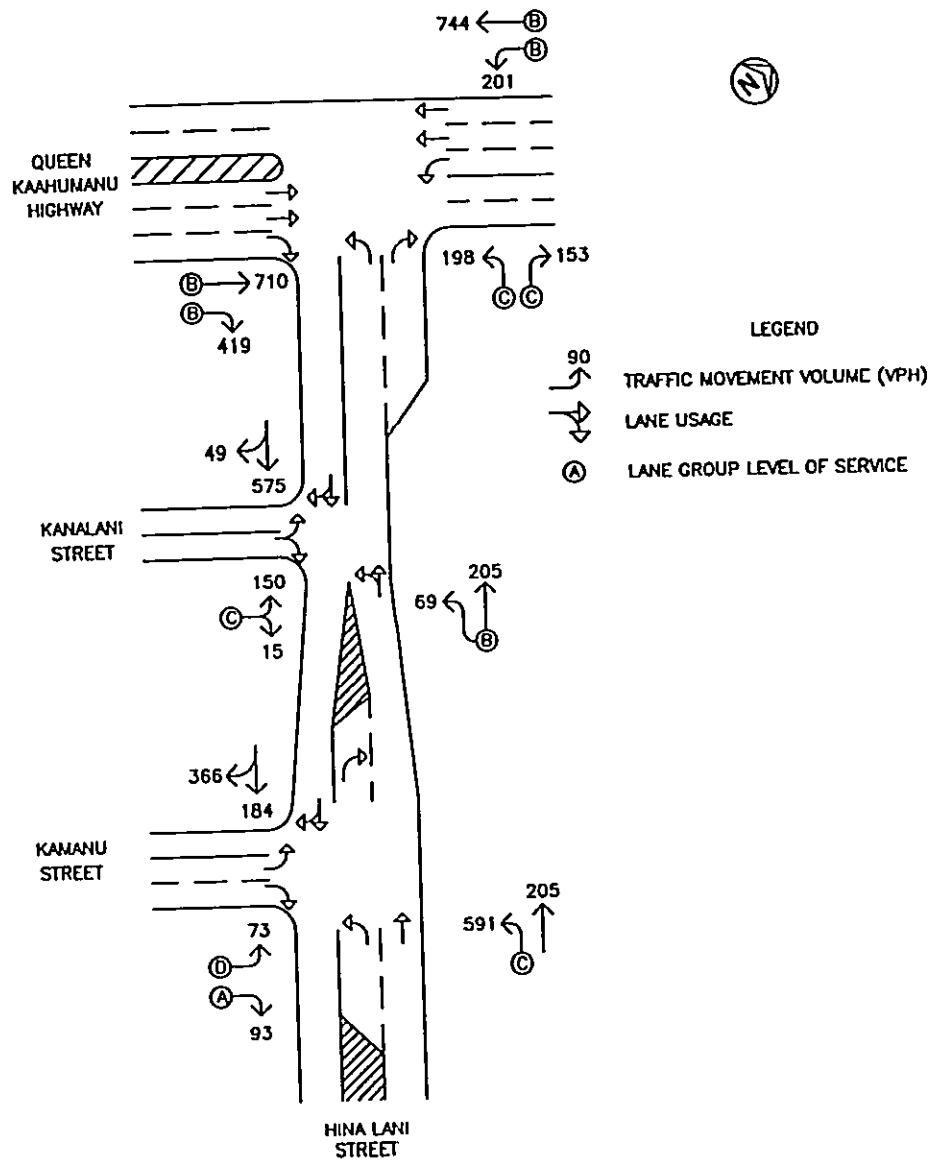
Exhibits 8 and 9 show the cumulative AM and PM peak hour traffic conditions resulting from the projected external traffic and the development of the proposed Kaloko Industrial Park, Phases III and IV. The cumulative volumes consist of site-generated traffic superimposed over Year 2010 projected traffic demands. For the purpose of this study, the intersection of Hina Lani Street with Kamanu Street is assumed to have been restriped to accommodate the increase in traffic along the minor street. The traffic impacts resulting from the proposed project are addressed in the following section.

VI. TRAFFIC IMPACT ANALYSIS

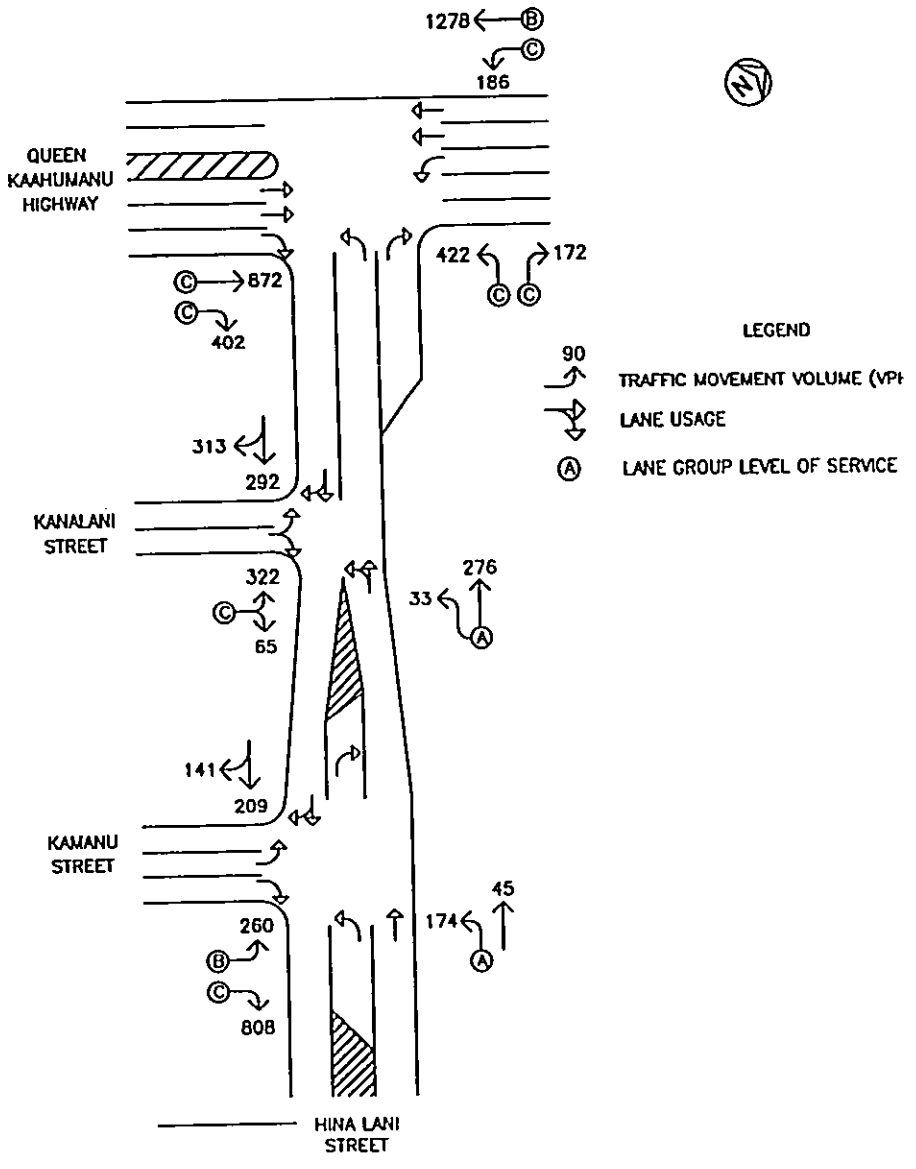
The Year 2010 cumulative AM and PM peak hour traffic conditions with the development of the proposed Kaloko Industrial Park, Phases III and IV, are summarized in Table 3. The existing and projected Year 2010 operating conditions without the proposed project are provided for comparison in Table 3.

Table 3: Comparison of Existing and Projected (With and Without Project) Levels of Service

Intersection	Movement	AM			PM		
		Exist.	Year 2010		Exist.	Year 2010	
			w/out Proj.	w/ Proj.		w/out Proj.	w/ Proj.
Queen Kaahumanu Hwy./Hina Lani St.	Southbound (LT)	B	B	B	B	B	C
	Westbound (LT)	F	B	C	F	C	C
Hina Lani St./ Kanalani St.	Northbound (LT & RT)	B	B	C	B	B	C
	Westbound (LT & TH)	A	A	B	A	A	A
Hina Lani St./ Kamanu St.	Northbound (LT)	A	A	D	B	B	B
	Northbound (RT)			A			C
	Westbound (LT)	A	A	C	A	A	A
	Westbound (TH)			-			-



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS 1907 S. BERETANIA STREET HONOLULU, HAWAII 96826	KALOKO INDUSTRIAL PARK, PHASES III AND IV YEAR 2010 AM PEAK HOUR OF TRAFFIC WITH PROJECT	EXHIBIT 8



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS 1907 S. BERETANIA STREET HONOLULU, HAWAII 96826	KALOKO INDUSTRIAL PARK, PHASES III AND IV YEAR 2010 PM PEAK HOUR OF TRAFFIC WITH PROJECT	EXHIBIT 9

In comparison to Year 2010 without project conditions, the traffic operations at the study intersections are slightly worse during the AM and PM peak hours for Year 2010 with project conditions. The addition of site-generated traffic from the proposed industrial park to the surrounding roadways may cause expected declines in the LOS for the critical movements of all three study intersections.

At the intersection of Queen Kaahumanu Highway and Hina Lani Street, the LOS for the southbound left-turn movement declines from LOS "B" to LOS "C" during the PM peak hour due to the increased traffic on Hina Lani Street. Similarly, the LOS for the westbound left-turn movement changes from LOS "B" to LOS "C" during the AM peak hour of traffic. However, the traffic operations for the critical movements at this intersection still operate at acceptable Levels of Service.

The increase in traffic on Hina Lani Street also causes a decline in the LOS for the critical movements at the intersection of Hina Lani Street and Kanalani Street. The LOS for the northbound movement of this intersection worsens from LOS "B" to LOS "C" during the AM and PM peak hours of traffic. The westbound movement of this intersection only experiences a change in LOS during the AM peak hour of traffic. The traffic operations of this movement changes from LOS "A" to LOS "B" during the AM peak hour. Although there are changes in the LOS, the traffic operations for the critical movements of this intersection still operate at acceptable Levels of Service.

The traffic operations at the Hina Lani Street and Kamanu Street intersection also experience changes in LOS due to the increase in traffic entering and exiting the proposed Kaloko Industrial Park, Phases III and IV. Kamanu Street currently serves as a secondary exit from the existing Kaloko Industrial Park and carries only light traffic volumes. The addition of site-generated traffic from the proposed industrial park to Kamanu Street could affect the traffic operations of the critical movements at this intersection. However, the addition of a left-turn refuge lane on Hina Lani Street and the provisions for exclusive left-turn and right-turn lanes on Kamanu Street should mitigate the impact of the additional traffic at the intersection. The critical movements at the intersection operate at acceptable Levels of Service under Year 2010 with project conditions

The development of the proposed Kaloko Industrial Park, Phases III and IV, should have a minimal impact on traffic operations in the project vicinity. Despite the increase in traffic at the study intersections under Year 2010 with project conditions, all of the movements at these intersections operate at acceptable Levels of Service due to the improvements at the intersections of Hina Lani Street with Queen Kaahumanu Highway and Kamanu Street.

VII. RECOMMENDATIONS

Based upon the analysis of the traffic data, the following are the recommendations of this study:

1. Maintain adequate sight distances for motorists to safely enter and exit all project driveways and roadways.

2. Restripe Hina Lani Street at the intersection with Kamanu Street to create a left-turn refuge lane for vehicles turning left from Kamanu Street onto Hina Lani Street. There is sufficient pavement width to accommodate three lanes along this segment of Hina Lani Street. Since the left-turn refuge lane will provide a median on the westbound approach of Hina Lani Street, a left-turn lane could be provided to accommodate vehicles turning left onto Kamanu Street.

3. Restripe Kamanu Street at the intersection with Hina Lani Street to provide exclusive left-turn and right-turn lanes for the approach. There is sufficient pavement width on Kamanu Street to accommodate three lanes at the intersection.

VIII. CONCLUSION

Traffic volumes along Hina Lani Street are expected to increase due to the development of the adjacent Kaloko-Honokohau Business Park and the proposed Kaloko Industrial Park, Phases III and IV. However, widening along Queen Kaahumanu Highway and the traffic signal system at the intersection of Queen Kaahumanu Highway and Hina Lani Street planned by the DOT, Highways Division will significantly improve traffic operations at the intersection. In addition, restriping the intersection of Hina Lani Street and Kamanu Street to provide exclusive turning lanes should mitigate the impact of additional site-generated traffic at that intersection. With these improvements, the intersections along Hina Lani Street should continue to operate at acceptable Levels of Service indicating that the

proposed Kaloko Industrial Park, Phases III and IV, does not have a significant impact on traffic operations in the project vicinity.

APPENDIX A

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS) for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle for a 15-min analysis period. The criteria are given in the following table.

Table 1: Level-of-Service Criteria for Signalized Intersections

Level of Service	Stopped Delay for Vehicle (SEC)
A	≤5.0
B	>5.0 and ≤15.0
C	>15.0 and ≤25.0
D	>25.0 and ≤40.0
E	>40.0 and ≤60.0
F	>60.0

Delay is a complex measure and is dependent upon a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service A describes operations with very low delay, up to 5 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of Service B describes operations with delay greater than 5 and up to 15 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than which LOS A, causing higher levels of average delay.

Level of Service C describes operations with delay greater than 15 and up to 25 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.

Level of Service D describes operations with delay greater than 25 and up to 40 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E describes operation with delay greater than 40 and up to 60 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level of Service F describes operations with delay in excess of 60 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service (LOS) criteria are given in Table 1. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. In situations where the degree of saturation is greater than about 0.9, the amount of average total delay is also dependent on the length of the analysis period.

Table 1: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Total Delay (Sec/Veh)
A	≤5.0
B	>5.0 and ≤1.0
C	>10.0 and ≤20.0
D	>20.0 and ≤30.0
E	>30.0 and ≤45.0
F	>45.0

"Highway Capacity Manual," Special Report 209, Transportation Research Board, Third Edition, 1994