THE ORIGINAL OF THE DOCUMENT RECORDED AS FOLLOWS:
STATE OF HAWAII

BUREAU OF CONVEYANCES

Doc 2008-102908
JUN 25, 2008 02:00 PM

Return by Mail ( ) Pickup (X)

Larry T. Takumi, Esq.
CADES SCHUTTE LLP
1000 Bishop Street, Suite 1200
Honolulu, Hawaii 96813-4216

This document contains 437 pages

Tax Map Key No. (3) 7-4-08:13, 74, 76 to 79

DECLARATION REGARDING POLLUTION PREVENTION PLAN FOR WEST HAWAII BUSINESS PARK

THIS DECLARATION dated as of June 18, 2008 (this "Declaration") is made by **WEST HAWAII BUSINESS PARK LLC**, a Hawaii limited liability company (the "Declarant"), whose principal place of business and mailing address is at 3465 Waialae Avenue, Suite 260, Honolulu, Hawaii 96816.

1. The Declarant is the fee simple owner of the real property situated at Honokohau 2nd, North Kona, Island and County of Hawaii, that is identified by TMK Nos. (3) 7-4-08:13, 74, 76 to 79 (the "Property"). The Property is a portion of the 336.984 acres of land that was reclassified by the State Land Use Commission, by its Findings of Fact, Conclusions of Law and Decision and Order dated September 26, 2003 (the "Decision and Order") under Docket No. A00-730. Pages 80 through 96 of the Decision and Order was recorded in the Certificate of Conditions recorded in the Bureau of Conveyances of the State of Hawaii (the "Bureau") as Document No. 2004-032728, and the State Land Use Commission subsequently amended the Decision and Order by an Order Granting Motion to Amend Conditions and Extend Time for Compliance adopted on January 31, 2008.

2. Condition 3b of the Certificate of Conditions requires the development of a Pollution Prevention Plan that addresses each of the types of uses permissible on the Property, by specifically designating Best Management Practices tailored to each specific use. Attached to this Declaration is the final Pollution Prevention Plan for the Property. When recorded in the

Exhibit 7

Bureau, this Pollution Prevention Plan shall run with the land comprising the Property in the same manner as all conditions of approval imposed by the State Land Use Commission.

IN WITNESS WHEREOF, the Declarant has executed this Declaration as of the date written above.

WEST HAWAII BUSINESS PARK, LLC
a Hawaii limited liability company

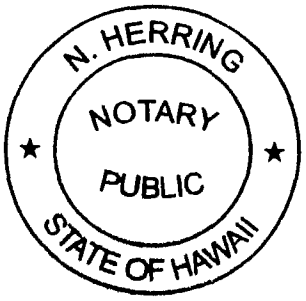
By: _____
James S. Greenwell
President

By: _____
Norman S. Hom
Vice President

"Declarant"

STATE OF HAWAII)
) SS
CITY AND COUNTY OF HONOLULU)

On this 18 day of June, 2008, before me personally appeared JAMES S. GREENWELL and NORMAN S. HOM, to me personally known, who, being by me duly sworn or affirmed, did say that such persons executed the foregoing instrument as the free act and deed of such persons, and if applicable, in such capacities shown, having been duly authorized to execute such instrument in such capacities.



N. Herring
Name: _____
Notary Public, State of Hawaii

My commission expires: _____

N. HERRING
NOTARY PUBLIC, STATE OF HAWAII
MY COMMISSION EXPIRES: APRIL 22, 2011

POLLUTION PREVENTION PLAN
WEST HAWAI`I BUSINESS PARK
TMK 7-4-8: Parcels 13, 74, 76, 77 and 78
NORTH KONA, ISLAND OF HAWAI`I

Prepared by:
Masa Fujioka & Associates
98-021 Kamehameha Highway, Suite 337
Ai`ea, Hawai`i 96701-4914
Telephone: (808) 484-5366 Facsimile: (808) 484-0007

MFA Job # 00314-002

June 2008

TABLE OF CONTENTS

LIST OF FIGURES, TABLES AND APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
BMP	Best Management Practice
CAB	Clean Air Branch (State Department of Health)
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
CNPCP	Coastal Nonpoint Pollution Control Program
CTAHR	College of Tropical Agriculture and Human Resources (University of Hawai`i)
CWA	Clean Water Act
CWB	Clean Water Branch (State Department of Health)
CZARA	Coastal Zone Act Reauthorization Amendments
CZM	Office of Planning's Coastal Zone Management
DBEDT	Department of Business Economic Development and Tourism
DOA	Department of Agriculture
DOH	Department of Health (State of Hawai`i)
DOT	Department of Transportation
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HAR	Hawai`i Administrative Rules
HEPCRA	Hawai`i Emergency Planning and Community Right-to-Know Act
HRS	Hawai`i Revised Statutes
MCX	Industrial-Commercial Mixed District
MG	General Industrial
MFA	Masa Fujioka & Associates
ML	Limited Industrial District
NPS	National Park Service
NPDES	National Pollutant Discharge Elimination System
OSWM	Office of Solid Waste Management (State Department of Health)
PPP	Pollution Prevention Plan
SDWB	Safe Drinking Water Branch (State Department of Health)
SPCC	Spill Prevention, Control, and Countermeasures Plan
TSCA	Toxic Substances Control Act
UIC	Underground Injection Control
US	United States
USC	United States Code
UST	underground storage tank
WHBP	West Hawai'i Business Park
WQS	Water Quality Standards

1.0 INTRODUCTION

1.1 Project Description

West Hawai`i Business Park, LLC, the successor to Lanihau Properties, LLC, intends to incrementally develop a 337-acre property located in Honokohau, North Kona, Island of Hawai`i. The 337-acre property is comprised of Lot A-1, a 314.4-acre parcel identified as TMK: (3) 7-4-8:13, and Lot A-2, a 12.7-acre parcel identified TMK: (3) 7-4-8:74 that was subdivided out of Parcel 13 in 2004. A third parcel, Lot A-3 (TMK: (3) 7-4-8:30) comprises the remaining 9.9 acres, but this freestanding site is being developed independently and is subject to a separate Pollution Prevention Plan (PPP).

Ordinance 04-110, County of Hawaii, rezoned 282.3 acres of the 337.0-acre property, leaving 54.7 acres unchanged. The rezoned portions of the site are split into three Zoning Parcels (which are not identical to the subdivided Lots) as follows:

- Zoning Parcel 1, consisting of 186.7 acres, zoned Industrial-Commercial Mixed (MCX-20) and comprising the majority of Lot A-1;
- Zoning Parcel 2, consisting of 85.7 acres, zoned General Industrial (MG-1a), comprising 12.7 acres of Lot A-2 and 73.0 acres of Lot A-1;
- Zoning Parcel 3, consisting of 9.9 acres, zoned Industrial-Commercial Mixed (MCX-20) and comprising Lot A-3, which is not part of this PPP.

As noted above, the remaining 54.7 acres of the 337-acre property was not included in the 2004 zoning application and remains in the Open (O) District. This area, which will be the subject of a future rezoning action, is also currently part of Lot A-1.

Lots A-1 and A-2, totaling 327.1 acres, are hereafter referred to simply as the West Hawaii Business Park (WHBP) (Figure 1) and are the sole subject of this PPP. On August 23, 2007, the Planning Department of the County of Hawaii approved the subdivision of Lot A-1 into five bulk parcels to create the right-of-way for the extension of Kamanu Street through the West Hawaii Business Park property (Lot A-1-E below). The subdivided parcels are identified as follows:

Lot A-1-A	TMK: (3) 7-4-8:13	170.9 acres
Lot A-1-B	TMK: (3) 7-4-8:76	95.4 acres
Lot A-1-C	TMK: (3) 7-4-8:77	37.7 acres
Lot A-1-D	TMK: (3) 7-4-8:78	5.6 acres
Lot A-1-E	TMK: (3) 7-4-8:79	4.8 acres

Existing Phases I and II and the proposed Phases II & IV of the Kaloko Industrial Park are situated immediately north of the WHBP. The existing Honokohau Industrial Subdivision is located immediately south of the WHBP.

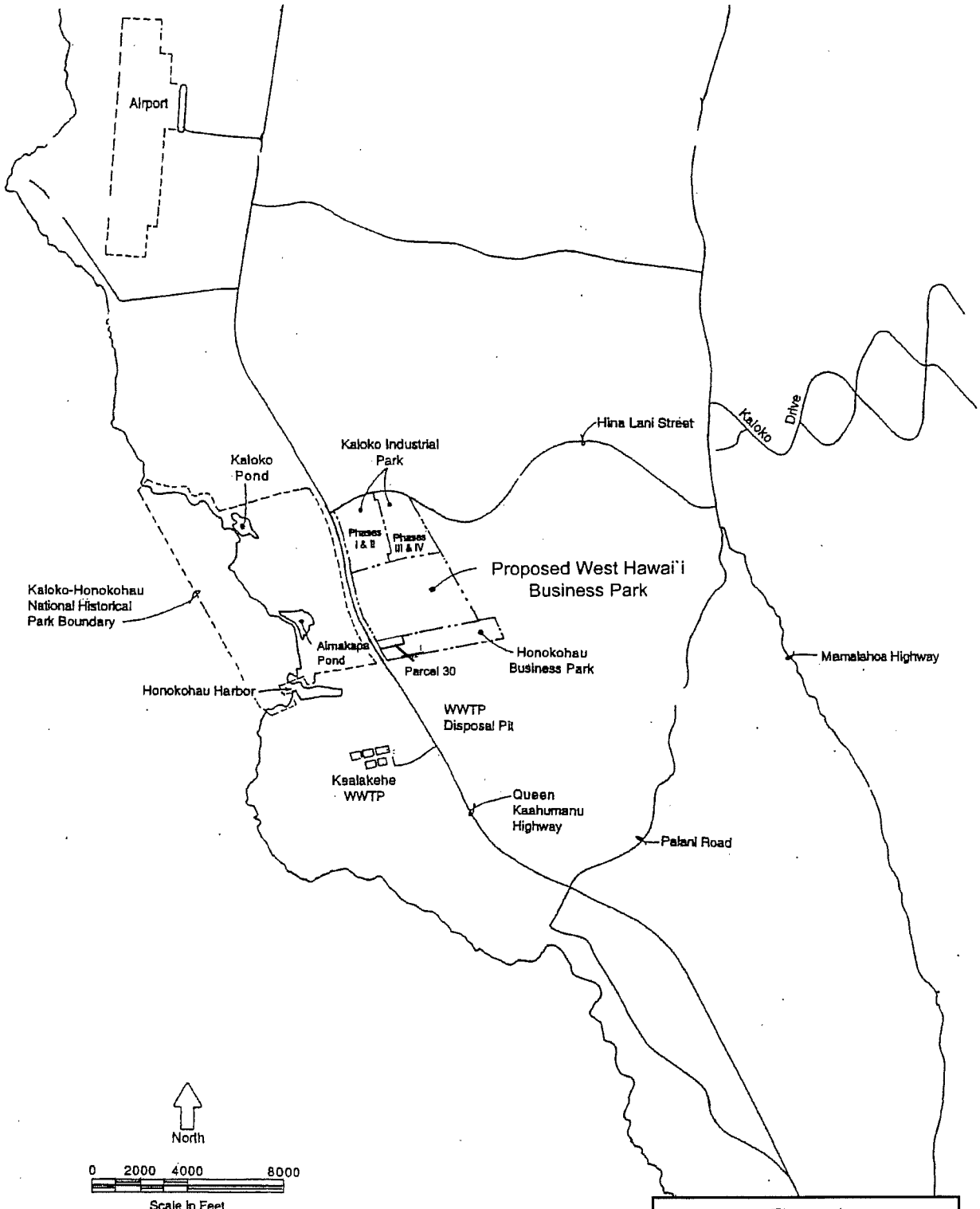


Figure 1
Vicinity Map
West Hawai`i Business Park

1.2 Purpose

The WHBP is situated east (mauka) of the Kaloko-Honokohau National Historical Park. The PPP has been prepared to assist the owners and tenants of the WHBP to limit potential contamination that may migrate via ground water to the National Historical Park and its resources.

The 1,160-acre National Historical Park was established in 1978 for the preservation, protection, and interpretation of traditional native Hawaiian activities and culture. The National Historical Park is the site of an ancient Hawaiian settlement that encompasses portions of four different ahupua'a (traditional land subdivisions from the uplands to the sea). In addition to house sites and heaiu, the National Historical Park contains two ponds that 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 and Aimakapa Pond is approximately 15 acres in size. The Kaloko-Honokohau National Historical Park also contains more than 130 anchialine pools (approximately 17% of the State's anchialine pool resources), and 596 acres of class AA marine waters. Sixteen threatened, endangered, and candidate endangered species can be found within the National Historical Park.

The National Historical Park offers numerous visitor activities, including bird watching, fishing, kayaking, and swimming. Additionally, the National Historical Park – particularly the fishponds – is home to two endangered species of endemic waterbirds (i.e., birds native to Hawai`i and found nowhere else in the world). The Kaloko-Honokohau National Historical Park provides an invaluable site for study and education of these and other wildlife. Additional information on the National Historical Park's resources and bird species is provided in Appendix A.

This PPP has been prepared to limit potential contamination of the Kaloko Honokohau National Historical Park and the water resources within the National Historical Park. The requirements for a PPP for the project are described in the State Land Use Commission (LUC) "Decision and Order" (Docket A00-730), dated September 2003 (and hereafter referred to as D&O; Appendix B). In particular, D&O Condition 3b lays out the items that must be discussed in the PPP.

Limiting potential contamination of the National Historical Park and its water resources can be accomplished by adherence to the applicable laws and regulations and implementation of appropriate Best Management Practices (BMPs). Handling and storage of potential contaminants are strictly controlled under State and Federal laws. Businesses that deal with these substances are required under law to implement BMPs and are subject to oversight by Federal, State, and local agencies. The PPP evaluates potential contaminants from industrial operations; identifies applicable Federal, State, and local regulations that serve to protect ground water; and provides appropriate BMPs. Additionally, the PPP identifies potential sources of non-point source pollution such as parking lot and vegetated land run-off, and provides BMPs for protecting the receiving waters.

1.3 Users

The PPP will be provided to all individual lot owners and tenants/operators of the proposed industrial/commercial and general industrial lots.

1.4 Format and Organization

The PPP assesses potential contaminants from industrial and commercial operations and provides owners/operators with guidance for environmental compliance for likely contaminants that might affect the Kaloko-Honokohau National Historical Park water resources. Section 2.0 discusses limitations of the PPP. Section 3.0 identifies allowable land uses and potential sources of contamination that might result from those land uses. Since a number of land uses have similar potential contaminants, the information on regulations and BMPs is organized according to the contaminants, rather than the land use.

Section 4.0 discusses the requirements mandated by environmental regulations applicable to the potential contaminants. For most potential pollutants, the environmental laws and regulations specify certain actions that must be taken. In this section, we have summarized the actions specified by the regulations.

Section 5.0 discusses the applicability of structural, procedural, and administrative Best Management Practices (BMPs) to mitigate the release of potential pollutants. BMPs are organized by contaminant type, and a table is included to match land uses to potential pollutants and BMPs.

Section 6.0 contains contact information for regulatory agencies and the National Park Service.

2.0 LIMITATIONS

This PPP provides guidance regarding the environmental laws and regulations that are likely to apply to specific types of light industrial/commercial and general industrial activities anticipated at the WHBP, subject to the following provisions of the D&O (Appendix B):

> 3a. Petitioner currently operates a quarry in a portion of the Petition Area. Any further public or private industrial development within the Petition Area which could be considered a new source of pollution or an increased source of pollution shall, in its initial project design and subsequent construction, provide the highest and best degree of waste treatment practicable under existing technology.
>
> 3b. Except for the existing quarry operation and the construction of roads and utilities, before constructing upon or occupying any portion of the Petition Area, a Pollution Prevention Plan (PPP), after consultation with NPS, shall be developed that addresses each type of uses permissible in the Petition Area, by specifically designating Best Management Practices (BMPs) tailored to each specific use.

Since the chief environmental concern at the subject site is contamination of the ground water and Kaloko-Honokohau National Historical Park water resources, the PPP addresses the types of activities and resulting contaminants that have the potential to result in ground water contamination and surface water contamination.

D&O Condition 3f states, "Owner or operator covenants developed for the Petition Area shall expressly disclose to all future individual lot owner(s) the existence of the National Park System Resource Protection Act, 16 U.S.C. Sections 19jj-19jj-4, and the consequences of violation of such act. In particular, future land owners shall be made aware that any person who destroys, causes the loss of, or injures any park system resource is liable to the United States for response costs and damages resulting from such destruction, loss or injury."

Other types of activities at the WHBP may be regulated under other environmental regulations (e.g., clean air, solid waste, environmental response, community-right-to-know) that are not relevant to potential contamination of ground water and the ponds. These activities are, therefore, not discussed in the PPP. The exclusion of such activities from the PPP does not relieve owners/operators from fulfilling their obligations under applicable regulations.

Also, because of anticipated changes to environmental laws and regulations, a reader addressing a specific environmental issue should consult the latest version of the laws, regulations and relevant planning documents, including the State of Hawai'i Non-Point Source Pollution Control Plan. When there is a conflict between the then-current environmental laws and regulations and the laws and regulations as stated in Section 4.0, the then-current environmental laws and regulations shall control.

3.0 POTENTIAL CONTAMINANTS FROM INDUSTRIAL OPERATIONS

3.1 Allowable Land Uses

All lands in the State are classified into four land use districts, i.e., Urban, Agricultural, Conservation, and Rural, by the State Land Use Commission. The State Land Use Commission has approved the reclassification of the WHBP from Conservation District to Urban District as contained in the document entitled *Findings of Fact, Conclusions of Law and Decision and Order, September 18, 2003 (Docket No. A00-730).*

The Hawai`i County Zoning Code regulates the use of lands within the State Urban, Agricultural, and Rural Districts on the island of Hawai`i. The WHBP has been rezoned by the County of Hawai`i to MCX-20, Industrial-Commercial Mixed District (Zoning Parcel 1) and MG-1a, General Industrial District (Zoning Parcel 2). The purpose of the MCX 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 non-industrial uses to unsafe and unhealthy environments. This district is also intended to promote and maintain a viable mix of light industrial and commercial uses.

Although the MG-1a zoning allows for more heavy industrial uses when compared to a MCX-20 zoning, the D&O Condition 5 states that, "The Petitioner, it's successors and assigns are prohibited from engaging in or allowing the following uses in the Petition Area: heliports, bulk storage of flammable and/or explosive materials (tank farms), landfills for dumping or disposal of refuse or waste matter (except for green waste/composting facilities), fertilizer manufacturing plants, junkyards, public dumps, saw mills, refining of petroleum products, slaughterhouses, commercial pesticide and/or extermination facilities, and power plants." (Appendix B).

3.2 Potential Sources of Contaminants

Industrial-commercial and general industrial uses have potential contaminants associated with some of the allowed activities. Table 1 shows permitted uses and contaminants of concern that could potentially affect ground water if a release occurred. Excepted from Table 1 are permitted uses that the Petitioner has agreed to prohibit in the WHBP, as noted above. *The Handbook of Environmental Contaminants: A Guide for Site Assessment* by Chris L. Shineldecker was used to assess potential contaminants of concern and the specific chemicals associated with the permitted uses. Potential contaminants have been grouped in the interest of space; for example, "metals" is used to group potential contaminants lead, mercury, arsenic, etc., and "petroleum products" is used to group all petroleum products and their constituents, including semi-volatile and volatile organics. Appendix C contains a more detailed description of each type of potential contaminant.

In addition to addressing specific contaminants, non-point source pollution, e.g., from parking lot run-off and use of pesticides and fertilizers, is a concern. No storm drain system exists, and pollutants entrained in storm water will enter ground water and eventually enter the ocean unless BMPs are applied.

In the event that a specific use is proposed for WHBP that is not addressed in the PPP, the individual property owner(s) shall consult with the National Park Service to establish a set of BMPs appropriate for the proposed use and consistent with the goal of preventing any and all pollutants from being released into the environment (D&O Condition 3b, item iii (see last sentence of condition; reference Appendix B)). In the event that an individual property owner(s) wants to employ a BMP that has not been identified in the PPP due to, among other things, improvements in applicable technology, the individual property owner(s) shall consult with the National Park Service concerning the new or revised BMP and provide information demonstrating that the proposed BMP affords the same level of protection for the environment with the goal of preventing any and all pollutants from being released into the environment. In the event that an agreement between the National Park Service and the property owner(s) cannot be made within 12 months, the State Land Use Commission shall review the revised PPP or the proposed BMP amendment, along with written comments from the property owner(s), the National Park Service, and other parties and issue a final PPP or amendment (in compliance with D&O Condition 3b, item iii; see Appendix B).

Table 1. Permitted Uses and Associated Contaminants for Industrial-Commercial Mixed Use (MCX-20) and General Industrial (MG-1a) Districts

Permitted Use	MCX	MG	General Associated Contaminants of Concern*, **
Agricultural products processing, major & minor	√ (minor)	√	fertilizers, herbicides, insecticides, metals[M], pesticides, petroleum products, rodenticides, solvents
Amusement & recreation facilities, indoor	√		none +
Animal hospitals & animal quarantine stations		√	animal feeds, bacteria, cleaners, deodorants, detergents, drugs, germicides, pesticides, metals, soaps
Animal sales, stock, & feed yards		√	fungicides, insecticides, metals
Aquaculture activities & facilities		√	pharmaceuticals, water treatments and conditioners, lime, zeolites, fertilizers, hormones, dyes, organic pigments, algaecides, fungicides, parasiticides, disinfectants
Art galleries, museums	√		none +
Auto/truck storage facilities		√	petroleum products
Automobile body & fender		√	dewaxers, paint, solvents, phthalic anhydride
Automobile sales & rentals	√		petroleum fuels and oils, cleaners, detergents
Automobile service stations	√	√	abrasives, acids, adhesives, removers, alkalis, antifreeze, brake linings, cleaners, detergents, epoxy resins, flame retardants, metals, gasoline additives, hydraulic fluids, lubricants, oils, paint removers, paint thinners, transmission fluid, paints, rubber, solders, solvents, thinners, other petroleum products
Bakeries		√	none+
Bars and nightclubs	√	√	detergents, disinfectants, pesticides, soaps
Breweries, distilleries, & alcohol manufacturing		√	alcohols, bacteria, ethyl alcohol, hydrogen fluoride, hydrogen sulfide, metals, sulfur dioxide
Broadcasting stations	√	√	none +
Business services	√		none +
Car washing	√	√	detergents, soaps, cleaners, petroleum products
Catering establishments	√	√	detergents, disinfectants, soaps
Cemeteries and mausoleums	√	√	formaldehyde, metals
Churches/temples/ synagogues	√	√	none +
Cleaning & dyeing plants using only non-flammable hydrocarbons in sealed unit	√ (not dyeing)	√	Cleaning: alcohols, detergents, solvents, surfactants Dyeing: acetates, acids, alkalis, bleaches, coal tar products, detergents, dyes, gums, solvents
Commercial parking lots & garages	√	√	petroleum products
Community buildings	√	√	none +
Concrete or asphalt batching & mixing plants & yards		√	acids, Portland cement, petroleum products, solvents, tar
Contractor yards for storage, repair, or maintenance		√	adhesives and removers, herbicides, lubricants, petroleum products, paints, pitch, sealers, solvents, wood preservatives
Convenience stores	√		none +
Crematoriums		√	acids, alkalis, dioxins, metals, PCBs, tetrahydrofurans
Data processing facilities	√		none +
Day-care centers	√	√	none +
Fabricating establishments		√	Depends on product(s), but could include: adhesives, removers, duplicating fluids, ink removers, inks, rubber, cutting oils, grease, petroleum products, metals, solvents, paints, PCBs

Table 1 (continued). Permitted Uses and Associated Contaminants

Permitted Use	MCX	MG	General Associated Contaminants of Concern
Financial institutions	√	√	none +
Food manufacturing & processing facilities	√	√	bleaches, brine, dyes, enzymes, petroleum products, resins, salts, waxes
Freight movers		√	petroleum products, PCBs, metals
Greenhouses, plant nurseries		√	fertilizers, pesticides, bacteria, metals
Heavy equipment sales, service & rental		√	Could be similar to automotive sales and service, above
Home improvement centers	√	√	cleaners, detergents, paints, pesticides, metals, oils, resins, thinners, solvents, petroleum products
Kennels in sound attenuated buildings	√	√	Similar to animal hospitals, above
Laboratories, medical & research	√	√	benzidine, formaldehyde, solvents, BTEX compounds
Laundries		√	alkalis, bactericides, bleaches, brighteners, detergents, enzymes, fungicides, soaps, surfactants
Lava rock or stone cutting or shaping		√	dust, petroleum products
Lumberyards & building material yards		√	petroleum products, resins, tar and derivatives, metals, chlorinated compounds, creosote, acids, alkalis, bleaches, epoxy resins, fillers, glues, lacquers, paints, solvents, stains, varnishes
Machine, welding, sheet metal, & metal plating & treating establishments		√	antioxidants, cutting fluids and oils, germicides, lubricants, rust inhibitors, soluble oils, solvents, paints, petroleum products, metals, PCBs, abrasives, acids, alkalis, degreasers, detergents, cleaners, naphtha, soaps
Major outdoor amusement and recreation facilities		√	adhesives and removers, deodorants, oils, petroleum products, soaps, bacteria
Manufacturing, processing & packaging establishments, light and general	√ (light)	√	Depends on product(s), but could include wide range of petroleum products, metals, solvents, etc.
Medical clinics (including dentists)	√		adhesives and removers, antiseptics, detergents, disinfectants, drugs, mercury, rubber, soaps, stains, waxes, petroleum hydrocarbons
Meeting facilities	√		none +
Motion picture & TV production studios	√	√	none +
Offices	√		none +
Photographic processing	√	√	acids, alkalis, turpentine, acetates, silver, selenium
Plant nurseries	√		fertilizers, fungicides, pesticides, metals
Public uses and structures	√	√	none +
Publishing plants; duplicating processes	√	√	alkalis, glues, gums, metals, inks, lubricants, petroleum products, resins, solvents, varnishes
Recycling centers		√	waste residue, petroleum products, PCBs, plastics, metals
Reduction, refining, smelting or alloying of metals or ores		√	metals, petroleum products
Repair establishments, major & minor	√ (minor)	√	Depends on product(s), but could include range of petroleum products, metals, solvents, glues, adhesives, etc.
Restaurants	√	√	detergents, disinfectants, pesticides, soaps, food grease
Retail establishments	√		none +
Sales & service of machinery used in agricultural	√		Could be similar to automotive sales and service, above

Table 1 (continued). Permitted Uses and Associated Contaminants

Permitted Use	MCX	MG	General Associated Contaminants of Concern
Schools, business, photog., art, music, & dance	√		Depends on school, but could include adhesives, paint, paint thinners, acids, alkalis, turpentine, acetates, metals
Schools, vocational	√		Depends on type of school, e.g., automotive repair could include items listed above; woodworking could include acids, alkalis, bleaches, epoxy resins, fillers, glues, lacquers, paints, petroleum products, solvents, stains, varnishes
Self-storage facilities	√	√	none +
Storage and sale of seed, feed, fertilizer & other agricultural products		√	fertilizers, metals, pesticides, petroleum products, solvents, hydrazine and derivatives, nitrates, phosphoric acid, phosphorus, polybrominated biphenyls, PCBs
Storage, curing, tanning of raw, green, or salted hides or skins		√	acid, brine, dyes, oils, pancreatic extracts, petroleum products, solvents
Telecomm. antennas	√	√	none +
Temporary real estate offices	√	√	none +
Theaters	√		none +
Transportation & tour terminals		√	metals, paints, PCBs, petroleum products, solvents
Truck, freight & draying terminals		√	metals, paints, PCBs, petroleum products, solvents
Utility facilities, include.offices or yards for equipment, material, vehicle storage, repair or maintenance		√	Petroleum products, solvents, metals, transformer oils, PCBs
Utility substations	√	√	petroleum products, PCBs, metals
Veterinary establishments		√	Similar to animal hospitals, above
Warehousing	√	√	Depends on product(s) stored, but could include wide range of potentially hazardous materials
Wholesaling & distribution, incl. storage of incidental materials & equipment		√	Depends on product(s) wholesaled or distributed, but could include wide range of potentially hazardous materials

* Shineldecker, Chris L. (1992). *Handbook of Environmental Contaminants: A Guide for Site Assessment.* Lewis Publishers, Inc. Chelsea, MI.

** Specific chemicals associated with the contaminants of concern are given in Appendix C

M metals may include arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and/or zinc.

\+ no contaminants of concern referenced for this use, but facilities may have other contaminants, such as pesticides used on landscaping or storm water runoff from parking lots; each facility should assess their potential for additional contaminants.

@ petroleum products may include constituents such as BTEX (benzene, toluene, ethylbenzene and xylenes), and PAHs (polynuclear aromatic hydrocarbons). See Appendix C for detailed definition.

4.0 REQUIREMENTS OF APPLICABLE REGULATIONS

4.1 Overview and Use of This Section

The applicable environmental regulations for the substances shown in Table 1 are summarized in this section. Potential contaminants that might originate from WHBP can be categorized into four main groups: petroleum compounds; hazardous materials/wastes (including heavy metals), agricultural/landscaping chemicals, and storm water runoff.

Facility owners/operators should evaluate the use or generation of potential contaminants. If such substances are of concern at their facility, the owner/operator should refer to the applicable regulations for complete information.

4.2 Petroleum Products

4.2.1 Underground Storage Tanks

The storage of petroleum in underground tanks is strictly regulated by the State Department of Health (DOH) and the Federal Environmental Protection Agency (EPA). As part of its seeking delegation of its underground storage tank (UST) program from EPA, DOH has adopted State UST rules (Hawai`i Administrative Rules (HAR) §11-281). Portions of HAR §11-281 are attached in Appendix D.

A permit is required for installation of USTs in Hawai`i. The Application for an Underground Storage Tank Permit is attached in Appendix D. Once the USTs are installed, a completed Certificate of Underground Storage Tank Installation (also contained in Appendix D) must be submitted to DOH's Underground Storage Tank Section. Several types of USTs are exempted from State and Federal regulation by definition; the rules should be checked for the terms of such exemptions. This information may be found by referring to the definition of "underground storage tank" and to the section on UST "applicability". Examples of tanks not included in the definition of UST are: certain farm and residential tanks; tanks used for storing heating oil for use only on the premises; and tanks situated in an underground area such as a basement but situated on or above the floor surface. Examples of tanks that meet the definition of UST but are exempt from the rules include those with maximum capacity of 110 gallons or less; and those used as an emergency spill or overflow system that are expeditiously emptied after use.

The rules contain requirements for performance standards for USTs; installation of USTs; notifications and permits; spill and overflow control; release detection; release reporting, investigation and confirmation; release response action; and closure. These standards have been designed to protect the environment from releases from USTs. The following requirements were extracted from the applicable regulations, but the applicable State and Federal regulations must be consulted for the complete requirements:

- Tank requirements

  Each UST must be properly designed, constructed and installed, and any portion underground that routinely contains product must be protected from corrosion. The regulations give the corrosion protection standard and examples of corrosion protection methods, such as constructing the tank of fiberglass-reinforced plastic, cathodically protected steel, or steel-fiberglass-reinforced plastic composite.

- Piping requirements

  The piping that routinely contains regulated substances and is in contact with the ground must be properly designed, constructed, and protected from corrosion. The regulations give the corrosion protection standard and examples of corrosion protection methods, such as constructing the piping of fiberglass-reinforced plastic, or cathodically protected steel.

- Spill and overfill protection

  To prevent spilling and overfilling associated with product transfer to a UST or tank system, owners and operators of tanks filled by transfers of more than 25 gallons at one time must use both spill and overfill prevention equipment. Spill prevention equipment must prevent release of product to the environment when the transfer hose is detached from the fill pipe. Overfill prevention equipment must automatically shut off flow into the UST or trigger a high-level alarm when the UST reaches certain fill percentages. Spill and overfill prevention methods that rely on the use of alarms must have the alarms clearly labeled and located where the delivery person can clearly see or hear the alarm in order to immediately stop delivery of the product.

- Installation

  All USTs and piping must be properly installed to prevent damage that may result in releases. Owners/operators must ensure that the installation is appropriately certified, tested, or inspected. Certification, testing, and inspection requirements are specified in the regulations.

- Permits

  DOH has a number of permit requirements for installation and operation of USTs; copies of the most recent version (June, 1999) **"Application for an Underground Storage Tank Permit"** and **"Certification of Underground Storage Tank Installation"** are attached in Appendix D. Other permit requirements are specified in the regulations.

- Secondary Containment

  Secondary containment systems must be designed, constructed, and installed to contain regulated substances released from the UST or tank system until they are detected and removed; prevent the release of regulated substances to the environment at any time during the operational life of the UST or tank system; and provide release detection so that the system can be checked for evidence of a release at least every thirty calendar days. Secondary containment may consist of double-walled USTs or external liners; requirements for these containment methods are contained in the regulations.

  Underground piping must also be equipped with secondary containment (e.g., trench liners, double-walled pipes, etc.). In addition, pressurized piping must be equipped with an automatic line leak detector.

- Release Detection

  Owners/operators of new USTs or tank systems must provide release detection that can detect a release from any portion of the UST and connected underground piping. Release detection must be installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions, including routine maintenance and service checks for operability (every twelve months or in a timeframe specified by the manufacturer). Release detection methods must meet specific performance requirements for tanks and for piping, as specified in the regulations.

  Tanks must be monitored at least every thirty days for releases using automatic tank gauging; vapor monitoring; interstitial monitoring; or other methods that meet DOH's performance criteria. **Groundwater monitoring, described as a release detection method in the HAR, cannot be used as a release detection method at this site** because the ground water is more than twenty feet from the ground surface.

  Piping must also be monitored. A test every twelve months of the operation of the piping leak detector must be conducted in accordance with the manufacturer's requirements.

- Release Detection Recordkeeping

  Owners/operators of USTs or tank systems must keep and maintain records demonstrating compliance with all applicable release detection requirements. The records must be kept at least one year, unless otherwise specified; requirements are contained in the regulations.

  Owners/operators of USTs or tank systems must notify the DOH within 24 hours if a release is suspected or known. Additionally, this PPP requires notification to the National Park Service at the time DOH is notified.

- Release Response

Upon confirmation of a release, or after a release from the UST or tank system is identified in any other manner, owners and operators must perform the following immediate response actions within 24 hours following the confirmation:

(1) Report the release to the department (e.g., by telephone or fax);
(2) Identify and mitigate any safety hazards (such as fire, explosion, and vapor hazards) posed by the release of the regulated substance;
(3) Take necessary actions to prevent any further release of the regulated substance into the environment, including removal of as much of the regulated substance from the UST or tank system as possible; and
(4) Take necessary action to minimize the spread of contamination.

This PPP also requires that the National Park Service is notified of the release at the same time the DOH is notified.

Owners/operators must submit to the DOH a **written notice of confirmation within seven days**. The notice shall include the source of the release; method of discovery and confirmation; estimated quantity and type of substance released; immediate hazards; release impact; migration pathways; and actions taken. Other information may be requested by DOH. **This PPP also requires that a copy of any such notice is sent to the National Park Service within the same time frame.**

After a release has been confirmed, owners/operators must perform **initial release abatement and control measures within 90 days** of confirmation of a release or sooner if directed by the DOH. Abatement and control measures are detailed in the regulations.

While carrying out the above release response actions, owners and operators must concurrently assemble information about the characteristics of the site and the nature of the release in order to adequately assess the impact or potential impact the release has on human health and the environment.

At sites where investigations indicate the presence of free product, owners and operators must remove free product to the maximum extent practicable, as determined by the DOH, while continuing, as necessary, other release response actions. Owners/operators shall initiate **free product removal as soon as practicable but no later than 90 days following confirmation** of a release or sooner if directed by the DOH. Requirements for free product removal are detailed in the regulations.

For confirmed releases, owners/operators must determine the extent and location of the soil contaminated by the release and the presence and concentrations of dissolved product contamination in the ground water and must conduct investigations of the release, the release site, and the surrounding area possibly

affected by the release. Owners/operators must remediate soil, water, and materials contaminated by releases from USTs or tank systems in a manner that is protective of human health and the environment and achieves cleanup satisfactory to DOH.

The DOH may require that the owner/operator submit a written **corrective action plan** for responding to a release, if the release poses, among other criteria, a **probable adverse impact to natural resources**. The PPP **adds a requirement that a corrective action plan must be prepared for each release and submitted to the National Park Service.**

No later than 90 days following the confirmation of a release, owners and operators must submit to DOH a **written report describing all release response actions taken during the first ninety-day period following the release; and a plan for future release response actions**. Beginning 180 days following confirmation of a release, owners/operators must submit **written quarterly progress reports** (unless response actions have met the requirements of DOH and a final quarterly report has been submitted). **This PPP also requires copies of the reports to be submitted to the National Park Service concurrently with the submittals to DOH.**

- Tank Closure

The regulations provide guidance for closure of tanks that are not in service, to prevent releases from such tanks. Owners/operators must perform a site assessment in permanently closing or changing the service of an UST or tank system. Before permanent closure or a change-in-service is completed, owners and operators must measure for the presence of a release of regulated substance where contamination is most likely to be present at the UST or tank system site.

4.2.2 Bulk Storage Facilities

Facilities that store petroleum in the industrial park could also be subject to EPA Clean Water Act regulations, since they could "discharge oil in harmful quantities into or upon navigable waters or adjoining shorelines". Preparation and implementation of a Spill Prevention Control and Countermeasure (SPCC) plan, designed to prevent discharge of oil to navigable waters and adjacent shorelines, is described in Code of Federal Regulations (CFR) Title 40, Part 112 (portions contained in Appendix E). The SPCC Plan (the Plan) must be prepared and implemented for oil storage facilities that meet the following:

1. The underground buried storage capacity of the facility is greater than 42,000 gallons; or
2. The total above ground storage capacity of the facility is greater than 1,320 gallons.

SPCC-regulated facilities are also required to submit information after having 2 discharges (over 42 gallons) in any 12-month period or a single discharge of more than 1,000 gallons. Prior to the installation of above-ground or underground storage tanks, the applicable State and Federal regulations must be consulted for the complete requirements.

Note that, in addition to the regulations imposed by the EPA for SPCC-regulated facilities, Section 4.2.3 of this PPP requires certain BMPs for facilities that store certain petroleum products in individual containers having a volume greater than 5 gallons, and Section 5.2.3 imposes certain notification requirements for releases of more than 5 gallons of petroleum products to the environment.

40 CFR §112.7 contains guidelines for the preparation and implementation of a SPCC Plan (Appendix E), as well as for monitoring and employee training. The following information was extracted from applicable Federal regulations, but the applicable regulations must be consulted for the complete requirements:

- Preparation of the SPCC Plan

  The Plan must be prepared within six months after the date a regulated facility begins operations and must be fully implemented not later than one year after a facility begins operations. The Plan must be reviewed and certified by a Registered Professional Engineer. A complete copy of the Plan must be maintained at the facility if the facility is normally attended at least 8 hours per day, or at the nearest field office if the facility is not so attended.

  Owners/operators must amend the Plan whenever there is a change in facility design, construction, operation or maintenance that materially affects the facility's potential for the discharge of oil. Such amendments must be made as soon as possible, but no later than six months after such change occurs. Amendments must be certified by a Professional Engineer.

  Owners/operators must review and evaluate the Plan at least once every three years. As a result of the review and evaluation, the owner/operator will amend the Plan within six months of the review to include more effective prevention and control technology if (1) such technology will significantly reduce the likelihood of a spill event from the facility, and (2) if such technology has been field-proven at the time of the review. Amendments must be certified by a Professional Engineer.

- Elements of the SPCC Plan

  The Plan must contain the following information:

  (1) Description of spills, corrective action taken and plans for preventing recurrence;
  (2) A prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of equipment failures.
  (3) Appropriate containment and/or diversionary structures or equipment to prevent discharged oil from reaching a navigable water course.

  Sections of the Plan should include a complete discussion of conformance with the regulatory guidelines for facility drainage; bulk storage tanks; facility transfer

operations, pumping, and in-plant processes; facility tank truck loading/ unloading racks; and security measures.

The Plan should specify requirements for inspections and record-keeping. Inspections should be in accordance with written procedures developed for the facility by the owner/operator. These written procedures and a record of the inspections, signed by the appropriate supervisor or inspector, should be made part of the Plan and maintained for a period of three years.

The Plan should specify requirements for personnel training and spill prevention procedures. Owners/operators are responsible for properly instructing their personnel in the operation and maintenance of equipment to prevent the discharges of oil and applicable pollution control laws, rules and regulations. Each applicable facility should have a designated person who is accountable for oil spill prevention and who reports to line management. Owners/operators should schedule and conduct spill prevention briefings for their operating personnel at intervals frequent enough to assure adequate understanding of the Plan for that facility. Such briefings should highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

4.2.3 Other Petroleum Storage Facilities

Facilities that store petroleum but are not subject to UST or SPCC regulations, described in Sections 4.2.1 and 4.2.2, are still required by this PPP to employ BMPs to ensure that petroleum is not released to the environment, as described in Section 5.2.3 of this PPP. Petroleum products contained solely in consumer products packaged for distribution to, and use by, the general public; or commercial products used at the facility solely for janitorial or minor maintenance purposes, such as paint thinner, are excluded from the BMP requirements. However, secondary containment shall be provided where petroleum based consumer products for sale to the general public or commercial products for janitorial or maintenance use on a premises are packaged in individual containers having a volume greater than 5 gallons. Releases to the environment not reportable under the UST or SPCC regulations require cleanup and must be reported to the National Park Service if they are greater than 5 gallons.

4.2.4 Vehicle or Equipment Washing Facilities

Mechanized vehicle or equipment washing facilities may introduce petroleum products into the resulting wash water. Such facilities are restricted by the County Planning Department from allowing water runoff onto adjacent properties or public rights-of-way. **This PPP further restricts effluent from washing activities from co-mingling with storm water. Effluent from washing activities is not permitted to run off the site.**

Vehicle and equipment washing facilities will be required to recycle their water, or alternatively, they will be able to discharge water to an injection well or wastewater system with potential pretreatment requirements, such as an oil/water separator. Facilities are required to use non-phosphate soap. D&O Conditions 2b through 2h describe special requirements for

the use of injections wells for this project (Appendix B). The full D&O requirements for injection wells are also listed in Section 4.5.2 Injection Wells.

Vehicle washing facilities that discharge water to injection wells or to private or public wastewater systems may have pretreatment requirements, such as oil/water separation, imposed by the system manufacturer or public works authority. Oil/water separators are required on WHBP when petroleum products are in use (D&O Condition 2h, Appendix B).

While use of oil/water separators is not subject to specific environmental regulations, i.e., a separator is not regulated as a tank, owners/operators must ensure that the oil/water separator is adequately maintained so that petroleum products are not released from the separator into the ground. Oil water separators are further discussed in Section 5.0.

4.2.5 Maintenance and Other Activities Utilizing Petroleum Products

The DOH publishes guidance addressing handling and disposition of vehicle fluids, such as battery acid, used motor oil, etc., and for recycling of solvents. DOH guidance should be consulted by owners/operators who handle or dispose of such materials (see Appendix F).

4.2.6 Parking Areas

Parking areas are a potential source of petroleum contamination of storm water runoff. The PPP requires specific actions related to parking areas, as described in Section 5.2.6.

4.3 Other Hazardous Substances/Waste

Many of the potential contaminants (identified in Table 1), such as metals and other potential contaminants not specifically discussed in this PPP, are hazardous substances and could be classified as hazardous wastes if they become wastes. While there are no regulations governing hazardous materials, the EPA suggests good housekeeping methods to prevent the release of such materials. **This PPP requires good housekeeping methods to protect the National Park's water resources. The pertinent hazardous materials handling procedures are given in section 5.3.**

Generators and transporters of hazardous waste are regulated under the federal Resource Conservation and Recovery Act (RCRA). The State's hazardous waste rules are similar to those under the federal RCRA program. All wastes defined as "hazardous" are regulated under HAR §11-260 to §11-279. Hazardous waste is defined to include all solid wastes or combination of solid wastes which may (1) cause or significantly contribute to an increase in mortality or an increase in a serious or irreversible or incapacitating reversible illness, or (2) pose a substantial existing or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. HAR §11-261 further identifies the characteristics of hazardous waste.

The rules establish standards applicable to generators, transporters, treatment, storage or disposal facilities, and persons who deal with hazardous waste fuel. The standards include operating practices, record keeping requirements, corrective action

plans and other standards. In the event of a hazardous waste release from a facility that handles hazardous wastes, the facility is required to take response actions, including corrective measures that are necessary to protect human health or the environment.

Portions of the State regulations concerning hazardous waste generators are contained in Appendix F. Applicable State and Federal regulations must be referenced prior to any hazardous waste activities. The regulations largely consist of requirements for tracking, containerizing, and monitoring of hazardous wastes. The following practices were extracted from regulations for generators of hazardous wastes:

- <u>Waste activity</u>

  An owner/operator must not generate, transport, or offer for transportation, hazardous waste without having received an EPA identification number, using EPA form 8700-12 "Notification of Regulated Waste Activity" (Appendix F).

  The regulations contain limits regarding accumulation times and quantities. Facilities that exceed these limits may be considered storage or treatment facilities, triggering a number of additional requirements.

  A number of other regulations regarding transportation and manifesting requirements for generators of hazardous waste are described in HAR §11-262. **Before transporting hazardous waste or offering hazardous waste for transportation off-site, a generator must package, label, and mark the waste according to applicable Department of Transportation (DOT) regulations.**

  Under some circumstances, the generator must have available at least one employee either on the premises or on call (i.e., available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures. The generator must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relevant to their responsibilities during normal facility operations and emergencies. The emergency coordinator or designee must respond to any emergencies that arise.

  The following actions are applicable to generators responding to an emergency situation:

  (1) **In the event of a fire, call the fire department or attempt to extinguish it using a fire extinguisher;**

  (2) **In the event of a spill, contain the flow of hazardous waste to the extent possible, and as soon as is practicable, clean up the hazardous waste and any contaminated materials or soil;**

  (3) **In the event of a fire, explosion, or other release** which could threaten human health outside the facility or when the generator has knowledge that a spill has reached surface water or ground water, **the generator must immediately notify the federal National Response Center** (using their 24-

hour toll free number 800/424-8802) **and the Hawai`i Department of Health's Hazard Evaluation and Emergency Response Office** via the State Hospital at (808) 247-2191 after business hours or directly at (808) 586-4249 during business hours. The report must include the following information:

(a) The name, address, and U.S. EPA identification number of the generator;
(b) Date, time, and type of incident (e.g., spill or fire);
(c) Quantity and type of hazardous waste involved in the incident;
(d) Extent of injuries, if any; and
(e) Estimated quantity and disposition of recovered materials, if any.

(4) **This PPP also requires that the National Park Service Dispatch at 985-6170 is notified of the release at the same time the DOH is notified.**

Transportation of hazardous materials is regulated under HAR §11-263 (Hazardous Waste Management; Standards Applicable to Transporters of Hazardous Waste) and federal Department of Transportation Regulations: 49 CFR, Subchapter C - Hazardous Materials Regulations (Parts 171-177). The regulations describe the reporting, packaging, marking, labeling, and transport requirements for hazardous materials.

4.4 Agricultural/Landscaping Chemicals

Owners/operators must be aware that chemicals used in landscaping have a potential to pollute ground water through infiltration and/or pollute coastal waters through runoff. D&O Condition 3e states that only the minimum required nutrients (fertilizer) to maintain the vegetation, without causing significant nutrient runoff, may be applied (see Appendix B).

Since this source of pollution does not come from a single point, it falls under the classification of "nonpoint source pollution", or "polluted runoff". The State of Hawai`i has established two programs to coordinate efforts to reduce and control non-point source pollution. One program is administered by DOH's Polluted Runoff Control Program, which implements Section 319 of the Federal Water Pollution Control Act (also known as the Clean Water Act). Under this program, the DOH produced *Hawai`i's Nonpoint Source Water Pollution Management Plan* in 1990, and updated it in 1999. The other program is controlled by the Department of Business Economic Development and Tourism (DBEDT), Office of Planning's Coastal Zone Management (CZM), and administers Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA). This program produced the *Hawai`i CNPCP* [Coastal Nonpoint Pollution Control Program] *Management Plan* in 1996. In an effort to integrate the work of the two programs, the state has established a single plan entitled *Hawai`i's Implementation Plan for Polluted Runoff Control*, produced in 2000. The Implementation Plan includes a section on Pollution Prevention Management Measures to address nonpoint source pollutant loadings for urban areas, including lawn and garden activities, including the application and disposal of lawn and garden care products. At this time, the Implementation Plan does not include BMPs for lawn and garden care, but **the PPP provides landscaping BMPs in Section 5.4,** including Table 4 and Figures 3 and 4 related to storm water management (Condition 3e, Appendix B).

Pesticides are regulated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The licensing, sale and use of pesticides in Hawai`i are governed by the Hawai`i Pesticides Law. Although the Federal FIFRA places ultimate supervisory responsibility for uniform control of pesticides with the EPA, the State may regulate the sale or use of pesticide used intra-state and may regulate the sale or use of pesticides which are not prohibited by FIFRA. The Hawai`i Department of Agriculture (DOA) is responsible for the administration of the Pesticide Law, under HAR §4-66, "Pesticides" (Table of Contents contained in Appendix G).

Three main characteristics can greatly affect a pesticide potential to contaminate surface or ground water. They are solubility, absorption and breakdown rate.

1) Solubility

Solubility is the ability of a pesticide to dissolve in water. The greater the solubility, the greater the chance that the chemical will leach to ground water.

2) Absorption

Absorption is the inherent ability of a pesticide to bind with soil. Some pesticides stick very tightly to soil while others are easily dislodged. A greater absorption means a pesticide will remain longer in the soil and thus be less likely to leach down into the ground water before it has degraded. Absorption increases as soil organic matter increases.

3) Breakdown Rate

Breakdown rate or half-life is the time a pesticide takes to degrade or breakdown into other chemical forms. Pesticides that do not break down quickly can be hazardous if they move to ground water or surface water.

In a given situation, pesticides with the highest water solubilities, greatest persistence, lowest affinities for absorption to organic matter and other soil components, and highest application rates have the greatest potential for movement in surface water or to ground water. An alternative means of minimizing the potential movement of a pesticide is to select a non-broadcast application technique for the same pesticide that reduces the amount of the chemical applied directly to the soil.

Proper pesticide management practices make efficient use of chemical while preventing contamination of surface water or ground water. Residues of pesticides used in forestry can affect water quality at several phases of the chemical use cycle. These phases are:

- transportation;
- storage;
- mixing and loading;
- application;
- cleanup; and
- disposal.

Pesticides that are received, used, sold, offered for sale or distributed within Hawai`i must be licensed by the Board of Agriculture (Board). The application for the license must contain a description of the pesticide, a copy of the labeling, claims made for the pesticide including directions for use and information about the license. Any pesticide that is sold, distributed or transported in violation of the Pesticides Law or rules may be seized.

Pesticides must be used and applied in a manner consistent with their labeling, or at a concentration, frequency or dosage less than that specified on the labeling. Pesticide containers must be stored, transported and discarded in a manner that does not have unreasonable adverse effects on the environment. The applicable State and Federal regulations must be further consulted for requirements concerning pesticides and storage of pesticides.

Excess of nutrients in water bodies can cause eutrophication, or algal blooms, upsetting the delicate balance of the ecosystem. Two potential sources of nutrient pollution to water resources in the National Park from landscaping are applying more fertilizer than plants can use, and improperly disposing of glass cleanings, clippings, prunings, or fruits. Although the State does not have comprehensive BMPs for lawn and yard care, the College of Tropical Agriculture and Human Resources (CTAHR) at the University of Hawai`i has published documents with information on fertilizer management. The major nutrients in "complete" fertilizers are nitrogen, phosphorous, and potassium. Use of such complete fertilizers may result in over-application of one or more of the nutrients. More effective is application of single-nutrient fertilizers based on vegetation needs and soil analysis. The D&O Condition 3e provides requirements related to application of nutrients (Appendix B).

4.5 Storm Water

If owners/operators store, transport or generate hazardous substances, these could be carried along with storm water runoff into the ground water and could eventually enter the ocean. Storm water runoff that exits facilities as sheet flow may be subject to National Pollutant Discharge Elimination System (NPDES) permit requirements (HAR 11-55, Water Pollution Control – Appendix H). Storm water that is disposed of in dry wells (injection wells) is subject to the regulations of HAR 11-23 (Injection Control – Appendix I).

4.5.1 Storm Water Runoff

Depending on their Standard Industrial Classification (SIC) Code, some facilities may be required to apply for National Pollutant Discharge Elimination System (NPDES) permits for discharge of storm water runoff. A comprehensive list of facilities subject to NPDES permitting requirements (including their SIC codes) is included in Appendix H (see EPA Fact Sheet listing industrial facilities subject to NPDES permitting).

The following are general guidelines regarding NPDES permitting, excerpted from 40 CFR §122.26:

- **Applicability**

Storm water discharges associated with certain industrial activities are required to apply for NPDES permits. This includes, but is not limited to "storm water discharges from industrial plant yards; access roads used to carry off raw materials, manufactured products, waste materials, or by-products; material handling sites; refuse sites; sites used for storage, residual treatment, or disposal; shipping and receiving areas," etc. (see EPA Fact Sheet, Appendix H).

- **Application requirements**
  Dischargers are required to apply for permits should the runoff be diverted to another facility. Although the State Department of Health Clean Water Branch has jurisdiction over the NPDES permit program in Hawaii, the waters below the WHBP are classified as Class AA, and an individual permit application is required. For discharges composed entirely of storm water runoff, owners/operators must submit Form 3510-1 and Form 3510-2F (Appendix H). As part of the NPDES permitting process, a variety of information will be required, such as: site maps indicating ground coverage, drainage, areas containing hazardous wastes, locations of injection wells; BMPs; estimates of the areas of impervious surfaces and total drainage area; expected amounts of contaminants; method of collection and pre-treatment, etc.

- **Group application for discharges**
  In general, each tenant that is required to apply for an NPDES permit will need to submit his own application. However, depending on the variety of hazardous wastes uses at the site, "in lieu of individual applications, a group application may be filed by an entity representing a group of applicants... where such groupings are *sufficiently similar* as to be appropriate for general permit coverage."

- **No exposure exclusion**
  If there is "no exposure of industrial materials and activities to rain, snow, and/or runoff," due to the presence of storm shelters, appropriate grading, curbing, air-borne containment controls, etc., tenants may apply for a "no exposure exclusion". In this context, "industrial materials and activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, immediate products, by-products, final products, or waste products. Appendix H contains the EPA's *"Storm Water Phase II Final Rule, Conditional No Exposure Exclusion for Industrial Activity"* guidelines, which can assist tenants in determining whether they qualify for the no exposure exclusion. Note that the exclusion is conditional and requires, among other things, periodic renewal, and that facilities be available for inspection by governing agencies. DOH's "No Exposure" Certification Form is also contained in Appendix H.

Detailed guidelines, examples, checklists and fact sheets related to the NPDES permitting process can be found on the EPA's web site at:
http://cfpub1.epa.gov/npdes/pubs.cfm?program_id=6.

The State of Hawai'i also maintains a website related to NPDES permitting that includes, among other things, all of the necessary forms for applying for a permit, at:

http://www.Hawai`i.gov/health/environmental/water/cleanwater/index.html

In addition to the State's NPDES requirements, several of the D&O Conditions specifically address non-point source pollution from storm and surface water runoff. D&O Condition 2a states:

- To the extent possible, all storm and surface water runoff shall be captured on the premises. To the extent possible, all runoff entering the ground shall be first treated to remove all industrial waste so that no industrial pollutants will reach [the Kaloko-Honokohau National Historical Park] or enter the water table. Petitioner shall be subject to and prepare covenants, conditions, and restrictions for the Petition Area and each lot into which the Petition Area may be subdivided, to contain spills and prevent materials associated with industrial uses attributable to the operations of the Property, including petroleum products, chemicals, or other pollutants from leaching or draining into the ground or subsurface storm drain collection areas. Said covenants shall be subject to consultation with the NPS, and the County of Hawai`i. The Petitioner and/or tenant shall obtain all required permits and construct required improvements for storm water discharge on and from the Property (Condition 2a).
- Prior to the occupancy of any part of the Petition area, the Petitioner shall engineer, construct (or require to be constructed) and maintain surface water/storm water containment systems that ensure no Federal, State or County water quality standards will be violated (Condition 2b).

4.5.2 Injection Wells

Injection wells are regulated under the Safe Drinking Water Act and, in Hawai`i, are administered by the State's Safe Drinking Water Branch (SDWB) under HAR §11-23, "Underground Injection Control" (portions contained in Appendix I). The State's underground injection control (UIC) program establishes standards that govern the location, construction, and operation of injection wells so that the injected fluids do not migrate or pollute ground water.

Injection wells are categorized by the State by the type of fluids that are injected into the well and by the aquifer characteristics. According to DOH's UIC Map for Keahole Point quadrant (DOH, 1983), the site is located below the UIC line and, therefore, the underlying aquifer is "exempt". Injection wells disposing of only storm water runoff are classified as Subclass C wells.

UIC regulations consist of certain practices for construction and operation of the injection well, designed to protect ground water from contaminated injection well effluent. **Prior to the installation of injection wells, the applicable State and Federal regulations must be consulted for the complete requirements. In addition, the requirements of the D&O Conditions 2b through 2h, pertaining to injections wells, must be met** (see Appendix B). Permits are required to construct, operate, modify or abandon

an injection well or wells. Pursuant to the provisions of HAR §11-23, DOH may grant an exemption for the operation of a Subclass C storm water drainage well upon reviewing the information contained in the permit application and obtained during construction and testing of a percentage of the wells. Current (June 2008) permit applications are contained in Appendix I.

Injection Well Construction

An injection well shall be designed for its intended use, in accordance with good engineering practices, as required by DOH Rules in HAR 11-23.

The D&O further states:

- No injection well shall be constructed as an element of a surface water/storm water containment system in the Petition Area unless, prior to the start of any construction, appropriate requirements of HAR §11-23 are satisfied and the Hawai`i Department of Health issues an UIC (Underground Injection Control) permit. **Contaminants shall be monitored and removed with best efforts prior to entering injection wells.** Monitoring protocols for injection wells shall be established in the Pollution Prevention Plan, pursuant to Condition 3b. All monitoring records shall be maintained and made available to the DOH, the County and the National Park Service, upon request (Condition 2c).

- If a large void, such as a lava tube or solution cavity, is encountered during drilling, where the drill rod drops more than three feet, measures shall be taken to prevent migration of the injected fluids to [the Kaloko-Honokohau National Historical Park] to the satisfaction of the Hawai`i Department of Health as described in HAR §11-23-09(f) (Condition 2d).

Injection Well Monitoring and Reporting

The D&O states:

- All injection wells established in the Petition Area shall be operated in such a manner that they do not violate any of the DOH's administrative rules under title 11 HAR, regulating various aspects of water quality and pollution, and chapters 342-B, 342-D, 342-F, 342-H, 342-J, 342-L, and 342-N, Hawai`i Revised Statutes (HRS). Relevant HAR includes but, are not limited to:
  - i. Chapter 11-20, "Rules Relating to Potable Water Systems"
  - ii. Chapter 11-62, "Wastewater Systems"; and
  - iii. Chapter 11-55, "Water Pollution Control"

  (Condition 2e).

- The operator of any injection well or wells in the Petition Area shall keep detailed records of the operation of the well or wells, including, but not limited to, the type and quantity of injected fluids, and the method and rate of injection for each well. Such records will be available for inspection or review by the Hawai`i DOH as specified under appropriate sections of HAR §11-28 (Condition 2f).

- In addition, the quality of the injected fluids shall be monitored as prescribed by the UIC permit. Injectate quality monitoring protocol will depend somewhat on the type of facility and injection well. The injection well owner/operator shall determine an appropriate method for obtaining an injectate sample at the frequency required by the UIC permit. The sample shall be collected in sample containers appropriate for the tests prescribed by the UIC permit. Standards for the UIC permit program shall be followed for chain-of-custody procedures, holding times, field and laboratory QA/QC, and laboratory selection.

- Any person who violates any of these conditions shall be subject to penalties as prescribed in appropriate chapters of HRS and HAR as they relate to but, not limited to: Potable Water Systems; Wastewater Systems; Water Pollution Control; Safe Drinking Water, and Underground Injection Control (Condition 2g).

Injection Well Plugging and Abandonment

The DOH requires an abandoned well to be plugged in a manner which will not allow detrimental movement of fluids between formations. Plugging may be performed by grouting with the tremie method or by some other method acceptable to the DOH. The DOH may order an injection well to be plugged and abandoned when it no longer performs its intended purpose, or when it is determined to be a threat to the ground water resource. Requirements for plugging and abandonment of a well are found in HAR 11-23.

Injection Well Signage

The D&O states:

- The petitioner, its successors or individual lot owners shall provide signage for all drainage/injection wells ... with warnings such as the following: DUMP NO WASTES. GOES TO GROUNDWATER AND OCEAN. HELP PROTECT HAWAII'S ENVIRONMENT. Signage shall be either stand-up (legible from at least 30 feet, permanently posted at an effective and safe height) or painted on the ground next to the drainage well's inlet. (Condition 3c)

5.0 BEST MANAGEMENT PRACTICES

5.1 Overview and Use of This Section

BMPs are measures or controls that are used to prevent pollution from being discharged to receiving waters, i.e., storm water or surface water. BMPs may be structural, such as berms or oil/water separators; procedural, such as training in spill response procedures; or administrative, such as record keeping.

The majority of BMPs are designed to prevent contamination of storm water by point source or non-point source pollution. However, a number of BMPs are also stipulated by regulations for petroleum handling, including storage tanks; hazardous wastes; and pesticides. Certain BMPs are stipulated by the D&O (Conditions 3a through 3e; see Appendix B). The D&O states that "[a]ny further public or private industrial development within the Petition Area which could be considered a new source of pollution or an increased source of pollution shall, in its initial project design and subsequent construction, provide the highest and best degree of waste treatment practicable under existing technology" (Condition 3a).

D&O Condition 3b requires that, except for certain operations and construction activities (see Section 2.0 herein), the PPP designate BMPs tailored to each specific use. Condition 3b further states that emphasis shall be given to structural BMPs to prevent any and all pollutants that may be associated with such industries from being released into the environment, including reaching the ground water. Structural BMPs are to include, but not be limited to, oil/water separators, detention ponds, lined containment pits, and storm water filtration units designed to contain and remove industrial contamination.

BMPs are discussed below, organized by specific use and contaminant type. Table 2 matches specific uses to potential pollutants and BMPs. Facility owners/operators should assess potential pollutants from their facilities and refer to the appropriate sections for descriptions of relevant BMPs. Businesses other than those listed specifically in Table 2 may also use petroleum products, hazardous materials or pesticides, or may contribute storm water flow, and are subject to the same required BMPs as those listed in this section.

5.2 Petroleum Products

5.2.1 Underground Storage Tanks

There are few BMPs associated with USTs, since strict regulations govern every aspect of construction and operation of USTs, limiting the need for BMPs. However, the regulations have some requirements that are essentially BMPs, such as the use of spill catchment basins to fulfill spill prevention requirements. Owners/operators must:

Structural BMPs:

- Use double containment.
- Install spill and overflow protection.

Procedural BMPs:

- Discourage topping off of fuel tanks.

Table 2. Permitted Uses and BMP Requirements

Permitted Use	MCX	MG	Petroleum Products				Hazardous Substances/Wastes	Pesticides	Stormwater**
			USTs	Bulk Storage	Vehicle Washing	Maintenance			
Agricultural products processing, major & minor	√ (minor)	√	√	√	√	√	√	√	√
Amusement & recreation facilities, indoor	√					√			√
Animal hospitals & animal quarantine stations		√					√	√	√
Animal sales, stock, & feed yards		√					√	√	√
Aquaculture activities & facilities		√					√	√	√
Art galleries, museums	√								√
Auto/truck storage facilities		√	√	√	√	√	√		√
Automobile body & fender establishments		√	√	√	√	√	√		√
Automobile sales & rentals	√		√	√	√	√	√		√
Automobile service stations	√	√	√	√	√	√	√		√
Bakeries		√							√
Bars & nightclubs	√	√					√	√	√
Breweries, distilleries, & alcohol manufacturing		√					√		√
Broadcasting stations	√	√							√
Business services	√								√
Car washing	√	√	√	√	√	√	√		√
Catering establishments	√	√					√		√
Cemeteries & mausoleums	√	√							√
Churches, temples, & synagogues	√	√							√
Cleaning and dyeing plants using only non- flammable hydrocarbons in a sealed unit as the cleaning agent	√ (not dyeing)	√					√		√
Commercial parking lots and garages	√	√			√	√	√		√
Community buildings	√	√							√
Concrete or asphalt batching and mixing plants & yards		√	√	√	√	√	√		√
Contractors' yards for storage, repair, or maintenance		√	√	√	√	√	√		√
Convenience stores	√								√
Crematoriums		√					√		√
Data processing facilities	√								√
Day-care centers	√	√							√
Fabricating establishments		√	√	√	√	√	√	√	√
Financial institutions	√	√							√
Food manufacturing & processing facilities	√	√	√	√	√	√	√		√
Freight movers		√			√	√	√		√
Greenhouses, plant nurseries		√					√	√	√
Heavy equipment sales, service & rental		√	√	√	√	√	√		√
Home improvement centers	√	√					√	√	√
Kennels in sound attenuated buildings	√	√					√	√	√
Laboratories, medical & research	√	√					√		√
Laundries		√					√		√
Relevant Regulatory/BMP Text Sections			§4.2.1 / §5.2.1	§4.2.2 / §5.2.2	§4.2.3 / §5.2.3	§4.2.4 / §5.2.4	§4.3 / §5.3	§4.4 / §5.4	§4.5 / §5.5

Table 2 (continued). Permitted Uses and BMP Requirements

Permitted Use	MCX	MG	Petroleum Products				Hazardous Substances/Wastes	Pesticides	Stormwater**
			USTs	Bulk Storage	Vehicle Washing	Maintenance			
Lava rock or stone cutting or shaping facilities		√		√	√	√	√		√
Lumberyards & building material yards		√				√	√		√
Machine, welding, sheet metal, and metal plating and treating		√		√		√	√		√
Major outdoor amusement and recreation facilities		√		√		√	√		√
Manufacturing, processing & packaging establishments, light & general	√ (not general)	√	√	√	√	√	√		√
Medical clinics	√		√	√			√		√
Meeting facilities	√								√
Motion picture & TV production studios	√	√							√
Offices	√								√
Photographic processing	√	√					√		√
Plant nurseries	√						√	√	√
Public uses and structures	√	√							√
Publishing plants (newspaper, book, magazine, printing shops, cartographing); duplicating processes (blueprinting/photostating)	√	√	√	√	√	√	√		√
Recycling centers		√	√	√	√	√	√		√
Reduction, refining, smelting, or alloying of metals or ores		√	√	√	√	√	√		√
Repair establishments, major & minor	√ (not major)	√	√	√	√	√	√		√
Restaurants	√	√					√	√	√
Retail establishments	√								√
Sales and service of machinery used in agricultural production	√		√	√	√	√	√		√
Schools, business, photography, art, music, & dance	√						√		√
Schools, vocational	√						√		√
Self-storage facilities	√	√							√
Storage & sale of seed, feed, fertilizer other agricultural products		√					√	√	√
Storage, curing, or tanning of raw, green, or salted hides or skins		√		√			√		√
Telecommunications antennas	√	√							√
Temporary real estate offices	√	√							√
Theaters	√								√
Transportation & tour terminals		√	√	√	√	√	√		√
Truck, freight & draying terminals		√	√	√	√	√	√		√
Utility facilities, including offices or yards for equipment, material, vehicle storage, repair or maintenance		√	√	√	√	√	√		√
Utility substations	√	√	√	√			√		√
Veterinary establishments		√					√	√	√
Warehousing	√	√	√	√			√		√
Wholesaling & distribution, incl. storage of incidental materials & equipment		√	√	√	√	√	√		√
Relevant Regulatory/BMP Text Sections			§4.2.1 / §5.2.1	§4.2.2 / §5.2.2	§4.2.3 / §5.2.3	§4.2.4 / §5.2.4	§4.3 / §5.3	§4.4 / §5.4	§4.5 / §5.5

- Train personnel in spill response procedures.
- Encourage employee participation in UST management activities.

Administrative BMPs:
- Keep records of release detection monitoring.
- Conduct appropriate release notification and response.

5.2.2 Bulk Storage Facilities

A SPCC Plan requires appropriate practices to prevent discharged oil from reaching a navigable watercourse. The SPCC Plan requires BMPs for bulk storage tanks; for drainage from containment areas; for facility transfer operations, pumping, and in-plant processes; for facility tank truck loading/unloading racks; and for facility security.

Aboveground bulk storage tanks

With respect to aboveground bulk storage tanks, owners/operators must:

Structural BMPs:
- Use tank material that is compatible with materials stored.
- Use high liquid-level alarms and cut-off devices where possible.
- Construct secondary containment that will accommodate the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation, and made of materials sufficiently impervious to contain spilled oil. The following structural BMPs shall be used to provide the necessary secondary containment; the BMP selected, either alone or in combination, must be appropriate for the type of facility:
  - dikes, berms or retaining walls sufficiently impervious to contain spilled oil;
  - curbing;
  - culverts, gutters or other drainage collection systems;
  - weirs, booms or other barriers;
  - spill diversion ponds;
  - retention ponds; and
  - sorbent materials.

Procedural BMPs:
- Conduct periodic integrity testing.
- Conduct frequent inspection of the outside of the tank by operating personnel.
- Conduct regular testing of liquid level sensing devices.
- Promptly correct visible oil leaks which result in loss of oil from tank seams, gaskets, rivets and bolts sufficiently large to cause the accumulation of oil in diked areas.

Administrative BMPs:
- Maintain records of tank integrity testing.

Secondary containment for aboveground bulk storage tanks

Table 3 describes the most common secondary containment systems for diked areas (e.g., storage tank areas).

Table 3. Commonly Used Secondary Containment Systems

Type of System:	Poured Concrete Walls
Description:	Strong, fairly watertight, and resistant to petroleum penetration if adequately designed and maintained according to good engineering practices.
Limitations:	• Conventional concrete is not totally impervious to petroleum; any spill left inside a containment area may eventually penetrate the concrete and could contaminate ground water sources. Therefore, spills inside diked areas should be cleaned up as soon as possible. • The expansion and contraction of piping which runs through containment walls create potential areas of weakness. • Grouting in expansion joints requires maintenance to prevent weak points, which may allow petroleum penetration.
Type of System:	Containment Curbs
Description:	Similar to speed bumps and are often used where vehicles need to access the containment area.
Limitations:	• They fill up with rainwater more rapidly than higher containment areas. • They can be worn down as a result of vehicle crossings.
Type of System:	Containment Pits/Trenches
Description:	Belowgrade containment structures, which may be covered with metal grates and lined with concrete.
Limitations:	• Earthen structures have the potential for ground water contamination unless constructed with appropriate materials. • If pits and trenches are not properly supported, they deteriorate quickly. • They pose a danger since people can fall into them if grates are not properly maintained.
Type of System:	Earthen Berms
Description:	Berms containing clay or bentonite mixtures are commonly used at very large oil storage facilities.
Limitations:	• Subject to water and wind erosion and require frequent rebuilding. • Sandy soil does not effectively contain oil spills; ground water contamination may result. Impervious liners of clay or synthetic membranes may be required to contain oil spills. • Vegetation inside bermed areas is a fire hazard and restricts the operator's ability to detect spills or defective equipment. In addition, the root systems of plants, such as trees, shrubs or bushes, could degrade the berm and promote leakage.
Type of System:	Concrete Block Walls
Description:	Commonly used for containment.
Limitations:	• Settling eventually separates or cracks the blocks and destroys the integrity of the wall. • Concrete blocks are very porous therefore they do not form liquid-tight seals between mortared joints.

Drainage from Containment Areas

With respect to drainage from containment areas, owners/operators must:

Structural BMPs:

- Use valves or other positive means to prevent a spill or other excessive leakage of oil from diked storage areas.
- Use manual, open-and-closed design valves instead of flapper-type valves.
- Direct flow from uncontained areas into containment areas.
- Use diversion system(s) that could, in the event of an uncontrolled spill, return the oil to the plant.

Procedural BMPs:

- Use manual startup of pumps or ejectors, following assessment of the condition of the accumulation, before starting facility drainage, to ensure no oil will be discharged.
- Open valves to drain rainwater and resealing following drainage by trained and authorized facility personnel only.
- Examine accumulated rainwater to determine that it is free of oil contamination before drainage occurs.
- Use an alternate method of draining the diked area if any oil sheen or accumulation of oil is observed.

Administrative BMPs:

- Maintain records of drainage events (i.e., date, time, personnel names).

Facility transfer operations, pumping, and in-plant processes

For facility transfer operations, pumping, and in-plant processes, owners/operators must:

Structural BMPs:

- Use protective coating and cathodic protection on buried pipes.
- Use exposed pipe corridors or galleries.
- Design pipe supports to minimize abrasion and corrosion and allow for expansion and contraction.

Procedural BMPs

- Cap or blank-flange, with origin marked, pipeline not in service.
- Regularly examine the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces.
- Periodically pressure test piping where failure might lead to a spill event.
- Install signage or other warning for vehicles that may, because of their size, damage aboveground piping.

Facility tank truck loading/unloading racks

At facility tank truck, loading/unloading racks, owners/operators must:

Structural BMPs:

- Use a quick drainage system for tank truck loading and unloading areas where drainage does not flow into a catchment basin or treatment facility designed to handle spills, using a containment system designed to hold at least the maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded at the facility.
- Use an interlocked warning light or physical barrier system, or warning signs, in loading/unloading areas to prevent vehicular departure before complete disconnect of flexible or fixed transfer lines.

Procedural BMPs:

- Establish loading/unloading procedures that meet the minimum requirements and regulations established by the Department of Transportation.
- Examine the lowermost drain and all outlets of any tank truck prior to filling and departure to check for leakage and, if necessary, tighten, adjust, or replace drains and outlets to prevent liquid leakage while in transit.

Facility Security

With respect to facility security, owners/operators must:

Structural BMPs:

- Use full fencing and entrance gates that are locked and/or guarded when the facility is not in use or is unattended.
- Use facility lighting commensurate with the type and location of the facility, such that spills occurring during hours of darkness can be detected by operating personnel or non-operating personnel and that acts of vandalism that may result in spills are prevented.

Procedural BMPs:

- Securely lock the master flow and drain valves, and any other valves that will permit direct outward flow of the tank's content to the surface, in the closed position when in non-operating or non-standby status.
- Lock the starter control on all oil pumps in the "off" position, or locating such controls at a site accessible only to authorized personnel when the pumps are in a non-operating or non-standby status.
- Cap or blank-flange loading/unloading connections of oil pipelines when not in service or standby service for an extended time.

5.2.3 Other Petroleum Storage Facilities

BMPs associated with USTs and bulk storage facilities should be employed for all petroleum storage as appropriate for the size and nature of the storage. Petroleum products contained solely in consumer products packaged for distribution to, and use by, the general public, or commercial products used at the facility solely for janitorial or minor maintenance

purposes (such as paint thinner), are excluded from the BMP requirements. However, secondary containment shall be provided where petroleum based consumer products for sale to the general public or commercial products for janitorial or maintenance use on a premises are packaged in individual containers having a volume greater than 5 gallons. Releases must be cleaned up and releases to the environment greater than 5 gallons must be reported to the National Park Service. Owners/operators must:

Structural BMPs:

- Use storage container material that is compatible with materials stored.
- Use secondary containment that will accommodate the contents of the largest single storage vessel plus sufficient freeboard to allow for precipitation, and made of materials sufficiently impervious to contain spilled liquids. The following structural BMPs shall be used to provide the necessary secondary containment; the BMP selected, either alone or in combination, must be appropriate for the type of facility:
  - dikes, berms or retaining walls sufficiently impervious to contain spilled oil;
  - curbing;
  - culverts, gutters or other drainage collection systems;
  - weirs, booms or other barriers;
  - spill diversion ponds;
  - retention; and
  - sorbent materials.

Procedural BMPs:

- Train facility employees in spill response procedures.
- Encourage employee participation in petroleum management activities.
- Conduct frequent inspection of the outside of the storage vessel by operating personnel.
- Promptly correct visible oil leaks that result in loss of oil from vessel seams, gaskets, rivets and bolts sufficiently large to cause the accumulation of oil in diked areas.

Administrative BMPs:

- Conduct appropriate release notification and response.

5.2.4 Vehicle or Equipment Washing Facilities

Water from vehicle washing operations must be collected and directed to a pretreatment facility prior to disposal in injection wells. Filtering and recycling vehicle wash water should be considered as a preferred alternative to injections wells. Owners/operators must:

Structural BMPs:

- Consider design of a closed-loop (recycling) system.
- Connect to the sanitary wastewater system if possible.
- Utilize design suitable to contain any leaks or spills.

- If injection wells are utilized to dispose of wash water, utilize structural BMPs as described in Section 5.5.

Procedural BMPs:

- Use phosphate-free detergents.

BMPs for injections wells include pretreatment (as described in D&O Condition 2h and listed in Section 5.5), as well as following the DOH requirements for construction, operation, monitoring and abandonment of the wells, as described in Section 4.5.2 and as required by conditions 2a-2i.

5.2.5 Maintenance Activities

Many vehicle and equipment maintenance operations in many types of businesses, even where maintenance is not the primary business, use materials or create wastes that are harmful to humans and the environment. These hazardous materials include: vehicle maintenance products, such as antifreeze, oil and grease; used oil filters; solvents for oil and grease removal and other cleaning operations; engine, parts and equipment cleaners; lubricants; rust removers; paints and paint preparation products; brush or spray gun cleaners; and lead acid batteries. Oils, fuels and solvents used for cleaning metal parts contain toxic ingredients. Fortunately, there are good recycling opportunities for both solvents and waste oil.

Numerous BMPs are required for equipment maintenance facilities and facilities storing used oil or other industrial liquids (Appendix B, 3b). Owners/operators must:

Structural BMPs:

- Design and locate maintenance facilities so that releases of hazardous materials/wastes do not occur.
- For all applicable businesses, ensure all cleaning, repairs and maintenance of equipment involving the use of industrial liquids, such as gasoline, diesel, solvent, motor oil, hydraulic oil, gear oil, brake fluid, acidic or caustic liquids, antifreeze, detergents, degreasers, etc. is conducted on a concrete floor, whether roofed or unroofed.
- Construct the concrete floor to contain any drip or spills and providing for the recovery of any spilled liquid.
- Pass water drainage from these concrete floors, if necessary, to prevent discharge of oily water, through an oil/water separator before being discharged.
- Maintain containers used for storage of used oil or other industrial liquids on a concrete surface.
- Berm the concrete surface to prevent the loss of liquid in the event of spills or leaks.
- Seal and maintain the containers under shelter from the rain.
- Follow the Department of Labor and Industrial Relations' Occupational Safety and Health regulations, sections titled, "Housekeeping Standards" and "Storage of Flammable or Combustible Liquids," along with the local fire code.

Procedural BMPs:

- Ban maintenance work, except for emergency repairs, on vehicles or other equipment in uncovered, unbermed parking areas.
- Check for leaking oil and fluids.
- Use nontoxic, low-toxicity, and recycled materials whenever feasible.
- Drain oil filters before disposal or recycling.
- Do not pour liquid waste down drains.
- Recycle engine fluids, used oil filters, antifreeze, and batteries.
- Segregate and label hazardous wastes.
- Rent a parts washer from a solvent recycler if solvents are used, or develop an alternate solvent recycling program.
- Use up old fuels whenever possible.
- Do not discharge or spill industrial liquids.
- Immediately collect and contain industrial liquid spills on the concrete floor;
- Prevent industrial spills onto the bare ground.

5.2.6 Parking Areas

For parking areas, the D&O establishes required BMPs as covenants running with the land and that emphasize pollution prevention rather than treatment (Appendix B, Condition 3d). Owners/operators must:

Procedural BMPs:

- Utilize drip pans beneath large vehicles (buses, trucks or construction equipment) to avoid release of petroleum onto paved or graveled surfaces.
- If feasible, include grassed or vegetative swales to capture drainage from parking areas for large vehicles.
- Check areas primarily used for automobile parking biweekly to note areas of oil or automotive fluid leaks. Absorbent materials shall be used to soak up fluids, and contaminated absorbent materials shall then be promptly removed and properly disposed of.
- Clean parking lots on a monthly basis to ensure no buildup of debris, sediment, or automotive fluids. Parking areas may be cleaned by sweepers, provided spilled automotive fluids are previously removed with absorbent materials.
- Prohibit use of water to wash down parking lots.
- Prohibit maintenance work other than emergency work on vehicles in parking areas.

5.3 Other Hazardous Substances/Waste

Businesses other than maintenance activities may use hazardous materials such as solvents, oils, degreasers, etc. described in 5.2.5, and are subject to the same required BMPs as listed in 5.2.5. Additional BMPs applicable to hazardous wastes are largely related to tracking, containerizing, and monitoring, which are also required by the regulations. Hazardous wastes are defined as materials that are ignitable, toxic, corrosive or explosive. Improper use of hazardous products may cause toxic health problems. Improper storage may allow chemicals to leak. Improper disposal may allow these chemicals to enter ground water. Two key steps to minimizing the risk of pollution from hazardous materials/wastes are to reduce the amount

of waste produced and recycle when possible. For facilities that use, store or handle hazardous materials/wastes, owners/operators must:

Structural BMPs:

- Dike or otherwise suitably containerize storage areas to prevent contamination from spills if the volume of the stored products and wastes exceeds 10 gallons.

Procedural BMPs:

- Return excess product, spills or drips to the original container.
- Collect waste paint, solvents, antifreeze, oil and grease, and other hazardous chemicals for community recycling.
- Contain any unusable wastes, spills and drips for appropriate disposal.
- Locate all hazardous waste products and activities, including mixing and storage, on a surface which will prevent spilled materials from entering ground water.
- Recycle engine fluids, used oil filters, antifreeze, and batteries.
- Segregate different types of waste in storage, to prevent dangerous chemical reactions that could release the products.
- Have emergency equipment, such as adsorbents and shovels, ready to contain spills.
- Store chemicals in clearly labeled containers designed to contain that hazard category (flammables, poisons or corrosives).
- Label wastes with the name of the waste and the date the waste was put into the container.
- Store chemicals in a safe, well-ventilated, flame-free area with sturdy shelves.
- Store flammable chemicals and batteries in an area shaded from direct sunlight.
- Store rags used to clean up solvent spills with the same care as other potentially flammable materials.
- Ensure sufficient aisle space to provide access for inspections and to improve the ease of material transport.
- Store materials well away from high-traffic areas to reduce the likelihood of accidents that might cause spills or damage to drums, bags, or containers.
- Stack containers in accordance with the manufactures' directions to avoid damaging the container or the product itself.
- Store containers on pallets or equivalent structures, to facilitate inspection for leaks and to prevent the containers from coming into contact with wet floors, which can cause corrosion. This consideration also reduces the incidence of damage by pests (insects, rodents, etc.).
- Store materials in covered areas so they are protected from storm water or wind. In addition, outdoor material loading and unloading areas should be covered or enclosed. Priority should be given to the most hazardous substances.
- Delegate the responsibility for management of hazardous materials to personnel trained and experienced in hazardous substance management.

5.4 Agricultural/Landscaping Chemicals

Pesticides, including those used for yard care, are referred to as acute hazardous substances because of their extreme toxicity. The only acceptable management practices for pesticides are to use them according to current label directions and to properly dispose of containers when all the pesticide has been used. D&O Condition 3e states that only the minimum required nutrients (fertilizer) to maintain the vegetation, without causing significant nutrient runoff, may be applied (see Appendix B).

Procedural BMPs for use with pesticides are provided by the State of Hawai`i Department of Land and Natural Resources, Division of Forestry and Wildlife.[1] Owners/operators must:

- Select pesticides suitable for use on the target species and registered for intended uses.
- Ensure the pesticide is registered by the EPA.

To minimize potential impacts on water quality, BMPs are required for pesticide use. Owners/operators must:

Transportation:

- Inspect all containers prior to loading and ensure all caps, plugs and bungs are tightened.
- Handle containers carefully when loading them onto vehicles.
- Secure containers properly to prevent shifting during transport.
- Check containers periodically en route.
- Limit access to containers during transport to prevent tampering.
- Educate and inform the driver of the proper transportation precautions.
- Never transport pesticides unless arrangements have been made to receive and store them properly.

Storage

- Manage and store chemicals in accordance with all applicable federal, state, or local regulations.
- Be aware of the container label information, including:
  - The EPA container registration information, as printed on the label.
  - Instruction for use as provided by the manufacturer.
  - Requirements or the use, application, and registration of the pesticide.
  - Requirements relating to the licensing of applicators.
  - All containers should be labeled in accordance with applicable federal, state and local regulations.
- Store pesticides in their original containers with labels intact.
- Ensure that pesticides stored for extended periods have containment that will contain a complete spill from the largest container being stored.

[1] State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, Watershed Protection and Management Program. ND. *Best Management Practices*. Retrieved February 2, 2004, from http://www.state.hi.us/dlnr/dofaw/wmp/bmps.htm#3.0%20Silvicultural%20Chemical. [Most BMPs cited verbatim. Some modified for west Hawai'i ground water]

- Check containers prior to storage and periodically during storage to ensure that they are properly sealed.
- Ensure pesticide storage facilities at sites minimize the possibility of impacts of water quality in case accidents or fires occur.
- Use storage buildings that have floors constructed of concrete or other impermeable materials so that spills are easy to clean up.
- Ensure that storage facilities can be secured under lock and key.
- Post storage areas with a list of chemicals and quantities stored and notify the fire department about storage.

Mixing/Loading

- Review the label before opening the container to ensure familiarity with current use directions.
- Exercise care and caution during mixing and loading.
- Replace pour caps and close bags or other containers immediately after use.
- Mix chemicals and clean equipment only where possible spills would not enter streams, lakes or ponds.
- Use a spray device capable of immediate shutoff.

Application

- Refer to label directions before making a pesticide application.
- Check all application equipment carefully, particularly for leaking hoses and connections and plugged or worn nozzles.
- Calibrate spray equipment periodically to achieve uniform distribution and rate.
- Apply pesticides under favorable weather conditions, i.e., low wind conditions, to minimize significant drift.
- Use pesticides in accordance with label instruction, and adhere to all Federal and State policies and regulations governing pesticide use.

Cleanup and Disposal

- Before disposal, rinse containers as described in equipment cleanup.
- Conduct cleanup in a location where chemicals will not enter any injection well or bare ground where ground water pollution might occur.
- Rinse empty pesticide containers and mixing apparatus as many times as needed. This flushing should be applied in spray form to the treated area, NOT into the ground or near injection wells.
- Dispose of pesticide wastes and containers according to Federal and State laws. Some pesticide wastes are specifically identified as hazardous wastes by law and must be handled and disposed of in accordance with hazardous waste regulations. For more information about proper management of waste pesticides, contact the Department of Health, Environmental Health Administration.

To prevent nutrients from reaching the National Park water resources, numerous BMPs must be followed. BMPs are based on two publications of CTARH, and on D&O Condition 2e. Owners/operators must:

- Prior to application, identify type and amount of fertilizer that will be most effective. Testing soil is the best way to learn how much fertilizer is needed.
- Select fertilizers based on nutrient requirements and apply only as much as necessary. Slow release fertilizers are best since they dissolve slowly, helping to reduce leaching and runoff losses of nutrients.
- Handle fertilizers in accordance with instructions on container.
- If fertilizer solution is mixed in a tank:
  - Never mix fertilizers using a water hose or other drinking water source without using a backflow prevention device and maintaining an air gap.
  - Rinse tanks or applicators away from a water bodies or injection wells.
  - Mix on a level concrete pad where spills can be quickly contained and cleaned up.
- Apply fertilizers in small amounts multiple times rather than large amounts in a single application.
- Lightly work fertilizers into the soil or cover by mulch to prevent their being washed away by rain.
- Do not dump organic wastes, such as grass clippings, shrub and tree trimmings, leaves, and fruits, on paved areas or in drainage ditches. They should be composted, left in place to decompose (for grass cuttings), or properly disposed in accordance with county regulations.
- Store all fertilizers as directed on container.
- For all vegetative swales, use only minimum required nutrients (fertilizer) to maintain the vegetation (Appendix B, D&O Condition 3e).
- Do not exceed the amount of water necessary to maintain the vegetation (Appendix B, D&O Condition 3e).

5.5 Storm Water

Many of the BMPs discussed above related to hazardous wastes, petroleum products, and agricultural chemicals are related to or also apply to the management of storm water runoff. Additionally, actions specified in the spill prevention plan will be primary BMPs for reducing contamination of storm water runoff. The D&O also set forth storm water BMP requirements, which have been referenced throughout the PPP.

5.5.1 Storm Water Runoff

With respect to general storm water control, owners/operators must:

Structural BMPs:

- Use structural BMPs relevant to containment of hazardous wastes, storage tanks, and spill prevention as described in previous sections and in Conditions 2a, 2b, 2h.
- Construct appropriate storm water management devices such as catch basins, storm water detention areas, storm shelters, dikes, berms, or grading (or combination to achieve the required storm water control) in order to prevent

introduction of rainwater or storm runoff into areas potentially housing hazardous wastes.

- Design and construct structural BMPS to capture, to the extent possible, storm water drainage from all perimeter lots, facilities, and parking areas. Various types of structural BMPs for storm water drainage are shown in Table 4.
- Control air-borne migration of dust that may contain contaminants that could enter storm water runoff. Dust emissions from some industrial activities can be minimized using common mechanical systems such as hoods, cyclone collectors, bag collectors, filters, sweepers, and negative pressure systems. These systems will typically require periodic operation and maintenance activities to remain effective.
- Keep containers used for storage of used oil or other industrial liquids on a concrete surface. Berm the surface to prevent the loss of liquid in the event of spill or leaks. Seal and maintain containers under shelter from the rain.
- Conduct all cleaning, repairs and maintenance of equipment involving the use of industrial liquids, such as gasoline, diesel, solvent, motor oil, hydraulic oil, gear oil, brake fluid, acidic or caustic liquids, antifreeze, detergents, degreasers, etc. on a concrete floor, whether roofed or unroofed. Construct the concrete floor to contain any drip or spills and to provide for the recovery of any spilled liquid. If necessary to prevent the discharge of oily water, pass water drainage from these concrete floors through an oil-water separator before being discharged.

Procedural BMPs:

- Conduct periodic storm water containment assessments (SWCA) to determine the most important pollutant sources, focusing on high risk activities such as loading and unloading, outdoor storage, outdoor manufacturing or processing, dust- or particulate generating activities, and on-site waste disposal activities.
- Conduct periodic visual inspections, examining storm water runoff for any indication of contaminants, as evidenced by odor, sheen, coloration, turbidity, or floating matter.
- Inspect storm water drainage paths after runoff events, noting the presence of deposits, stains, or changes to vegetation caused by contaminants.
- Periodically inspect facilities, with particular attention paid to storage facilities, transfer pipelines, loading and unloading areas, pipes, valves, fittings, tanks, containment facilities, and shipping containers.
- Perform preventative maintenance including inspection, testing, replacement and repair of equipment and operational systems, including storm water management devices such as catch basins, storm water detention areas, and water quality treatment systems.
- Inform all employees to immediately collect and contain any industrial liquid spills and inform them against discharging or spilling any industrial liquids onto the bare ground. Report industrial spills onto bare ground to the National Park Service as stated in Section 4.3.

5.5.2 Injection Wells

Owners/operators of injection wells must:

Structural BMPs:

- Construct appropriate pretreatment measures, such as catch basins, filters and oil/water separators, to remove contaminants inadvertently entrained in storm water runoff. D&O Condition 2h specifies that storm water runoff must first enter the debris catch basin before flowing into drainage wells to allow the detention and periodic removal of rubbish and sediments deposited by runoff. The debris catch basin shall be periodically inspected and cleaned accordingly. Oil/water separators shall be utilized where petroleum products are used.
- If oil/water separators are proposed as a pretreatment BMP prior to discharge to an injection well or other device, conduct a thorough analysis to determine if the oil/water separator can treat the waste stream effectively, if a closed-loop system or connection to the sanitary sewer is possible, and if the design is suitable to contain any leaks or spills from the oil/water separator.

Procedural BMPs:

- Perform preventative maintenance including inspection, testing, replacement and repair of pretreatment catch basins (see Condition 2f, Appendix B).
- Provide signage for all drainage structures and injection wells with the following warning: DUMP NO WASTES. GOES TO GROUNDWATER AND OCEAN. HELP PROTECT HAWAI'I'S ENVIRONMENT. Signage shall be either stand-up (legible from at least 30 feet, permanently posted at an effective and safe height) or painted on the ground next to the drainage structure's inlet (Condition 3c, Appendix B).

Table 4. Structural BMPs for Storm Water Management [2]

Type of System: Vegetated Swales Description: Grassed swales are shallow vegetated storm water channels used to remove pollutants by using filtration through grass and soil. Generally, a well-maintained and designed swale can be expected to remove 70% of total suspended solids (TSS), 30% for total phosphorus (TP), 25% for total nitrogen (TN), and 50% to 90% of trace metals. Schematic shown in Figure 2. Limitations: Wet areas may be potential breeding grounds for mosquitoes and there is a possibility of erosion and channelization over time.
Type of System: Vegetated Buffer Strips (Filter Strips) Description: Buffer strips are vegetated sections designed to accept runoff as overland sheet flow. They appear as vegetation ranging from grasslands to forest and are essentially flat with low slopes. They are designed to intercept upstream flow, lower flow velocity and spread water out as sheet flow. Pollution removal is facilitated through filtration by vegetation and soil as well as detention. A 20ft with grass filter strip can be expected to remove 20% to 40% TSS, >20% TP, >20% TN, 20% to 40% of trace metals, and >20% biological/chemical oxygen demand. A forested filter strip approximately 100 ft long significantly increases removal efficiencies. Schematic shown in Figure 3. Limitations: Wet areas may be potential breeding grounds for mosquitoes and there is a possibility of erosion and channelization over time
Type of System: Inlet Devices Description: In general, inlet devices are placed in the inlets of storm drainage systems to trap pollutants and floating trash. They can be installed in almost any shape or size of curb inlet and usually involve being cleaned by a vacuum truck or by a person emptying the basket. Inlet devices generally trap trash, floating debris, sediment, hydrocarbons, as well as leaves and grass clippings. Removal efficiencies depending on particle size are 96.53 % TP, 96.07 TN, and 30% to 90% TSS according to the two performance studies. Schematic shown in Figure 4. Limitations: The required maintenance and associated costs may be high.

[2] American Society of Civil Engineers. (2001). *Guide For Best Management Practice (BMP) Selection in Urban Developed Areas.* Reston, VA: Urban Water Infrastructure Management Committee's Task Committee For Evaluating Best Management Practices

Table 4. Structural BMPs for Storm Water Management (continued)

Type of System: Baffle Boxes Description: Baffle boxes are sediment removal traps generally used to remove suspended solids and floating debris from stormwater pipe flow. In addition, heavy metals and particulate phosphates will bind to suspended solids and be removed also. The baffle boxes are cleaned using a vaccume truck on a regular basis. Removal efficiencies depending on particle size are 30% Phosphorus, 70.6% TSS according to a study done in Brevard County, Florida. Schematic shown in Figure 5. Limitations: The required maintenance and associated costs may be high.
Type of System: Porous Pavement Description: Permeable surface with an underlying stone reservoir which reduces runoff and filters some pollutants from runoff. Limitations: • Should not be used in areas with heavy vehicle or high traffic, on slopes greater than 5 percent, within 100 feet of a drinking water source, and where activities generate highly contaminated runoff. • Soils need to have permeability between 0.5 and 3.0 inches per hour and a drainage time of at least 24 hours. • Requires regular maintenance for proper functioning.
Type of System: StormTreat System™ Description: An engineered wetland cell and biofilter that captures and treats the first flush of runoff removing oil/grease, bacteria, sediment, heavy metals, nutrients and a minimal amount of trash. Requires a land commitment of 2% of the drainage area. Limitations: • An annual inspection is required, which includes removing and replacing the burlap grit screening bags, and removing, cleaning and reinstalling the filters. The sediment is cleaned out via suction pump once every 3 to 5 years. • Better applied in project design than in retrofit.

Figure 2. Vegetated Swale Schematic[3]

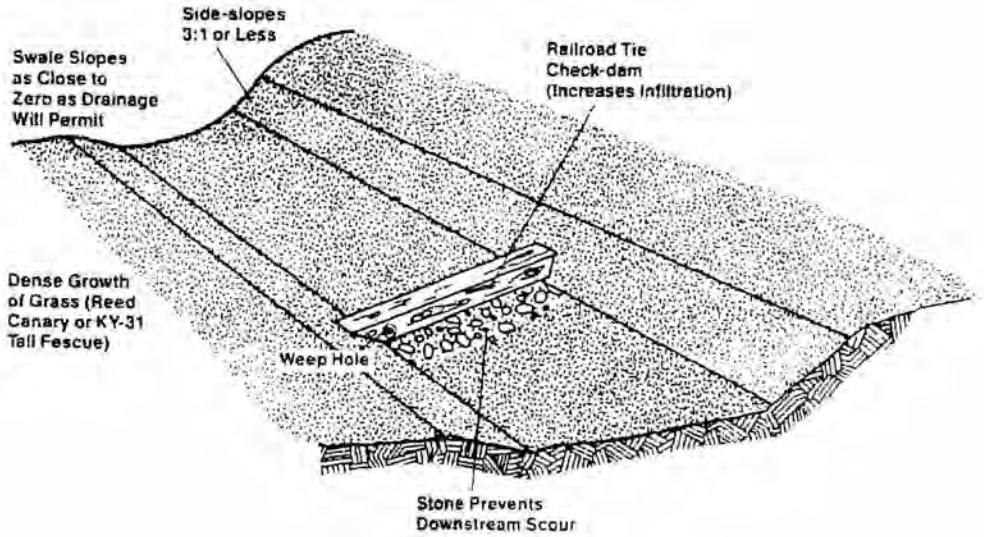
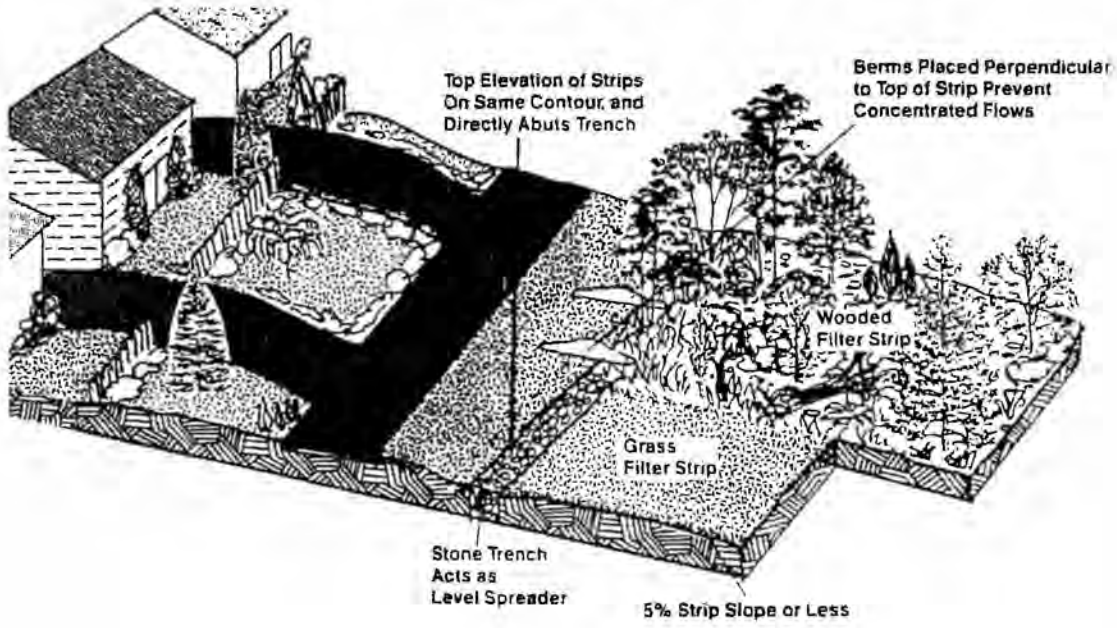


Figure 3. Vegetated Buffer Strip (Filter Strip) Schematic[3]



[3] Schueler, Thomas R. (1987). *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs.*

Figure 4. Inlet Device Schematic[4]

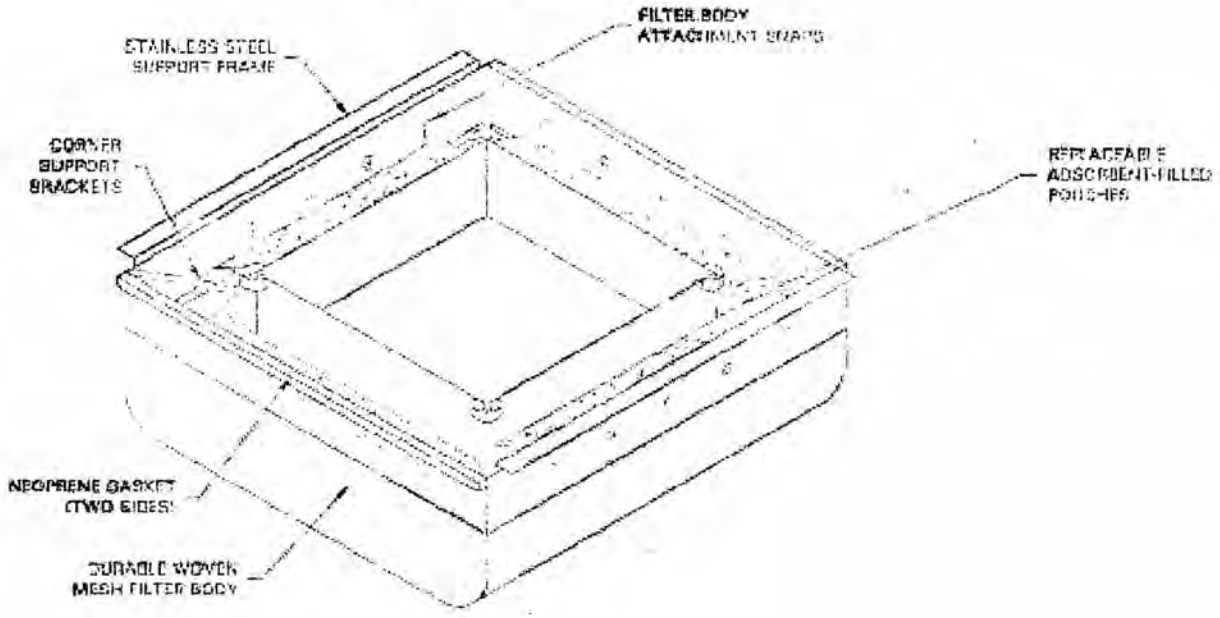
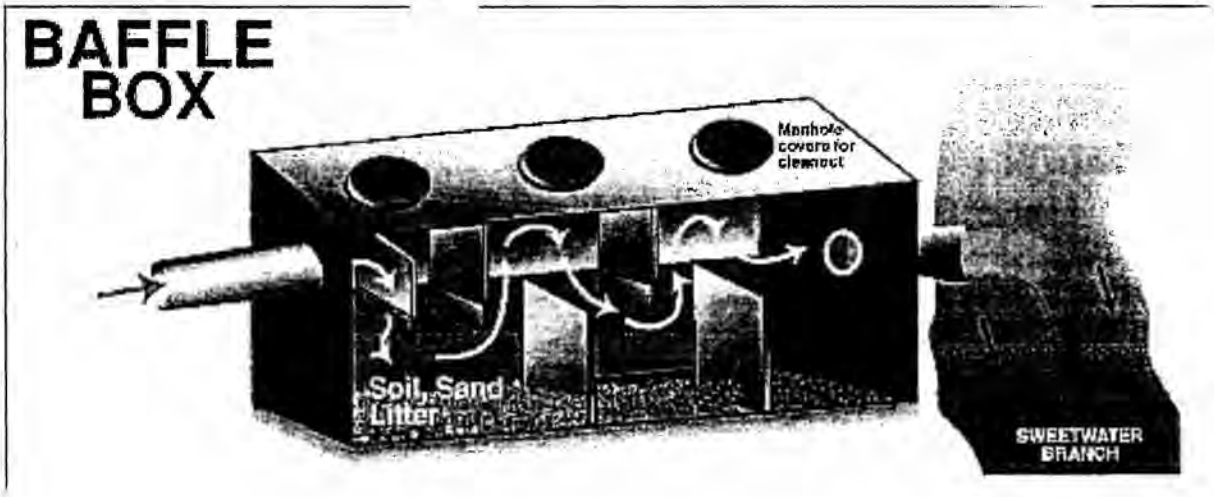


Figure 5. Baffle Box Schematic[5]



[4] Kristar Enterprizes, Inc. *"KRISTAR PRODUCT DRAWINGS AND MEASUREMENT CHARTS- Catch Basin Inserts and Storm Water Pollution Prevention": (http://www.kristar.com/MEDIA/pdf2/fossilfilter1.pdf)*

[5] Alachua County (North-Central Florida) Environmental Protection Department (Pollution Prevention: Water Quality) Baffle Box Page Website: (http://www.environment.alachua.fl.us/Pollution_Prevention/stormwat/baffle_box.htm)

Figure 6. Porous Pavement Schematic[7]

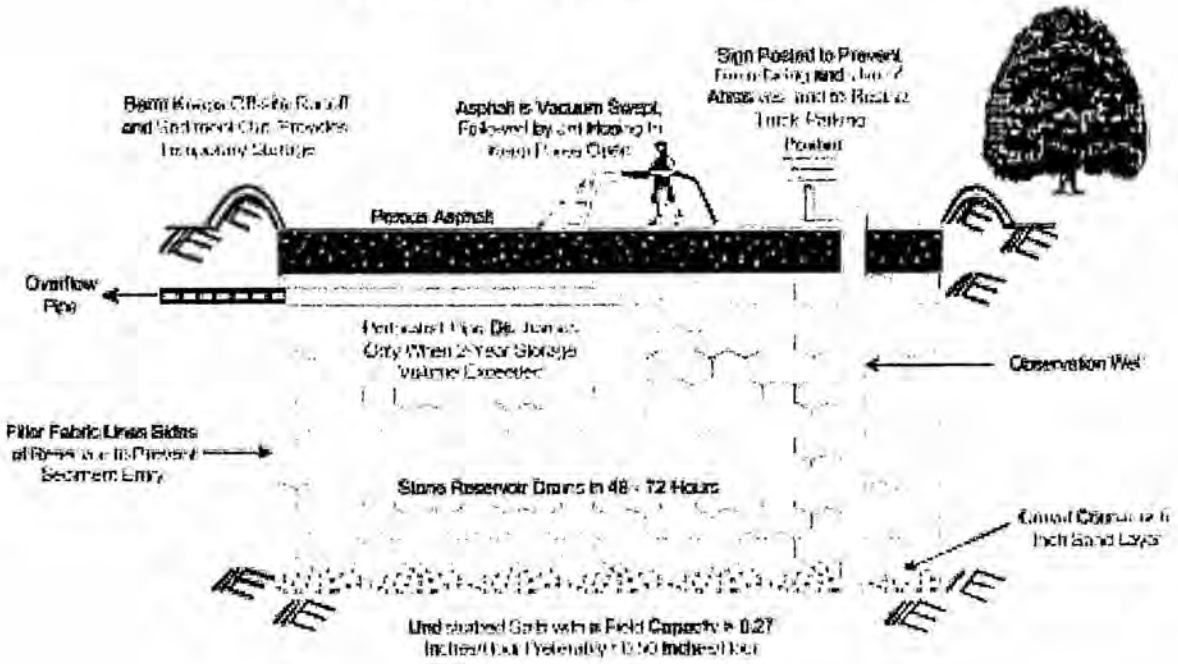
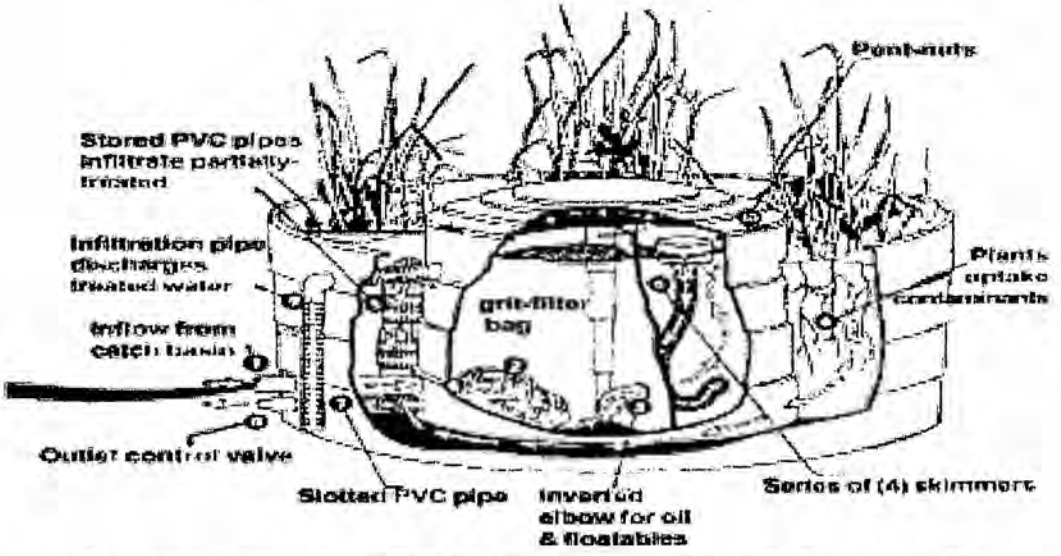


Figure 7. StormTreat™ System Schematic[8]



[7] Environmental Protection Agency (EPA) Website: http://www.epa.gov/owm/mtb/porouspa.pdf

[8] The Center for Energy Efficiency and Renewable Energy (CEERE); The StormTreat Fact Sheet is one in a series of fact sheets for stormwater technologies and related performance evaluations, which are undertaken by the Massachusetts STrategic Envirotechnology Partnership (STEP).: http://www.ceere.org/ees/EES_Publications/step/Stormtreat%20fact%20sheet%20rev%201002.pdf

6.0 CONTACTS

REGULATORY CONTACTS

DOH Clean Air Branch
919 Ala Moana Boulevard, Room 203
Honolulu, Hawai`i 96814
(808) 586-4200
http://tako.icsd.Hawai`i.gov/doh/eh/cab

DOH Clean Water Branch
919 Ala Moana Boulevard, Room 301
Honolulu, Hawai`i 96814
(808) 586-4309
http://tako.icsd.Hawai`i.gov/doh/eh/cwb

DOH Safe Drinking Water Branch
919 Ala Moana Boulevard, Room 308
Honolulu, Hawai`i 96814
(808) 586-4258
http://tako.icsd.Hawai`i.gov/doh/eh/sdwb

DOH Solid & Hazardous Waste Branch
919 Ala Moana Boulevard, Room 250
Honolulu, Hawai`i 96814
(808) 586-4240
http://tako.icsd.Hawai`i.gov/doh/eh/shwb

DOH Underground Storage Tank Program
DOH Hazardous Waste Program
919 Ala Moana Boulevard, Room 250
Honolulu, Hawai`i 96814
(808) 586-4226
http://tako.icsd.Hawai`i.gov/doh/eh/shwb

DOH Office of Hazard Evaluation and Emergency Response
919 Ala Moana Boulevard, Room 206
Honolulu, Hawai`i 96814
(808) 586-4249
http://tako.icsd.Hawai`i.gov/doh/eh/heer

County of Hawai`i
Local Emergency Planning Committee
Attn: Jay Sasan, Industrial Safety Office
25 Aupuni Street
Hilo, Hawai`i 96720
(808) 961-8215

County of Hawai`i
Fire Department
Attn: Nelson Tsuji, Chief
777 Kilauea Avenue, Mall Lane, Room 6
Hilo, Hawai`i 96720
(808) 961-8297

U.S. EPA Region 9
Hazardous Waste Management Division
75 Hawthorne Street
San Francisco, California 94105
(415) 744-2422
http://www.epa.gov/epaoswer/osw/index.htm

U.S. EPA Region 9
RCRA Notifications
75 Hawthorne Street
San Francisco, California 94105
((415) 495-8895
http://www.epa.gov/rcraonline

Appendix A

"Bird Checklists of the United States: Kaloko-Honokohau National Historical Park"

and

A Cultural History of Three Traditional Hawai`ian Sites on the West Coast of Hawai'i Island,

Chapter VIII "Kaloko-Honokohau National Historical Park"

USGS
science for a changing world
Northern Prairie
Wildlife Research Center

Bird Checklists of the United States

Kaloko-Honokōhau National Historical Park[1]

Kailua-Kona, Hawaii

- Map of location of Kaloko-Honokōhau NHP on Hawaii [i]
- Additional information on Kaloko-Honokōhau National Historical Park [ii]

Kaloko-Honokōhau National Historical Park was established in 1978. The area has profound cultural significance to many persons of Hawaiian ancestry. 'Aimakapā and Kaloko Fishponds, as well as 'Ai'ōpio Fishtrap, are prominent features of the park. They were built by Hawaiians for aquaculture. More recently the ponds have become prime habitats for two types of endangered Hawaiian waterbirds: Hawaiian Coots (*'Alae ke'oke'o*) and Hawaiian Stilts (Ae'o).

[1] David, Reginald E. July 1994. Birds of Kaloko-Honokōhau National Historical Park. National Park Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. Retrieved from http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r1/kalhono.htm on January 30, 2004 (Version 23FEB01).

Unique anchialine pools in the park coupled with the intertidal zone provide additional wetland habitat. These wetlands support both native waterbirds, as well as numerous migrant waterfowl and shorebirds. Vegetated areas elsewhere in the park are largely inhabited by non-native (alien) bird species.

This checklist of the 82 species of birds that have been recorded within the park follows the phylogenetic order of the "Checklist of the Birds of Hawaii-1992".

STATUS

YR - Year round - Jan-Dec
M - Migrant or Vagrant - Sep-Apr

ABUNDANCE

A - Abundant: Sure to see
C - Common: In proper habitat or season
U - Uncommon: Present but may not be seen
O - Occasional: Seen a few times a year
R - Rare: Seen every 2 to 5 years
X - Acccidental: One or two records only

1 - Endemic species or sub-species (found no where else)
2 - Alien; introduced by humans (exotic)
3 - Breeding; has nested at least once
4 - Endangered species or sub-species
5 - Pelagic species

GREBES	YR	M
___ Pied-billed Grebe 3	C	-

PETRELS & SHEARWATERS	YR	M
___ Wedge-tailed Shearwater 5 ('Ua'u *kani*)	R	-

BOOBIES	YR	M
___ Brown Booby 5 ('A)	O	-

FRIGATEBIRDS	YR	M

___ Great Frigatebird 5 *('Iwa)*	O	-

HERONS	YR	M
___ Great-blue Heron	-	X
___ Cattle Egret	U	-
___ Black-crowned Night-Heron 1,3 *('Auku'u)*	U	-

IBISES	YR	M
___ White-faced Ibis	-	X

GEESE, SWANS & DUCKS	YR	M
___ Greater White-fronted Goose	-	X
___ Brant	-	X
___ Green-winged Teal	-	U
___ Mallard 2,3	U	X
___ Northern Pintail *(Koloa māpu)*	-	C
___ Garganey	-	R
___ Blue-winged Teal 3	-	U
___ Cinnamon Teal	-	X
___ Northern Shoveler *(Koloa mohā)*	-	C
___ Gadwall	-	R
___ Eurasian Wigeon	-	R
___ American Wigeon	-	C
___ Canvasback	-	R
___ Ring-necked Duck	-	U
___ Tufted Duck	-	R
___ Greater Scaup	-	R
___ Lesser Scaup	-	U
___ Bufflehead	-	X
___ Hooded Merganser	-	X

FRANCOLINS & ALLIES	YR	M
___ Grey Francolin 2,3	U	-

RAILS & ALLIES	YR	M
___ Hawaiian Coot 1,3,4 *('Alae ke'oke'o)*	A	-
___ American Coot	-	X

PLOVERS	YR	M
___ Black-bellied Plover	-	X

___ Pacific Golden Plover (*Kōlea*)	-	C
___ Semipalmated Plover	-	U

STILTS & AVOCETS	YR	M
___ Hawaiian Stilt 1,3,4 (*Ae'o*)	-	A

SANDPIPERS & SNIPES	YR	M
___ Lesser Yellowlegs	-	R
___ Wandering Tattler (*'Ūlili*)	-	C
___ Grey-tailed Tattler	-	X
___ Spotted Sandpiper	-	R
___ Whimbrel (Asiatic)	-	X
___ Bristle-thighed Curlew	-	X
___ Bar-tailed Godwit	-	X
___ Ruddy Turnstone (*'Akekeke*)	-	C
___ Sanderling (*Hunakai*)	-	C
___ Western Sandpiper	-	R
___ Rufous-necked Stint	-	R
___ Least Sandpiper	-	R
___ Sharp-tailed Sandpiper	-	U
___ Dunlin	-	U
___ Pectoral Sandpiper	-	U
___ Ruff	-	R
___ Short-billed Dowitcher	-	R
___ Long-billed Dowitcher	-	U
___ Wilson's Phalarope	-	X
___ Red-necked Phalarope	-	X

GULLS & TERNS	YR	M
___ Laughing Gull	-	R
___ Franklin's Gull	-	R
___ Bonaparte's Gull	-	R
___ Ring-billed Gull	-	U
___ Herring Gull	-	X
___ Glaucous-winged Gull	-	X
___ Caspian Tern	-	X
___ Little Tern	-	X
___ Least Tern	-	X
___ Sooty Tern 5 (*Pākalakala*)	R	-
___ Black Tern	-	X

PIGEONS & DOVES	YR	M
___ Rock Dove 2,3	A	-

___ Spotted Dove 2,3	A	-
___ Zebra Dove 2,3	A	-
PARAKEETS	YR	M
___ Rose-ringed Parakeet 2	U	-
BARN OWLS	YR	M
___ Barn Owl 2	U	-
KINGFISHERS	YR	M
___ Belted Kingfisher	-	X
STARLINGS & MYNAS	YR	M
___ Common Myna 2,3	A	-
SILVEREYES	YR	M
___ Japanese White-eye 2,3	A	-
WARBLERS & SPARROWS	YR	M
___ Northern Cardinal 2,3	C	-
___ Yellow-billed Cardinal 2,3	C	-
___ Saffron Finch 2,3	C	-
CANARIES, SISKINS & ALLIES	YR	M
___ House Finch 2,3	C	-
___ Yellow-fronted Canary 2,3	C	-
WEAVERS & ALLIES	YR	M
___ House Sparrow 2,3	C	-
WAXBILLS & ALLIES	YR	M
___ Lavender Waxbill 2,3	U	-
___ Warbling Silverbill 2,3	U	-
___ Nutmeg Manikin 2,3	C	-
HYPOTHETICAL		
___ Snowy Egret		

___ Osprey
___ Erckel's Francolin 2
___ Northern Mockingbird 2
___ Java Sparrow 2

Date: _____

Time: _____

Observers: _____

_____

Weather: _____

Remarks: _____

_____

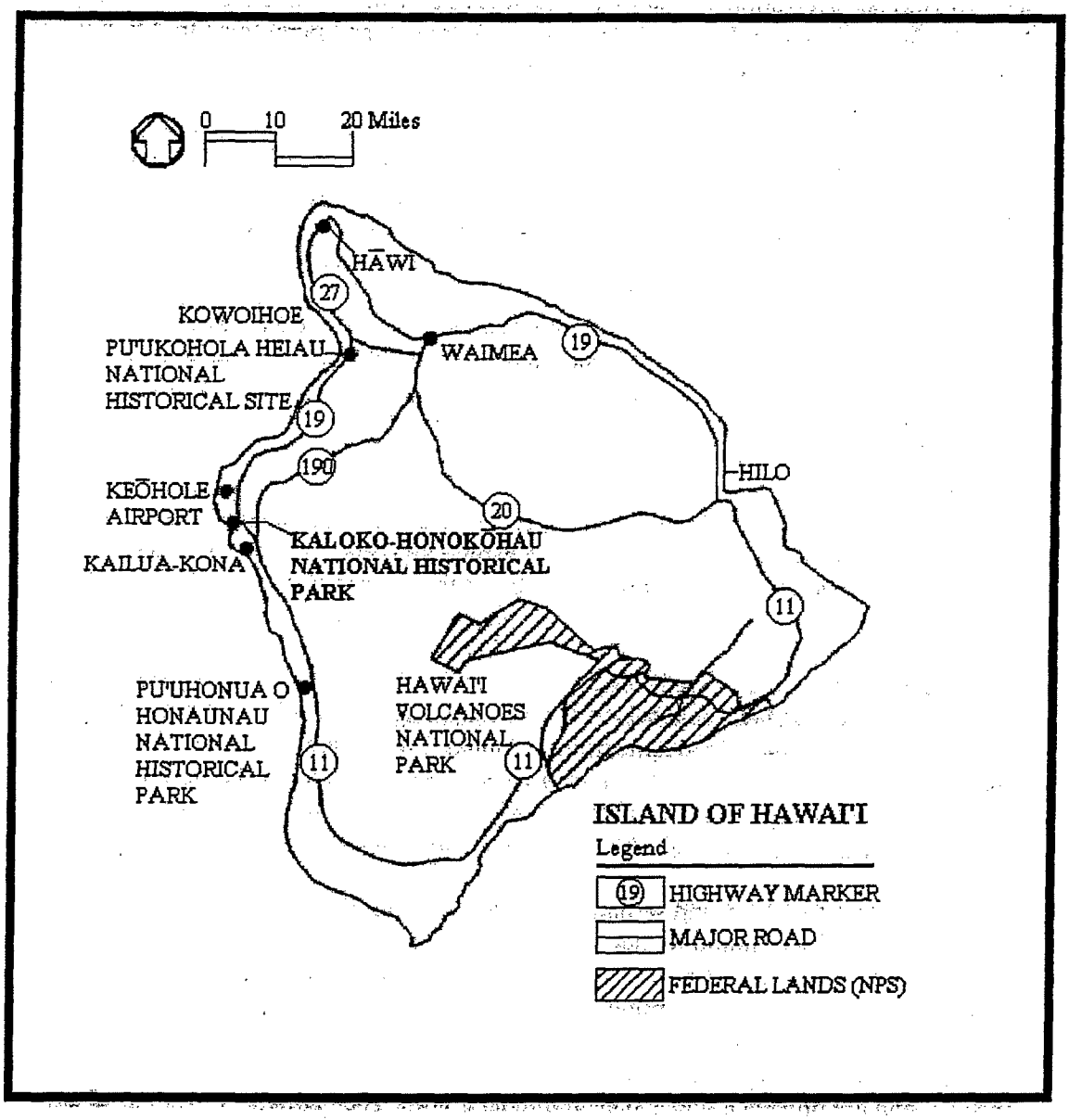
_____

This list was prepared by: Reginald E. David -- July 1994

For more information about the park, please contact:

Superintendent
Kaloko-Honokōhau National Historical Park
73-4786 Kanalani Street #14
Kailua-Kona, Hawaii 96740
Phone: (808) 329-6881
Kaloko-Honokōhau National Historical Park

i



[ii] Kaloko-Honokōhau National Historical Park sits below the majestic Hualilālai Volcano along the Kona coast on the island of Hawai'i. Because of its archeological and cultural values, the area was designated as a National Historic Landmark in 1962 and was established as a National Historical Park in 1978.

Kaloko-Honokōhau National Historical Park was established by Congress on November 10, 1978. The purpose of the park is to preserve, interpret, and perpetuate traditional native Hawaiian activities and culture, and to demonstrate historic land use patterns.

At first glance the landscape appears unsuitable for human habitation. Despite its appearance, the area was once a thriving Hawaiian settlement that harvested from the sea and fishponds, cultivated sweet potatoes, coconut, and raised chickens, dogs, and pigs. In this *ahupua'a* (sea to mountain land division), the people from the ocean traded with those further inland, thus living in harmony within a self-sustaining community.

The most impressive evidence of Hawaiian settlement in this 1160-acre park can be found at Kaloko and 'Aimakapā fishponds and 'Ai'ōpio fish trap. The ocean makes up nearly one half of the park and is an important resource. The waters off Kaloko-Honokōhau National Historical Park are currently managed by the State Department of Land and Natural Resources.

Kaloko fishpond, with its massive seawall, provides an excellent example of the engineering skills of the ancient people. The natural sand enclosure at 'Aimakapā fishpond (modified for aquaculture) demonstrates their capability to live in concert with the environment.

Kaloko fishpond, like most wetlands in an arid setting has been invaded by non-native plants. The pond was favorable habitat for the red mangrove which once encircled the entire pond and eliminated valuable nesting habitat. The National Park Service removed the red mangrove from this pond and other sites within the park. Reclaiming and restoring the pond improves the natural habitat for birds and other animals. Other non-native species are being controlled to encourage native plants and animals to flourish.

The fishponds, tidal areas, and wetlands at Kaloko-Honokōhau National Historical Park are also important as a home for many waterbirds. There are very few natural wetlands in Hawai'i. Today, most significant wetlands on the islands have been built by people (e.g., ponds, reservoirs, sugar mill settling basins, taro fields). The *ae'o* (Hawaiian black-necked stilt) and the *'alaeke'oke'o* (Hawaiian coot) are endemic to Hawai'i -- that is, they are found nowhere else. Both of these waterbirds are officially designated as "endangered species" and are protected under state and federal laws. The habitats at 'Aimakapā and Kaloko fishponds are essential to the survival of these resident waterbirds. Nesting waterbirds are very sensitive to outside disturbances; for this reason we ask that you and your pets keep your distance from the pond's nesting areas. Pets must be on a leash no longer than six feet while in the park.

Anchialine ponds are another unique park resource found scattered throughout -the lava flows. These ponds were a source of brackish to fresh water that attracted people to the area to live or those who traveled through this otherwise arid landscape. The anchialine ponds host an extraordinary biota, including endemic invertebrate species.

Hundreds of archeological features found in the park are reminders of the rich cultural history of Hawai'i, including *kahua* (house platforms), *pa* (planters), *kū'ula* (fishing shrines), *paena wa'a* (canoe landings), *na ala hele* (trails), and *ki'i pōhaku* (petroglyphs-rock carvings). To date, more than 200 archeological sites have been recorded in the Kaloko portion alone and many more have been noted. The significance of the area is the relationship between the people who once lived here, the resources, and a culture that spanned 600 years prior to Western contact.

The Māmalohoa Trail (also known as the King's Highway) was built in the early to mid 1800's. A restored one mile segment is but a fraction of what once extended around much of the island of Hawai'i.

There are several *heiau* (Hawaiian religious sites) found in the park. The most prominent is Pu'uoina, located on the south end of the park boundary adjacent to the Honokāhau boat harbor.

An example of a *hōlua* (stone slide) is located on the east side of 'Aimakapā fishpond. The *holua* was used by the *ali'i* (Hawaiian chiefs) for recreation. The *holua* was prepared by lining the surface with grasses before the event began. This *holua* is only one of six in existence in Kona.

Visitor Information

This park is still under development. Future plans include a unique opportunity to restore the archeological resources to perpetuate traditional aquaculture, horticulture, and the living culture of Hawai'i. Drinking water and other concessions is not available. Overnight camping and fires are not allowed. Rest rooms are located at Kaloko fishpond and on the trail to Honokōhau beach. Interpretive programs are provided for educational groups when arranged in advance.

Visitor information is available at the park headquarters located in the Kaloko Industrial Park, two miles north of the Honokōhau Boat Harbor, or two miles south of the Keāhole Airport. Turn *mauka* (inland) on Hinalani Street. Take the first right hand turn onto Kanalani Street. Turn right into the fourth driveway. Our office hours are Monday through Friday, 7:30 a.m. to 4:00 p.m.

Cultural Resources include archeological sites and artifacts. Do not climb on or alter any rock structures, such as rock walls, *heiau* (ancient temples), or petroglyphs (rock engravings). All archeological sites are protected under the Archaeological Resources Protection Act.

A Cultural History of Three Traditional Hawaiian Sites on the West Coast of Hawai'i Island

Linda Wedel Greene

September 1993

United States Department of the Interior
National Park Service
Denver Service Center[1]

CHAPTER VIII: KALOKO-HONOKOHAU NATIONAL HISTORICAL PARK

A. Setting

About three miles north of Kailua-Kona lies therugged lava-covered shoreline comprising Kaloko-Honokahau NationalHistorical Park. This area includes those lands *makai* of theQueen Ka'ahumanu Highway (Route 19) in the *ahupua'a* of Kaloko and Honokahau.

[1] Retrieved January 30, 2004 from http://www.cr.nps.gov/history/online_books/kona/historyb.htm. [Last Updated: 15-Nov-2001.]

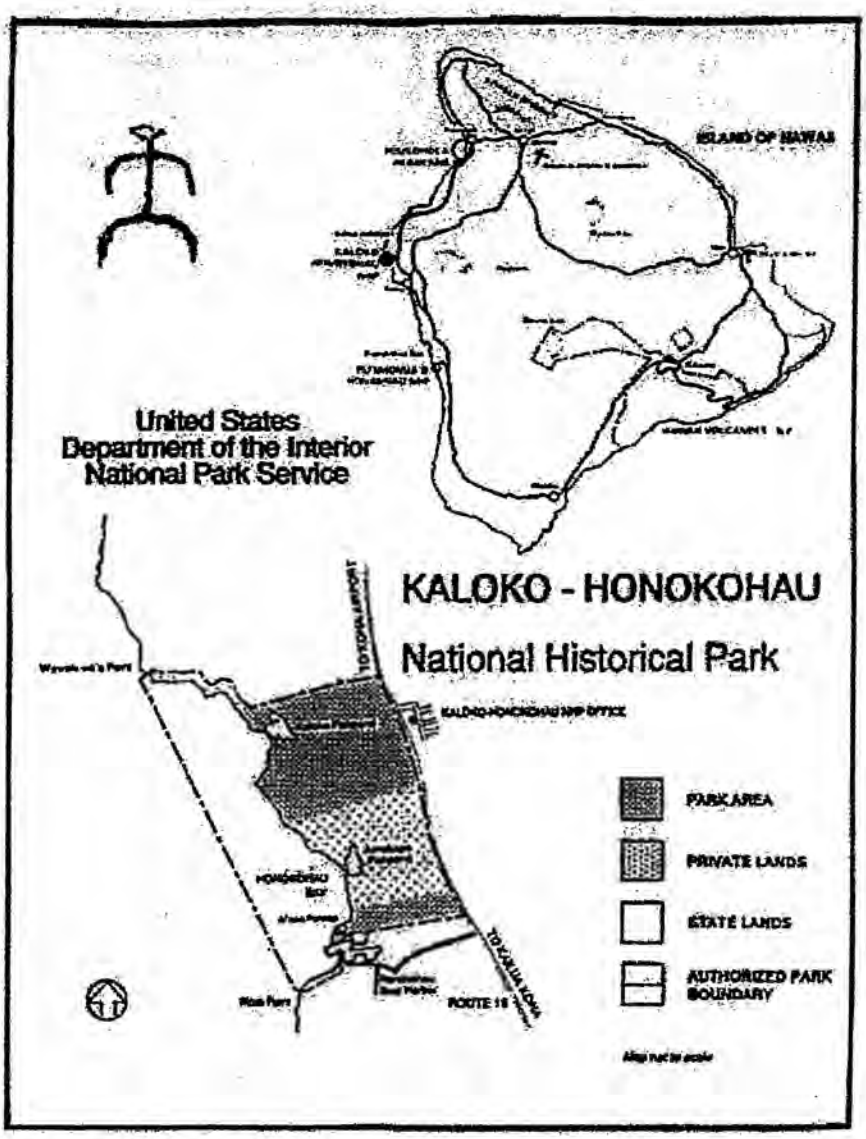


Illustration 93. Map of Kaloko-Honokokau National Historical Park, Hawai'i.
(click on image for an enlargement in a new window)

The area of broad lava fields north of Kailua-Kona resulting from volcanic flows as recent as the 1800s is called Kekaha— a name designating a dry, barren, and harsh land. This portion of the Kona Coast consists of flat open areas with scattered grasses among the convolutions of rugged lava. The jagged terrain makes foot travel almost impossible, a problem that the early Hawaiians addressed by means of painstakingly built trails. In 1823, walking northwest from Kailua toward Kaiwi Point, the missionaries Asa Thurston and Artemas Bishop noted neat houses shaded by coconut and *kou* trees erected on top of the lava flows along the shore. Small gardens in the few patches of soil among the rocks produced sweet potatos, watermelons, and even some tobacco. The last eruption prior to their visit had been in 1801, that outflow from Hualalai having destroyed villages, agricultural fields, and fishponds on its way to the sea, where it re-formed the coastline.[1]

The lack of rainfall in this area made large-scale agricultural production impossible, but several other advantages enabled establishment of a settlement that lasted well into the nineteenth century. These included calm seas with a shallow canoe landing area, plentiful marine resources, and a variety of plants and flowers that served medicinal and dietary needs as well as furnishing material for making fishnets and for thatching simple shelters erected on the *pahoehoe* and *'a'a* lava flats. Cool, brackish springs provided a sufficient water supply. The use of these pools was dictated by the *kapu* system, which designated some of these for drinking, some for bathing, and others for washing utensils or clothes. [2]

Despite the dryness and hostility of the environment, the early inhabitants of the Kaloko-Honokahau coastal settlements devised successful adaptive methods of growing supplementary food items such as sweet potatoes and gourds upon the lava beds. The husks of dry coconuts, immersed in water until well soaked, and then placed around the plant roots provided moisture and protected against direct exposure to the harsh sun. Stone enclosures built around the plants provided support for vines, deflected the wind, and lessened the effects of the afternoon heat. [3] Archeologist Robert Renger theorized that the presence of these agricultural structures enabled a different type of adaptation to the environment in this area— one in which agricultural production along the coast supplemented both the marine resources *and* the products of the upland. [4]

The most important subsistence features of this shoreline, and those that imbued the area with such importance for the ancient Hawaiians, were its fishponds. Of the three structures within the park, two were originally inland bays converted into ponds by stonewalls constructed across their mouths, isolating them from the sea except for controlled water movement through *makaha* (sluice gates). The third feature, a fishtrap, was formed by arcing a stone wall from the shoreline out to a protruding point of land.

B. Chronology of Settlement

In a new publication currently in press, Archeologists Ross Cordy, Joseph Tainter, Robert Renger, and Robert Hitchcock, on the basis of historical accounts and archaeological data, have postulated the social, economic, and physical development of the Kaloko-Honokahau area over the years. The following information is taken from their study.

1. A.D. 900s-1700s

The authors believe that small permanent settlements in the leeward portions of Hawai'i Island began by the A.D. 900s to 1000s, and possibly earlier. These would have occurred near favorable water sources, Kaloko bay probably having been one of the most sheltered and inviting large inlets along the Kona Coast. Coastal habitations had expanded by the 1200s, utilizing inland fields as well as sea resources for subsistence. The Kekaha lands north of Kaloko and extending to Kohala are thought to have undergone initial permanent settlement beginning in the 1400s, with subsequent occupation of the coast north and south over the next few centuries.

Sometime during the period of 1580 to 1600, Laeanuikaumanamana, the *kahuna-nui* of the ruling chief, Liloa, acquired the Kekaha region. It is thought that the construction of fishponds at Kaloko and Honokahau began during this time, with Kaloko Fishpond dating from at least the 1400s to 1500s During the 1600s to 1700s, as the Kona Coast population grew with the

establishment of the royal residence of Umi-a-Liloa at Kona and the consequent increased demand for food production, Kaloko also increased to probably almost 200 residents. It continually supported a higher population than other Kekaha areas because of its fishpond and extensive inland field system.

It was the presence of these resources that resulted in residence at Kaloko by a high chief for at least part of the late prehistoric period. The authors suggest that Kaloko *ahupua'a* had been given to Kame'eiamoku, a high chief and one of the counsellors of Kamehameha, as well as one of the heirs of the Kekaha lands, the area having been a periodic residence of that family from his grandfather's time. A specific site within the park has even been identified as a chiefly residence. At some time during this period Kaloko's large *heiau* was built. Such structures were occasionally constructed away from the major centers of government, serving as *luakini, ahupua'a heiau,* or as a high chief's personal *hieau.* It is possible the "Queen's Bath," an anchialine pond, and its associated cairns is also a religious site constructed during this period, perhaps as an *ahupua'a* shrine, although its precise use has not yet been determined. [5]

2. Historic Period (1800-1900)

Major changes occurred along the Kona Coast in the early historic period. Drastic depopulation resulted from inhabitants leaving the coastal settlements for the port towns of Kailua and Kealakekua, resulting in a decline in agricultural production and in the utilization of marine resources. Diseases; the abolition of the *kapu* system; and the removal of the central government to O'ahu and Maui all contributed to the dissolution of the early settlements.

By the early 1800s, Kaloko was still an identifiable community, containing about six households near the coast, but with no high-ranking occupants in residence. These coastal habitations centered mainly around the fishpond. A few scattered inland residences remained. Although the abolition of the ancient religious system probably ended formal use of the *heiau* and other religious shrines in the area, the already declining population and the movement of the high chiefs of Kekaha to Honolulu may have instigated this move much earlier. Subsistence still depended on agriculture and marine exploitation. By the 1830s to 1840s, the coast was being abandoned, with some resettlement occurring in the uplands zone. Only a single household, that of a caretaker, occasionally occupied the area around the fishpond. [6]

Hawaiian *ali'i* had always highly valued lands containing fishponds as a dependable source of a continuing and plentiful food supply. The Kaloko and 'Ai'makapa fishponds were among the largest along the Kona Coast and added considerable value to the lands on which they were located. They were probably the primary reason that *ali'i* used this area for recreational and ceremonial purposes. [7] The 1848 Great *Mahele* resulted in almost all lands with fishponds being selected as private property by members of the ruling family. To Lot Kamehameha (Kamehameha V), a grandson of Kamehameha, went the lands of Kaloko and Kaupulehu, both supporting fishponds. Kaloko Fishpond was considered a very valuable resource, later having its own overseer who sold its products in Kailua. Kamehameha's granddaughter, Kekauonohi, received the *ahupua'a* of Honokohau-nui, containing the large 'Aimakapa Fishpond. W.P. Leleiohoku, heir of Kuakini, Ka'ahumanu's brother, received the smaller 'Ai'opio Fishtrap in Honokohau-iki. [8]

The land that Lot Kamehameha received in Kaloko *ahupua'a* included all acreage except cultivated lands *(Kuleana* grants) awarded to commoners, which numbered twelve adjacent to or near the main road around the island. [9] A Catholic school with forty-five students was listed in Kaloko in 1848. [10] Government records show that in 1857 nineteen people were paying taxes in Kaloko; this number reached twenty-three in 1860. [11] In her discussion of the population changes in Kaloko through the years, Kelly surmises that the entire *ahupua'a* of Kaloko might have supported up to 400 people at one time. The *Mahele* wrought numerous changes by initiating a new system of land division and the transition to a cash-based economy. Crops and produce from Kaloko Fishpond were taken to Kailua-Kona and the arid Kekaha region for sale. [12] The coastal trail connecting Kekaha villages was abandoned as traffic moved to the trails connecting the upland communities. The Mamalahoa Trail, or Lower Government Road, farther away from the coast and inland of the prehistoric coastal King's Highway, was constructed between 1835 and 1855. The *Mahele* and subsequent awarding of private claims probably also forced some of the inhabitants off their lands, either into outlying areas or into one of the larger port cities such as Kailua or Kawaihae. Eventually the aggrandizement and fencing of large portions of land by ranchers also served to discourage smaller native landowners. [13]

Princess Ruth Keelikolani acquired Kaloko by deed in 1874 as the sole heir of Kamehameha V. She leased the *ahupua'a* of Kaloko to three lessees for five years, but exempted the fishpond. A second five-year lease was granted to two of these men in 1881. [14] After Ruth Ke'elikolani's death in 1883, her sole heir was Princess Bernice Pauahi Bishop. Upon her death in 1884, Kaloko was sold to C. H. Judd, trustee of the estate of King Kalakaua and Queen Kapiolani. (John A. Maguire of the Huehue Ranch obtained Kaloko from that estate in 1906.) [15]

The area around Kaloko Fishpond began losing its identity as a community beginning in the 1880s, when permanent settlement started moving upland where cash crops could be grown, the population focusing on the Kohanaiki Homesteads. Social and economic ties were expanding outside the Kaloko area as the shoreline was virtually abandoned both here and in neighboring *ahupua'a.* The Kaloko Fishpond caretakers relied completely on cash sales of its produce. [16] J.S. Emerson's ca. 1888 map of North Kona shows only a few houses along the Kaloko-Honokohau coast: that of Kealiihelepo on the east edge of Kaloko Fishpond and those of Kalua and Beniamina between 'Ai'opio and 'Aimakapa fishponds in Honokahau. [17]

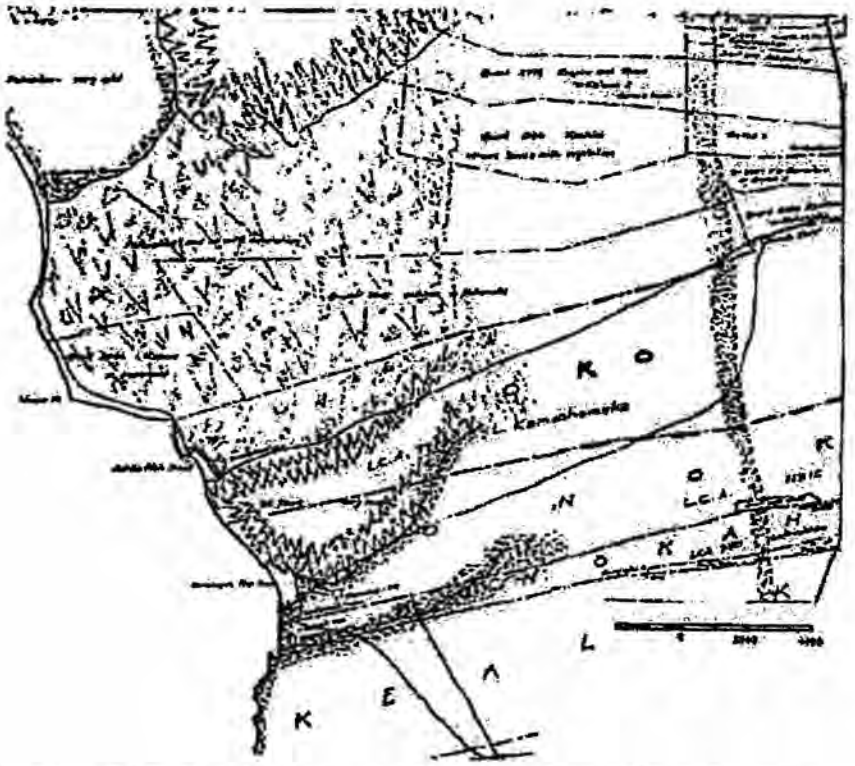


Illustration 94. Portion of Kailua Section, North Kona, Hawaii, Hawaii Territory Survey, survey and map by J.S. Emmerson, 1952.

Ultimately large ranches began leasing and purchasing the lands formerly owned by Hawaiian chiefs. Ownership of the Kaloko *ahupua'a,* excluding the *kuleana* grants, passed into the hands of the later Huehue Ranch operation. Subsistence in Kaloko *ahupua'a* from here on began to depend on the small-scale household farming in the uplands, which had shifted primarily to cash crops by the 1880s; on sales of fish from Kaloko Fishpond by its caretakers or lessees in the markets of Kailua-Kona; and on cattle raising by the Huehue Ranch. [18]

Plantation agriculture began in Hawai'i in the mid-nineteenth century, after the decline of the whaling trade and of the demand for ship provisioning that had given impetus to the native agricultural system. Plantation agriculture greatly altered the native social and economic systems. Many native Hawaiians would not work as laborers in the cane fields. Others were either forced to migrate to the upland plantations to work under this system so foreign to their traditional way of life or to move to larger towns, such as Kailua or Honolulu, to find other means of subsistence. The continuing prosperity of the plantations created a continuing need for fieldworkers. In addition, then, to new tools, agricultural practices, and forms of landownership, Western-style plantation agriculture introduced foreign contract laborers. [19] Chinese, Japanese, Portuguese, Korean, and Filipino immigrants soon began arriving to work on the plantations.

Coffee raising was a growing industry in Kona in the 1880s. A large number of coffee plantations filled the hills behind Kailua. These trees grew in narrow strips or belts of volcanic land on the leeward slopes of Hualalai and Mauna Loa. Small-scale coffee operations also existed around Kaloko and Honokahau in North Kona. [20]

Few written records exist about the Kaloko coast from the latter half of the nineteenth century through the turn of the twentieth. What little is known exists primarily only in the memories of older Kona District residents. [21] As the archeological record bears out, many of the sites in this once heavily populated area were gradually abandoned in the middle and late nineteenth century due to a combination of factors causing heavy population decline, including culture change, disease, new land laws, and a growing desire to move to urban centers. [22] At that time the remaining inhabitants tended to cluster around the fishponds in the area. [23] Honokahau village ca. 1913 held about a dozen houses along the beach. At Kaloko at this time, only one house is mentioned, near the fishpond — probably that of a caretaker. [24]

The Honokahau settlement continued to be inhabited as a Hawaiian village until about 1920, when people left it due to its isolation — it was accessible by sea only in small boats and by land only on foot or horseback. The site was later occupied by Filipino fishermen, living in shacks on the shore. [25] The Filipinos who obtained leaseholds on the Frank Greenwell property had come to Hawai'i beginning in the 1920s. After the expiration of their work contracts, many stayed on, moving from the plantation camps down to the beach.

3. Historic Period (1960s-Present)

Kaloko continued as a working domestic and commercial fishpond during the early part of this century, the main seawall undergoing constant repairs. Between 1943 and 1961, it was leased to a resident of Kailua, who cemented several sections of wall to minimize maintenance. He also built a jeep trail from Kaloko to Kailua over which to ship fish from the pond to market. After that lease expired, the coastal area was sporadically used by fishermen and campers, who mostly occupied the coconut grove at the south end of the seawall. [26] Kona's resort/development boom started in the late 1960s, aided by construction of the Queen Ka'ahumanu Highway, which provided easy access to the seaward portions of North Kona and South Kohala. [27]

A 1972 federal court memorandum stated that the Kaloko-Honokohau area remained rural in character, with its inhabitants still relying on the ocean, as well as the land, for their subsistence. The bounty of the ocean and fields kept them independent and off public assistance. [28] Today, under permits first issued by the Greenwells and later by the National Park Service, a few huts of fishermen dominate the Honokohau shoreline around 'A'iopio Fishtrap.

A final development spurring further activity in the area occured when the 1965 River and Harbor Act authorized construction of a small boat harbor, which began in 1968 and was finished by March 1970. (Although located in the *ahupua'a* of Kealakehe, it is referred to as the Honokohau boat harbor.) Because of the basaltic lava that had to be removed, many tons of explosives were used to form the facility, which included an inshore harbor basin, entrance channel, main access channel, rubble wave absorbers, and a wave trap. Its total accommodation was planned at more than 400 boats. [29] Construction of the boat harbor resulted in destruction of some archaeological sites, but they were of marginal value and were salvaged prior to their loss. This construction added another dimension to activity along the coast, providing impetus for planning further resorts there and housing in the upland areas.

C. Social and Political Structure of the Prehistoric Community

The number of recreational and ceremonial structures that remain in the park, especially in the vicinity of 'Ai'makapa Fishpond, suggest intensive use of the area by *ali'i.* Reportedly the armies of Kamehameha, who housed his court a short distance south in Kailua, rested and refreshed themselves at Kaloko-Honokohau during long marches. [30]

Archeologist Ross Cordy has formulated some interesting societal data in his studies of prehistoric social change, postulating that two social rank echelons were present at Kaloko. Only commoners resided there between A. D. 1050-1100 and 1400-1450, with an overlord probably living elsewhere in the district. The upper (high chief) echelon was present sometime between A.D. 1450-1500 and 1600-1650. Cordy also believes that Kaloko was a discrete community with identifiable boundary features, including unoccupied buffer zones to the south and north between it and the houses of neighboring settlements. A religious cairn site ("Queen's Bath" area) marked its southern border. He believes that other features, such as an internal trail network between permanent sites and the presence of a major temple and a cemetery, also indicate a community entity at Kaloko. [31]

Two researchers recording the oral traditional and social history of the Kaloko-Honokohau area under the auspices of the Bishop Museum gathered information on the *kahuna* hierarchy that ruled there during ancient times. According to that information, the high priest Pa'ao brought in a king named Pili to set up a new regime to replace the chaotic one Pa'ao found on the island. This was the beginning of the religious hierarchy that characterized Kaloko-Honokahau. Establishing his residence on a hill overlooking Kawaihae, Pili ruled Kohala and Kona through chiefs stationed at Kawaihae, Honokohau, and Palemano Point, Ke'ei. Communication in times of danger or conflict consisted of signal fires that could be seen over long distances. These chiefs governed activities in their respective areas and maintained communications with their high chief.

Makakilo, the chief at Honokohau, ruled North Kona from his base of operations at Pu'uoina Heiau. He also directed fishing operations. His home was reported to be on the first terrace of the *heiau,* closest to the ocean. A connection between the *heiau* and fishtrap is suggested by the fact that, in connection with his supervision of fishing activities, he reportedly held fish in the pool prior to distribution. Mano succeeded Makakilo, establishing his residence on the second terrace of Pu'uoina. The next *kahuna* chief, Kaumanamana, lived on the top level of the *heiau.* Kanaka-leo nui his successor, set up his base at Keauhou and commuted to Honokohau to direct activities there from the bluff above 'Aimakapa. Another famous ruling chief was Kekuaokalani, the highest-ranking *kahuna* on Hawai'i at the time of Kamehameha's birth, and the same person who, left as guardian of Ku-ka'ili-moku by Kamehameha, lost his life opposing Liholiho's abolition of the *kapu* system. [32]

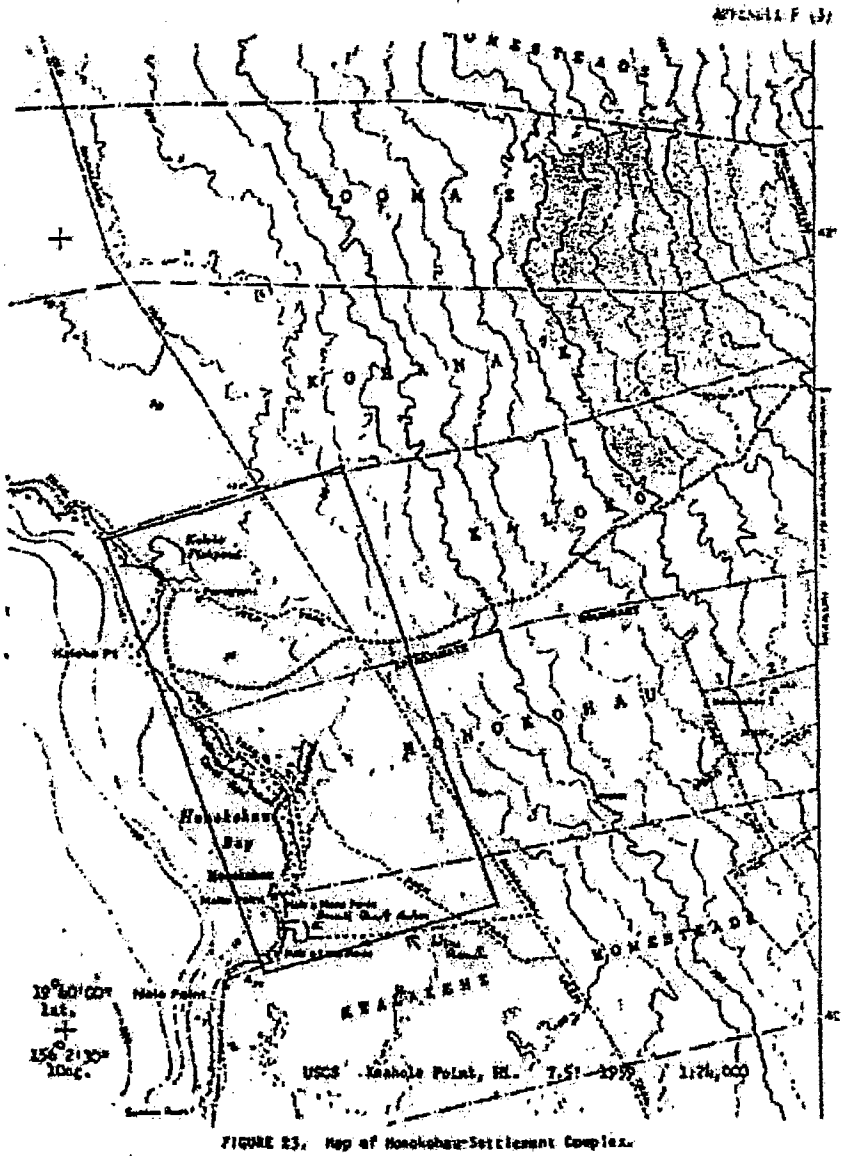


FIGURE 23. Map of Honokohau Settlement Complex.

Illustration 95. Map showing boundaries of Honokohau Settlement area from National Register of Historic Places Inventory Nomination form, 1970.

D. Relationship of Prehistoric Kaloko with Neighboring *Ahupua'a*

Robert Renger explored the relationship that might have existed between Kaloko and the neighboring *ahupua'a* of Honokahau and Kohanaiki. He concluded that because the distribution of archaeological sites between the three areas was not continuous, there was probably not much interaction between them. This might have been because in early times usually only *ali'i* had much mobility across *ahupua'a,* although numerous trails between the coast and uplands signify considerable interaction *within* the *ahupua'a* by the common people. Renger theorized that only with increasing population decline in the Kaloko area was there more interaction along the coast between Kaloko and Kailua. [33]

In consonance with this line of thought, another report suggests that the name Honokohau Settlement on the national historic landmark form is misleading. Its writer points out that although strong social and kinship ties existed between people in the same *ahupu'a'* living on the coast, inland, or between these two areas, social ties were much weaker between people living in different *ahupua'a,* even if they were located next to one another on the coast. Because the area of Honokohau Settlement National Historic Landmark included the coastal sections of three separate *ahupua'a* — Kaloko, Honokohau, and Kealakehe — it would not have comprised a single integrated settlement, but three habitation areas that constituted the coastal portions of inland-coastal cultural complexes. And within these, there probably would have been closer social ties between the *makai-mauka* people within the same *ahupua'a* than between the coastal people of the different *ahupua'a.* [34]

E. Summary of Prehistoric Development

Briefly then, research suggests that although originally established as an outlier settlement of another community, Kaloko possibly had become a unified community after A.D. 1200-1300. The coastal village was composed of several residential groups, within which one household was probably dominant in certain activities, such as religious observances. In addition to this low-level, horizontal division of authority, a hierarchial pattern of authority existed in the form of a chief who exercised control over the political and religious functions of the community. Prior to and after A.D. 1490-1610, this chief lived elsewhere in the district; during that time period, however, he apparently resided in Kaloko. No exact population figures for the settlement are available, but it probably supported from 60 to 100 people. In Kaloko, as in other *ahupua'a,* agricultural activities took place in the uplands while marine exploitation supplemented by the artificial raising of fish occurred along the shore. In other areas, these pond fish were intended only for chiefly consumption; it is uncertain if this was the case at Kaloko. Drinking water was available in brackish pools near the settlement, which were linked to the households by a trail system. [35] These same generalities probably hold true for the Honokohau coastal settlement area as well.

F. Historical Associations

1. Earliest Reference to Kaloko-Honokohau Area

Samuel Kamakau presents the earliest traditional reference to this region when recounting a secret trip made by a spy of the chief of Maui to investigate the west coast of Hawai'i. When asked where he had gone and what he had seen, the spy reported, among other things, visiting "large inland ponds" at Kaloko and Honokahau. [36] According to genealogical calculations by Marion Kelly, this probably occurred in the late sixteenth or early seventeenth century, testifying to the antiquity of these fishponds. [37] Historically Kaloko's closest ties were to the Kona chiefs and particularly to Kamehameha's court at Kamakahonu in Kailua-Kona, a village that was probably dependent on the pond for supplemental food and on which the later caretakers of the pond depended for cash sales of fish. [38]

2. Use as Burial Ground for *Ali'i*

The Kaloko-Honokohau settlement area contains burial places for the dead. It is also characterized by a number of secret caves and lava tubes that figured prominently in early

Hawaiian folklore as the burial place of high-ranking *ali'i*. As described in an earlier section of this report, funeral rites connected with the death of ruling chiefs of Hawai'i involved complex initial ceremonies that prepared the body for afterlife, followed by secret burial of the bones. These were entrusted to loyal followers whom the deceased had previously designated. Burial took place at night to prevent disclosure of the hiding place and desecration of the remains, which might result in transference of the deceased's *mana* to an enemy.

3. Traditional Burial Site of Bones of Kamehameha

An early traditional reference to the area in the late eighteenth century mentions the burial in a hidden cave at Kaloko of Kahekili, the ruler of Maui. However, the most significant burial ceremony traditionally reported to have taken place there is that of Kamehameha, although there is no firm proof of this event. His bones were supposedly transported by canoe from Kailua to Kaloko, where the bearers of the royal remains met the man in charge of the secret burial cave, and together they placed the bones in the same depository used for Kahekili. [39] Kamakau presents a description of this burial place, relating:

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. [40]

Kamehameha's burial place has been a subject of long conjecture, and will probably never be identified beyond doubt. On the basis of traditional sources, however, and on the basis of a lack of any solid evidence for an alternative site, it is thought to be at Kaloko.

In 1887 King Kalakaua designated a man named Kapalu, who had guided him to a burial cave at Kaloko in which he supposedly beheld Kamehameha's bones, as overseer and keeper of the "Royal Burial Ground" at Kaloko. A year later Kalakaua wrote that he ordered Kapalu to retrieve the bones, which the king took to Honolulu and deposited in the Royal Mausoleum in Nu'uanu Valley. [41] There is some question as to whether the bones were authentic and differing accounts exist as to what happened to them in later years. Barrère, in commenting on the Kamehameha burial question, states:

it is obvious that conflicting stories were given by informants named and unnamed since the early 1820s. The earliest stories were no doubt purposely misleading; the later ones are mainly versions of the earlier, with the embellishments to be expected in the retelling of oral traditions. If, despite vehement denials, the bones Kalakaua obtained at Kaloko and deposited in the Mausoleum in Nuuanu were indeed those of Kamehameha, they were spirited away from there before March of 1918, and this story too becomes but another version of the tale of the bones.

Let those who will, profess knowledge of the hiding place of the bones of Kamehameha — "The morning star alone knows. . . ." [42]

4. Association with Kamehameha II

Another early reference to the Kaloko area states that after Liholiho's meeting with the *ali'i* at Kawaihae shortly after his father's death, when discussions were held to resolve political and economic issues plaguing the kingdom, the young heir went to Honokohau to consecrate a *heiau.* Because he was intoxicated, however, the ritual was considered imperfect. It was immediately after this incident that he returned to Kailua and abolished the *kapu* system. [43]

G. Description of Resources

1. Fishponds

Fishponds are impressive examples of native prehistoric engineering/technological achievements and comprise one of the many effective techniques Hawaiians used in adapting to a sometimes hostile environment. On the North Kona Coast most of the land is covered with lava that has not yet decomposed to the degree that it produces enough soil for large-scale agriculture. The dry and bleak environment of the Kekaha region between Honokohau and 'Anaeho'omalu was somewhat ameliorated by the presence in ancient times of nineteen major fishponds. Enabling a larger population by bolstering food resources, these ponds became the focal point of settlement and social organization in the area. [44]

Very few fishponds exist on Hawai'i Island, because many are being filled in to create more land for housing developments. The two at Kaloko-Honokohau, therefore, comprise some of the park's most significant and unique resources. Kaloko is a *loko kuapa,* or walled fishpond, formed by sealing off a small bay. 'Ai'opio Fishtrap was built by constructing a stone seawall arc from the shore to form an enclosed body of water. It is considered a fishtrap rather than a fishpond because it lacks a sluice gate. 'Aimakapa Fishpond is a lagoon formed behind a barrier beach.

Kaloko Fishpond and 'Ai'opio Fishtrap are the only remaining large Hawaiian aquacultural structures with extensive ancient foundation remains in place in relatively good condition. In addition, many prehistoric and historic sites associated with them and their use are present. [45] 'Ai'opio is the only fishtrap on the island of Hawai'i, and in addition to its good state of preservation, is a significant example of one aspect of prehistoric fishing technology. [46]

One of the general settlement types identified for the Hawaiian Islands is referred to as an agglutinated pattern. This pattern is characterized by high population density, a grouped community, clustered residential sites, and clear boundary delineations between the cluster and sites outside it. Agglutinated sites tend to be found along the shore in coastal areas with sandy beaches and safe canoe anchorages that offer good fishing and surfing possibilities — in other words, generally idyllic settings. [47] They also are often associated with people of high status. The Kaloko, 'Aimakapa, and 'Ai'opio sites are all representative of the agglutinated settlement pattern. All three exhibit a density of habitation features and the presence of temples and shrines, as well as canoe and net sheds supporting fishpond maintenance and harvest. These sites did not support a very large population, however, probably indicating that the pond harvests were not generally available for public use. [48]

Illustration 96. Map showing boundaries of Honokohau Settlement area from National Register of Historic Places Inventory Nomination form, 1970.

Illustration 97. Map showing boundaries of Honokohau Settlement area from National Register of Historic Places Inventory Nomination form, 1970.

G. Description of Resources (continued)

1. Fishponds (continued)

a) Kaloko Fishpond

Kaloko is one of the largest surviving Hawaiian fishponds and is thought to have been, if not a major source of food, at least a dependable source of fish for the community in times of need.

Robert Renger's analysis of data on Hawaiian fishpond utilization has convinced him that this pond did not play a major role in the prehistoric subsistence economy of the area, but *was* important as an indicator of social status. [49] The present pond was originally a natural embayment that was cut off from the sea by means of a manmade seawall. The entire pond covers about eleven acres. Secondary walls in the pond form three separate areas in which fingerlings were raised or in which different species of fish were segregated. [50]

Kaloko's smaller secondary pond walls are still well preserved. Although several sections of the original Hawaiian seawall have either been destroyed or modified, enough segments of the main wall and its foundations remain to provide some indication of the original fishpond construction. [51] This pond and its seawall are considered an excellent example of the high degree of engineering skill attained by the ancient Hawaiians. Kaloko possesses the largest and thickest manmade seawall on Hawai'i and is the island's best and most impressive example of a *loko kuapa* type pond. [52]

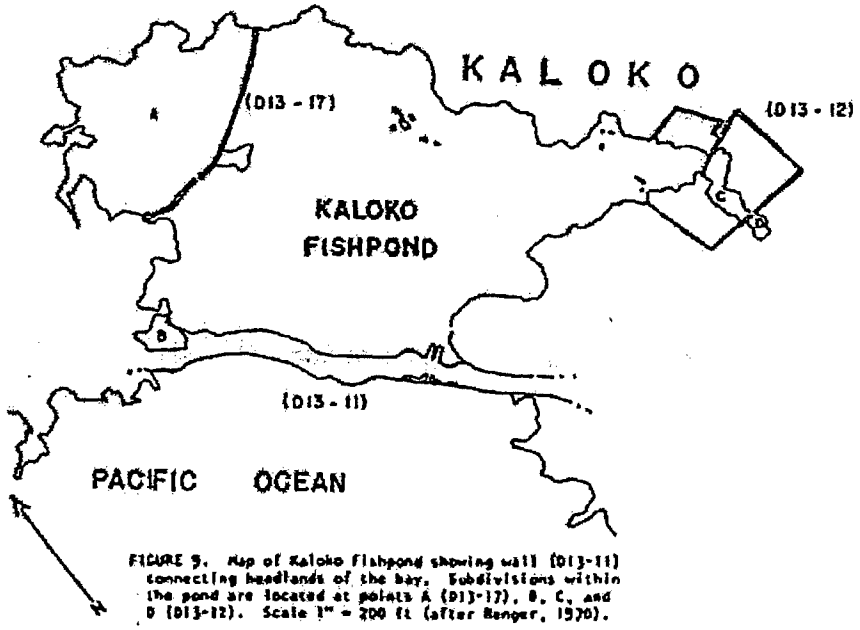


FIGURE 9. Map of Kaloko Fishpond showing wall (013-11) connecting headlands of the bay. Subdivisions within the pond are located at points A (013-17), B, C, and D (013-12). Scale 1" = 200 ft (after Renger, 1970).

Illustration 98. Map of Kaloko Fishpond, showing subdivisions. Figure 9 in Kelly, *Historical Survey of Kaloko*, p. 19.

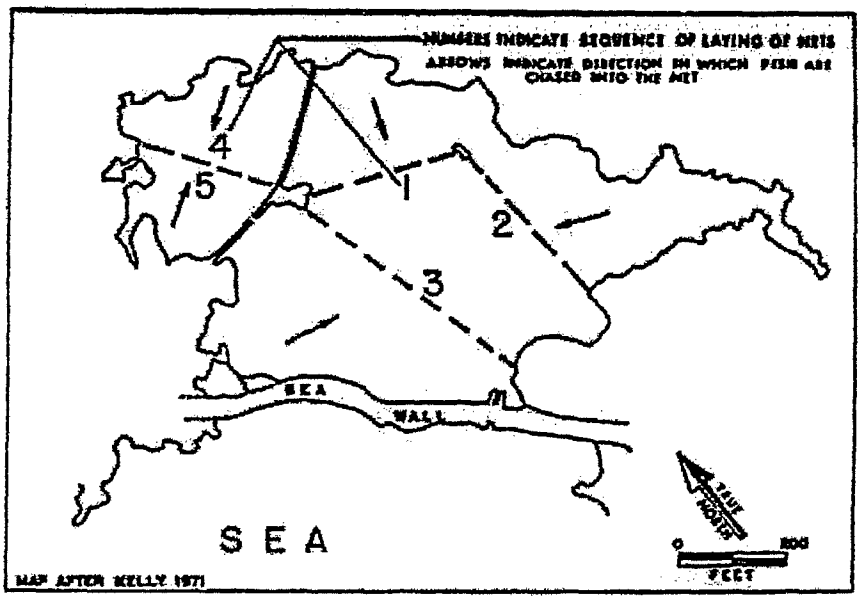


Fig. 35. Placement and Progression of Fishnets, Kaloko Fishpond

Illustration 99. Map of Kaloko Fishpond, showing placement and progression of fishnets for harvesting. Figure 35 in Kikuchi, "Hawaiian Aqualcultural System," p. 132.

The Hawaiian word *kaloko* means "the pond." Although most fishponds had their own specific names, as do 'Aimakapa and 'Ai'opio Fishtrap, Kaloko Fishpond has always been referred to by this generic term that also refers to the *ahupua'a* in which it is located, which may indicate its antiquity and importance. Kikuchi and Belshe suggest that Kaloko was constructed after 'Aimakapa because its more massive construction would have required a well-established social and labor organization. It has a much less significant cultural assemblage associated with it, the habitation sites found near the coast and inland from this pond and the canoe shed sites at the edge of the pond suggesting a small population primarily tending to maintenance of the pond and harvesting of its products. [53]

Evidently from the time of the Great *Mahele* through its ownership by King Kalakaua and Queen Kapi'olani, Kaloko Fishpond's caretaker served as an agent of the ruling chief of the *ahupua'a.* By 1860, fish from the pond were being sold for cash, perhaps supplementing the overlord's coffers. Later the Huehue Ranch leased the pond to caretakers. [54]

In her historical study of the Kaloko area, Marion Kelly traced the chronology of a continuing succession of Kaloko Fishpond caretakers and lessees through the early 1960s and also provided information on how the pond was fished and the experience of living near it. These residents periodically performed repair work on the walls of the pond and were responsible for developing some of the house sites surrounding it. In fact, many of these sites can be attributed to specific individuals or families. [55]

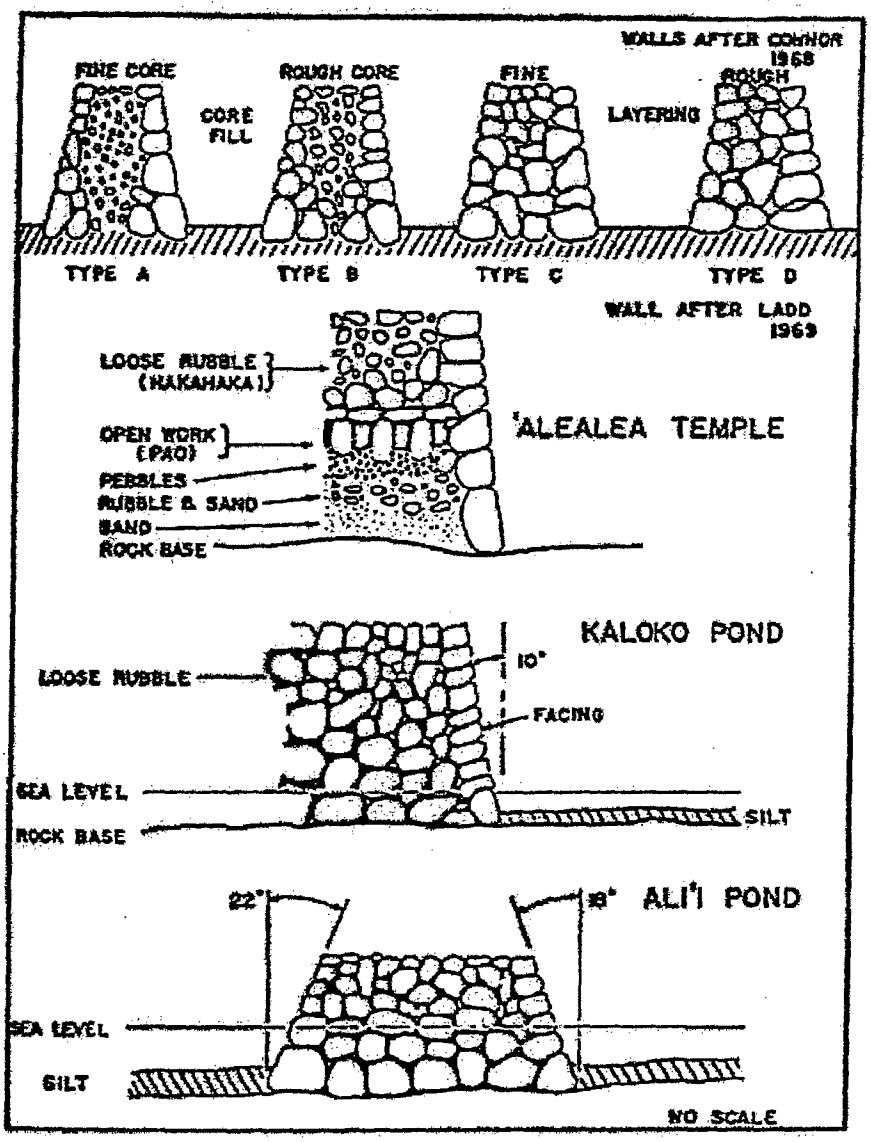


Fig. 27. Wall Construction

Illustration 100. Techniques of ancient Hawaiian fishpond wall construction. Figure 27 in Kikuchi, "Hawaiian Aquacultral System," p. 53.

Kaloko Fishpond is highly respected by the Hawaiians as the burial place of Kamehameha's remains, which were interred during a ritual ceremony conducted in the traditional secret manner. It is also revered as the burial place of other high *ali'i* as well as of deceased respected ancestors. In addition, religious activities of the *kahuna* hierarchy that ruled here have long been associated with the area. These religious and cultural ties are very sacred to native Hawaiians. As the reputed burial place of the greatest of all Hawaiians — the king whose life and achievements still influence modern thoughts, attitudes, and emotions — the pond has overriding historical and cultural significance to Hawaiians. [56]

Some native Hawaiians think the pond is *kapu* because of a *mo'o* (lizard) or spirit guardian that protects it and its resources from abuse. It is thought that if the pond is treated badly, its *mo'o*

will be angered and shower bad luck on those responsible. If the pond is well cared for, the *mo'o* will be benign and cooperate in fishing activities. [57] Kelly's informants have told her the *mo'o* is female, one person having reported seeing a "mermaid"-like figure sitting on a rock in the pond. [58]

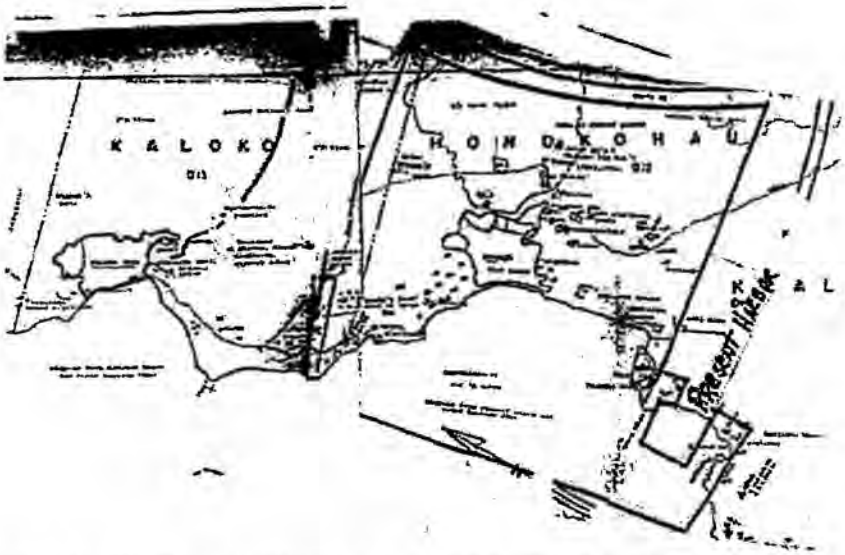


Illustration 101. Emory and Soehren map of Kaloko-Honokohau-Kealakehe area with additional notations by NPS Western Regional Archeologist Roger Kelly. One of the concrete tombs near the *holua* is dated "1924"; the other is inscribed "W.P. Kahale, born Dec. 3, 1857, died Oct. 15, 1915." There are several other grave depressions nearby. From figure 1 in *Archaeological and Historical Survey, Honokohau Area,* p. 2.
(click on image for an enlargement in a new window)

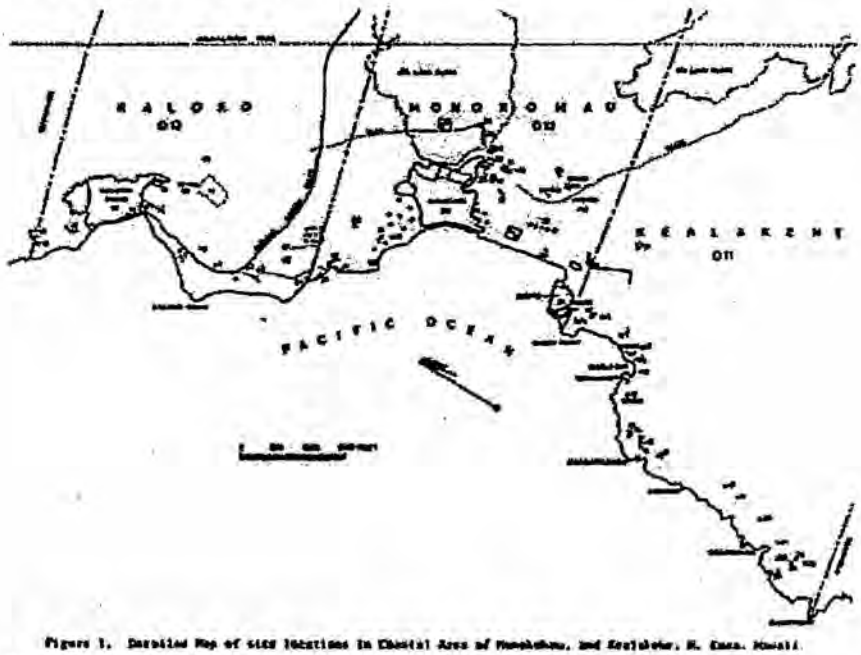


Illustration 102. Archeological sites along the Kaloko-Honokohau-Kealakehe coastal area. Figure 1 in Emory and Soehren, *Archaeological and Historical Survey,*

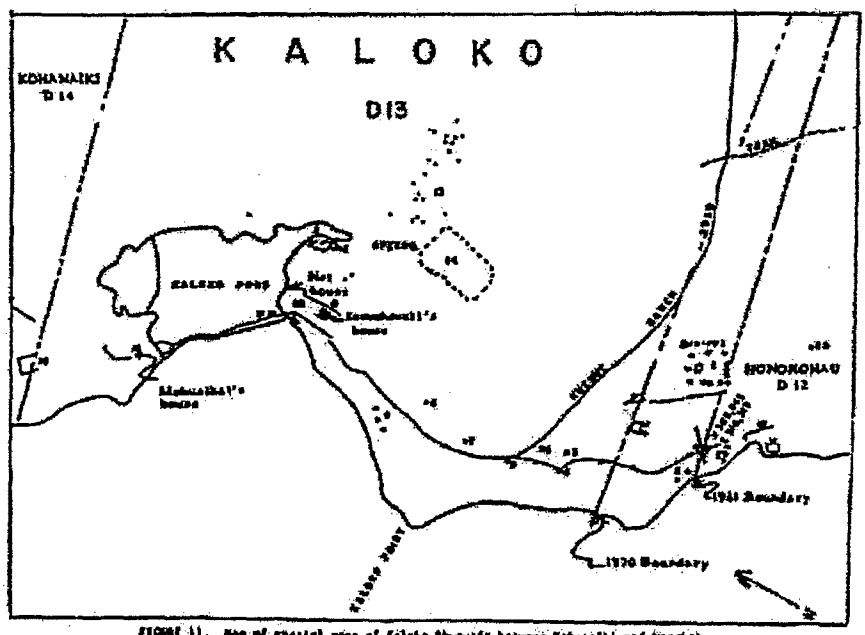


Illustration 103. Detail of archeological sites along Kaloko coast. Figure 11 in Kelly, *Historical Survey of Kaloko*, p. 26.

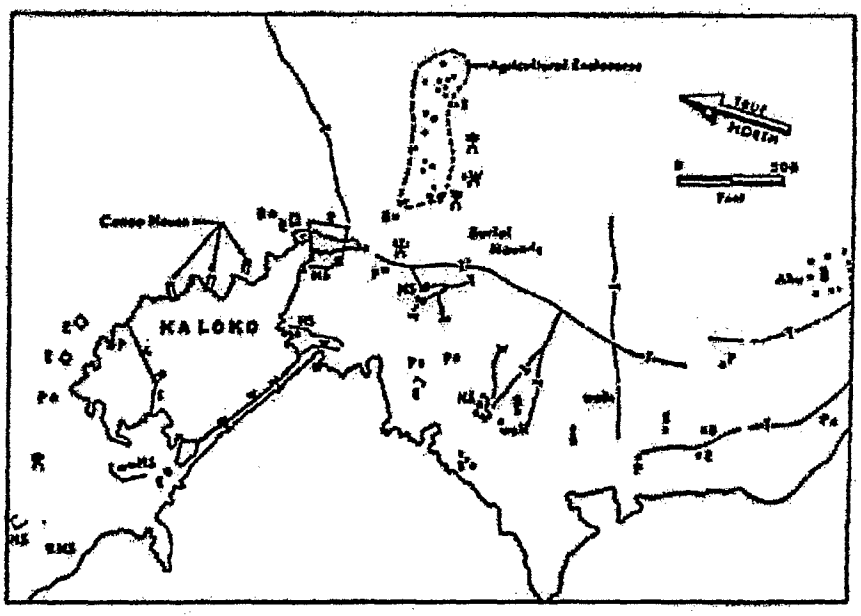


Fig. 40. Archaeological Sites Associated with Kaloko Fishpond

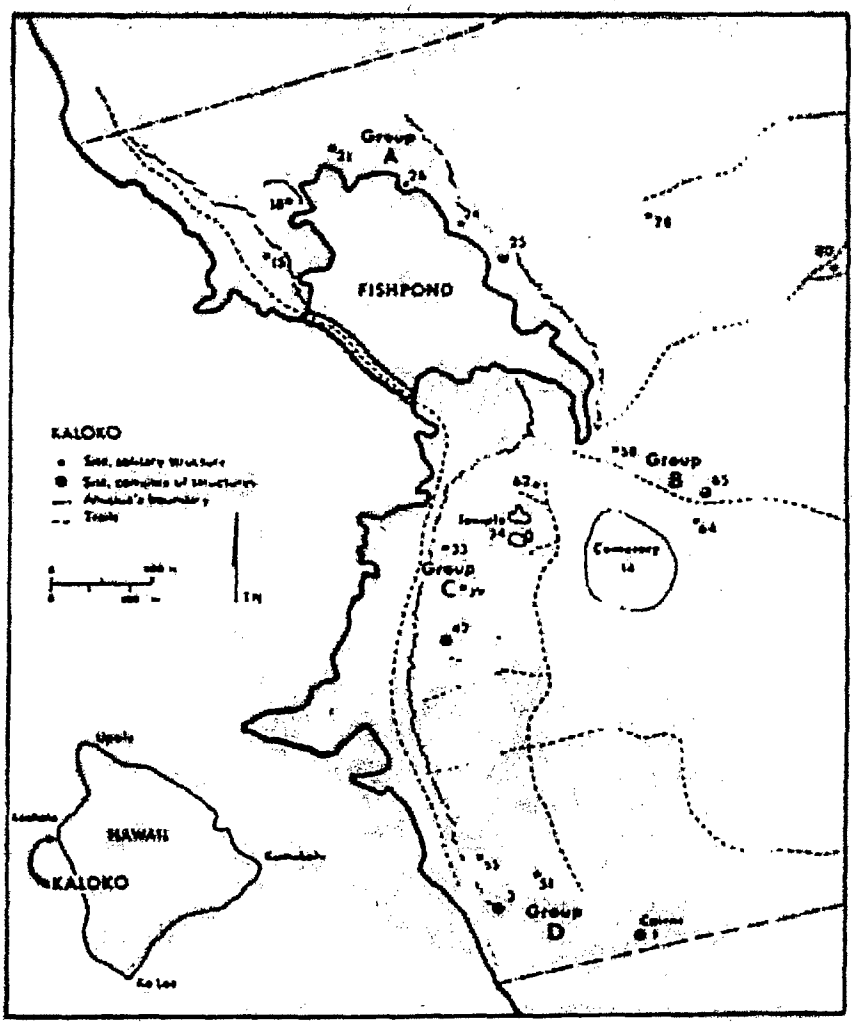


FIGURE 12. Kaloko: location map of prehistoric permanent structures

Illustration 104. Archeological sites around Kaloko Fishpond. Top: Figure 40 in Kikuchi, "Hawaiian Aquacultural System," p. 178. Bottom: Figure 12 in Cordy, *A Study of Prehistoric Social Change*, p. 129.

Illustration 105. Habitation site east of Kaloko Fishpond. NPS phot, 1989.

Illustration 106. "Queen's Bath." NPS photo, 1989.

G. Description of Resources (continued)

1. Fishponds (continued)

b) 'Aimakapa Fishpond

'Aimakapa, the larger of the fishponds, comprises about fifteen acres. It is a *loko pu'uone* type pond, a large natural water area trapped behind sand dunes. It was originally much larger, including another fifteen acres that are now marshland. A stone-lined channel cut through the beach once formed the sluice gate by which seawater entered the pond. 'Aimakapa also has secondary walls, forming at least six compartments for separating fish. [59] The pond is intact, though somewhat overgrown. It still contains *awa* (milkfish) and is an important wildlife refuge for native and migratory birds. Numerous sites along its shores indicate intensive human activity, particularly use by *ali'i* for recreational and ceremonial purposes. [60]

The nearby *holua* is one of eight surviving in Kona, others existing at Ka'upulehu, Keauhou, Honaunau (2), Keokea, Ki'ilae, and Okoe. It and the one at Keauhou allowed two contestants to compete simultaneously. The slide is a narrow built-up stone track covered with grass to create a slick sledding surface. The sled itself was a narrow piece of wood on which the contestant threw himself full length, attempting to remain on the track all the way to the bottom. It is said that only *ali'i* participated in this sport. The takeoff and runway to the brow of the *a'a* flow are well preserved, but the lower section of slide has been cannibalized for stones to construct two corrals on the flat below. At the head of the *holua* is a graveyard, while house sites and tombs are found at the base of the hill supporting the slide. Scattered petroglyphs may be seen throughout the area, as well as ancient *heiau* remains on the *pahoehoe* plain. [61]

A platform close to the Mamalahoa Trail might have been used as a gathering place for meetings and/or ceremonies. On a high point behind 'Aimakapa stands a large stone, called *Kanaka Leo Nui,* meaning "man with a loud voice." Tradition says that in ancient times the chief by that name stood on this stone while directing fishing activities off the coast. [62] This pond is thought to have been in existence prior to the fifteenth century A.D. [63] There also appear to be remains of an old unnamed fishpond seaward of the present coastline, *makai* of 'Aimakapa Fishpond, that are visible in the water. [64]

According to tradition, chiefs directed the activities of Kaloko-Honokohau inhabitants by issuing hand or flag *(ka pa)* signals to their subordinates from high places such as the bluff above 'Aimakapa Fishpond. [65]

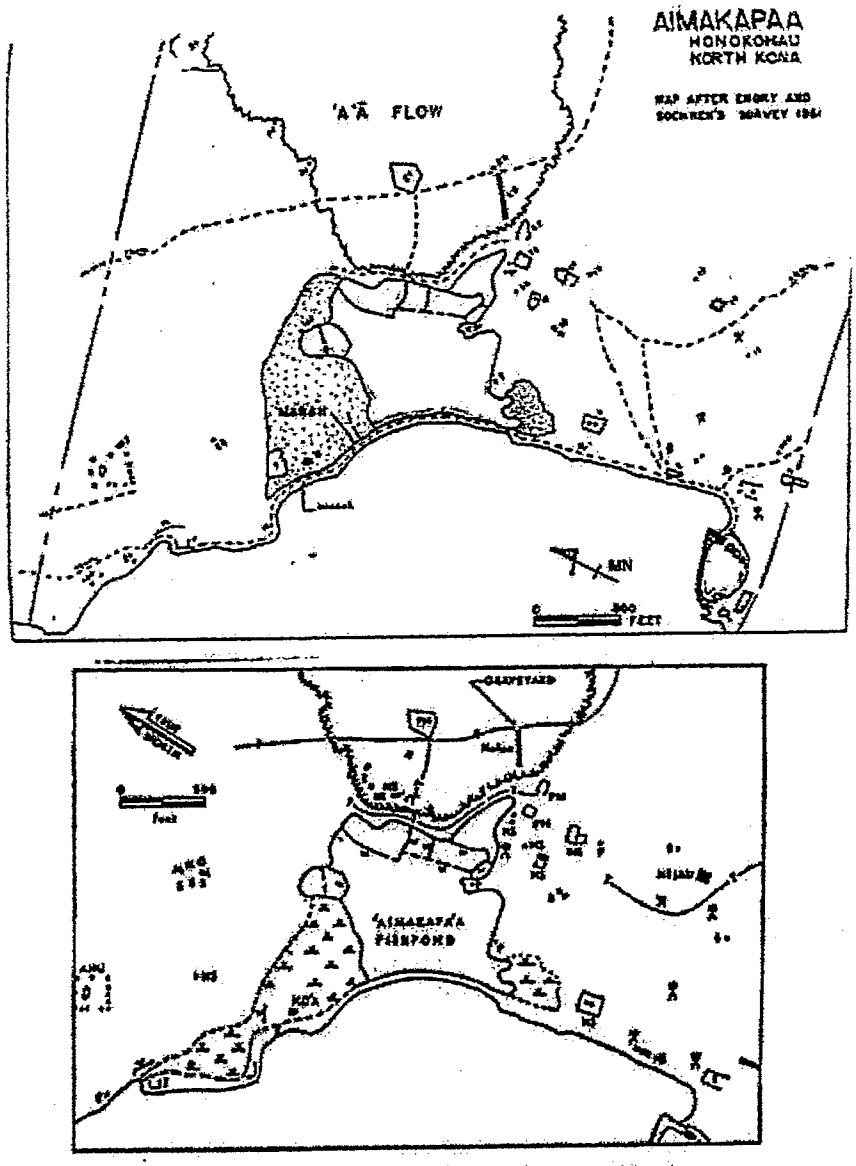


Fig. 38. Archaeological Sites Associated with 'Aimakapa'a Fishpond

Illustration 107. Two sketches of archeological sites in the vicinity of 'Aimakapa Fishpond. Top: From Kikuchi and Belshe, "Examination and Evaluation of Fishponds," p. B17. Bottom: Figure 38 in Kikuchi, "Hawaiian Aquacultural System," p. 176.
(click on image for an enlargement in a new window)

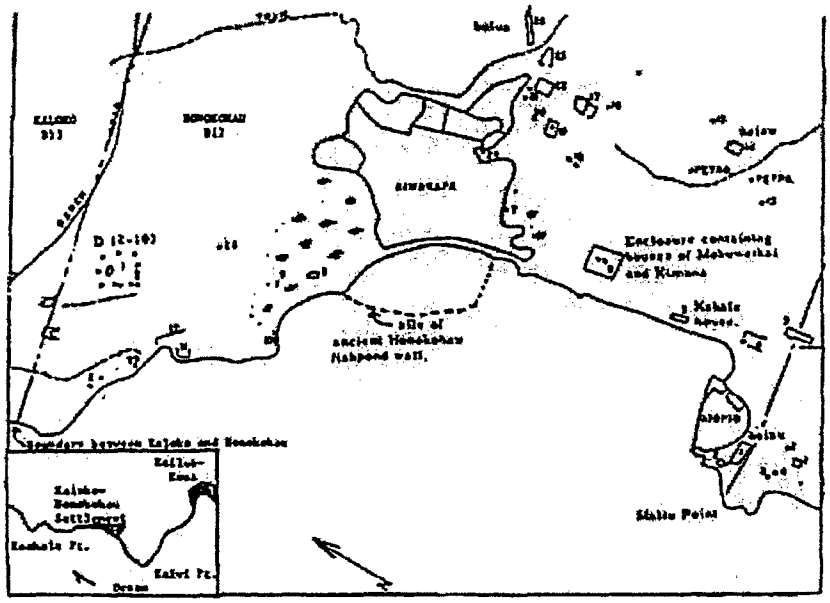


Fig. 39. MAP OF HONOKOHAU AREA. The monumental pile and "Queen's Bath" are at left of photo (Site D 12-103). The ruins of an old fishpond wall south of Aimakapa Fishpond are shown.

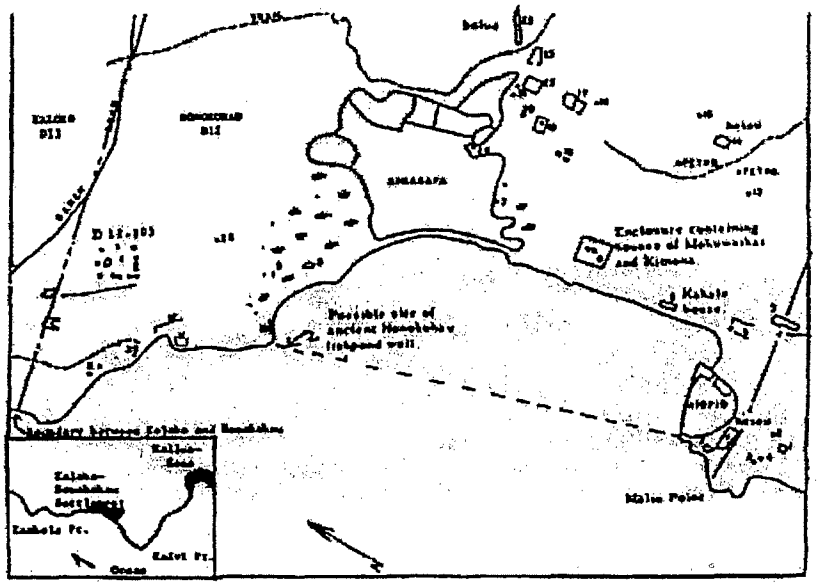


FIGURE 10. Map of coastal area of Honokohau Ahupua'a between Kaloko and Kaulukohe, showing fishponds, house sites, and cluster of adze (D12-103).

Illustration 108. Sketches showing possible locations of ancient fishpond wall southwest of 'Aimakapa Fishpond. Top: Figure 39 in Rosendahl, *Archeological Salvage of Ke-ahole to Anehoomalu Section*, p. 110. Bottom: Figure 10 in Kelly, *Historical Survey of Kaloko*, p. 20.
(click on image for an enlargement in a new window)

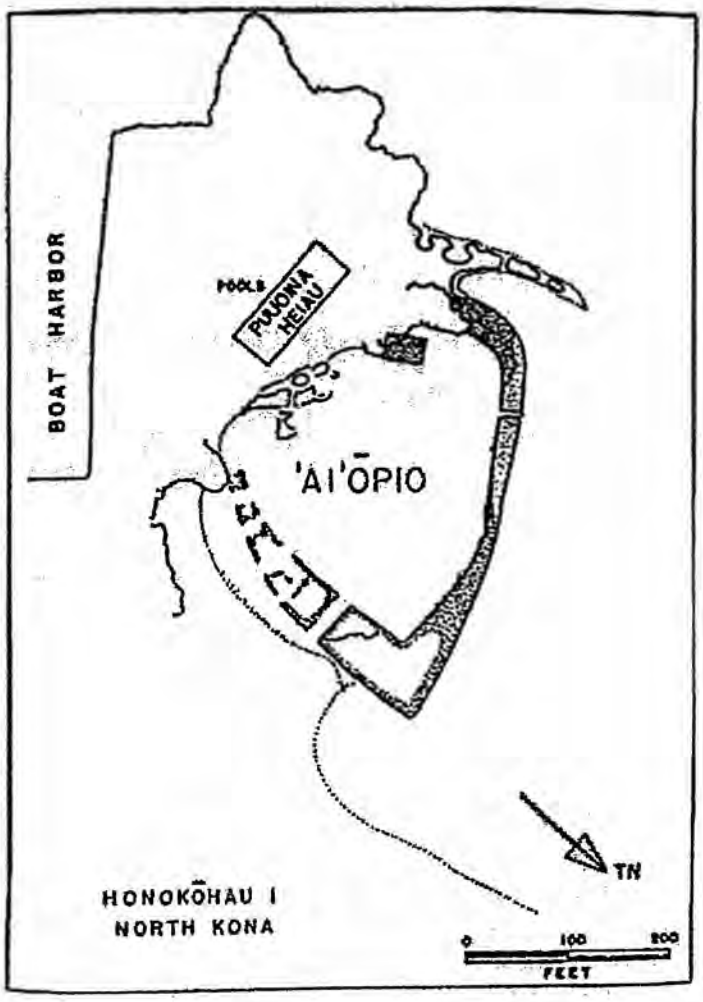
Illustrations 109-111. Top: remains of sluice gate for 'Aimakapa Fishpond. Middle: possible remains of another fishpond or some other type of structure in sea west of beach near 'Aimakapa Fishpond. Bottom: view to southeast of 'Aimakapa Fishpond. NPS photos, 1989.

G. Description of Resources (continued)

1. Fishponds (continued)

c) 'Ai'opio Fishtrap

'Ai'opio Fishtrap is almost two acres in size and roughly circular in shape. Its seaward side is separated from the ocean by a manmade stone wall, while its other sides are bordered by rocky lava headlands and the sandy beach. Fish entered the pond at high tide through a narrow channel in the seawall; it has no sluice gate. Four rectangular walled enclosures within the pond along the shoreline were probably used either as holding pens for netted fish or as lanes in which the fish were netted. [66] Kickuchi and Belshe have suggested that, because of their proximity to each other, 'Ai'opio might have played a supporting role in the management of 'Aimakapa Fishpond, possibly providing its fish supply. [67] House sites can be seen around the pond area, while inland are large concrete salt pans and the remains of frame houses, indicating occupancy of this area into the twentieth century. [68]



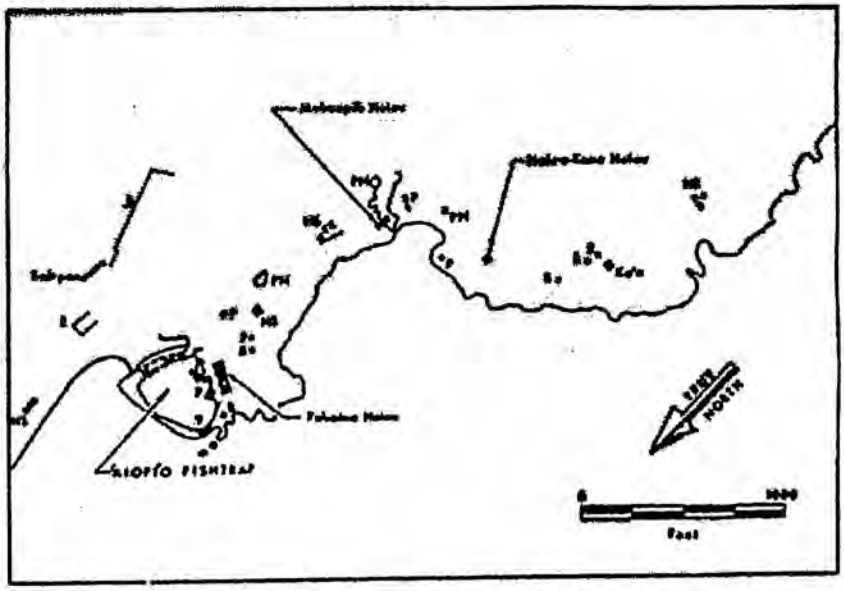


Fig. 39. Archaeological Sites Associated with 'Aiopi'o Fishtrap

Illustration 112. 'Ai'opio Fishtrap and associated archeological sites. Top: From Kikuchi and Belshe, "Examination and Evaluation of Fishponds," p. B12. Bottom: Figure 39 in Kikuchi, "Hawaiian Aquacultural Systems," p. 177.
(click on image for an enlargement in a new window)

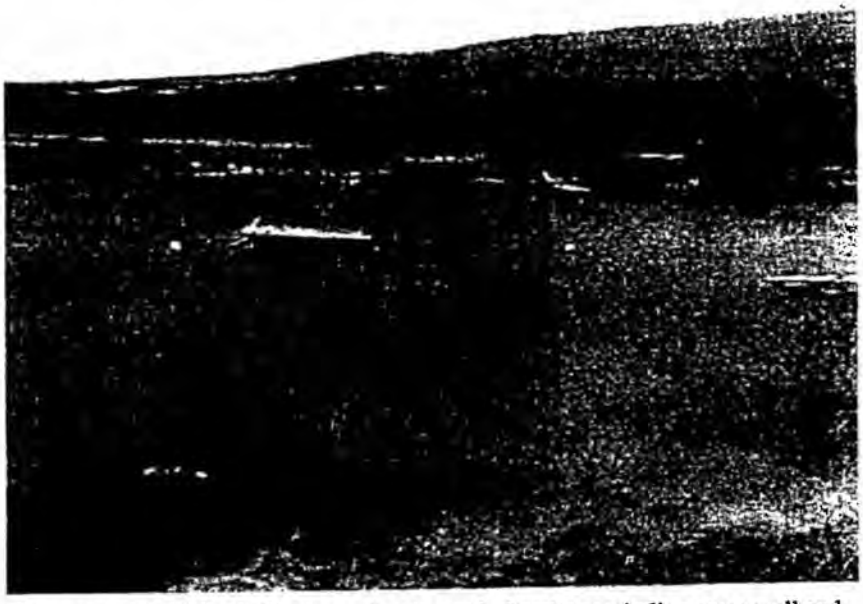


Illustration 113. 'Ai'opio Fishtrap, view to north showing encircling stone wall and fishermen's huts. NPS photo, 1989.

Illustration 114. View from Pu'u'onia Heiau toward 'Ai'opio Fishtrap. NPS photo, 1989.

G. Description of Resources (continued)

2. *Heiau*

Other important resources within the park and nearby vicinity are the several *heiau* located between Wawahiwa'a Point in Kohanaiki and the Alula Bay area in Kealakehe, The two most important of these are Maka'opio (Hale-o-Lono) on Alula Bay and Pu'u'oina (Hale-o-Mano) south of 'Ai'opio Fishtrap. [69]

a) Maka'opio Heiau

The fisherman's *heiau* known as Maka'opio, a Hale-o-Lono class of *heiau,* is a low rectangular platform built out into a shallow, ponded area. Its outstanding features are two great upright stone slabs, measuring over six feet five inches in height, that rise above the pavement perpendicular to the seaward face. The stones, one of which bears a petroglyph of a man about twenty-four inches high, may have represented fishermen's gods. Also present is a small *ko'a* (fishing shrine) comprising a large, smooth stone *(ku'ula)* standing on a platform. [70] Nearby are ancient house sites, petroglyphs, and bathing pools.

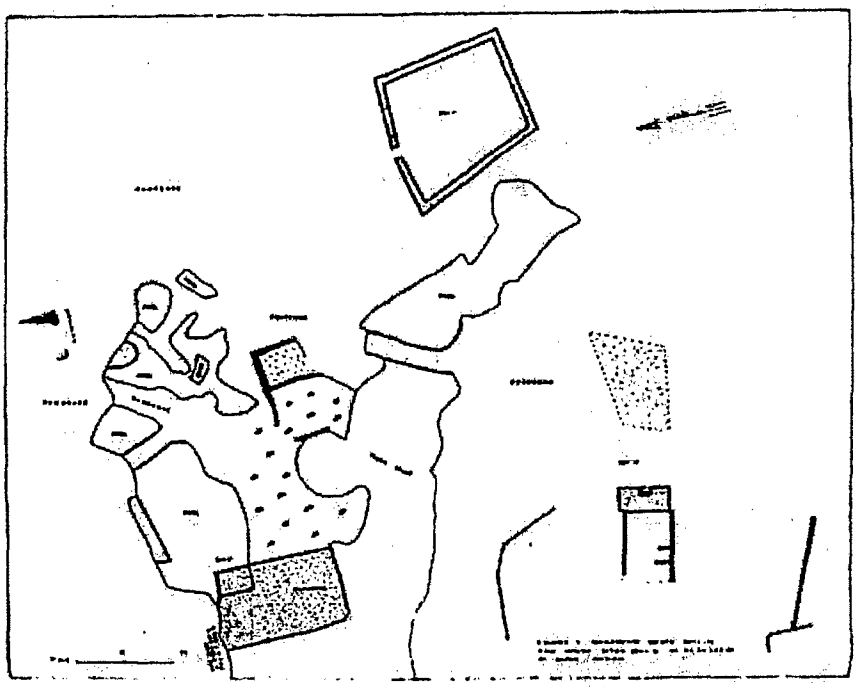


Illustration 115. Maka'opio Heiau and associated features. Figure 5 in Emory and Soehren, *Archaeological and Historical Survey, Honokohau Area,* p. 10.
(click on image for an enlargement in a new window)

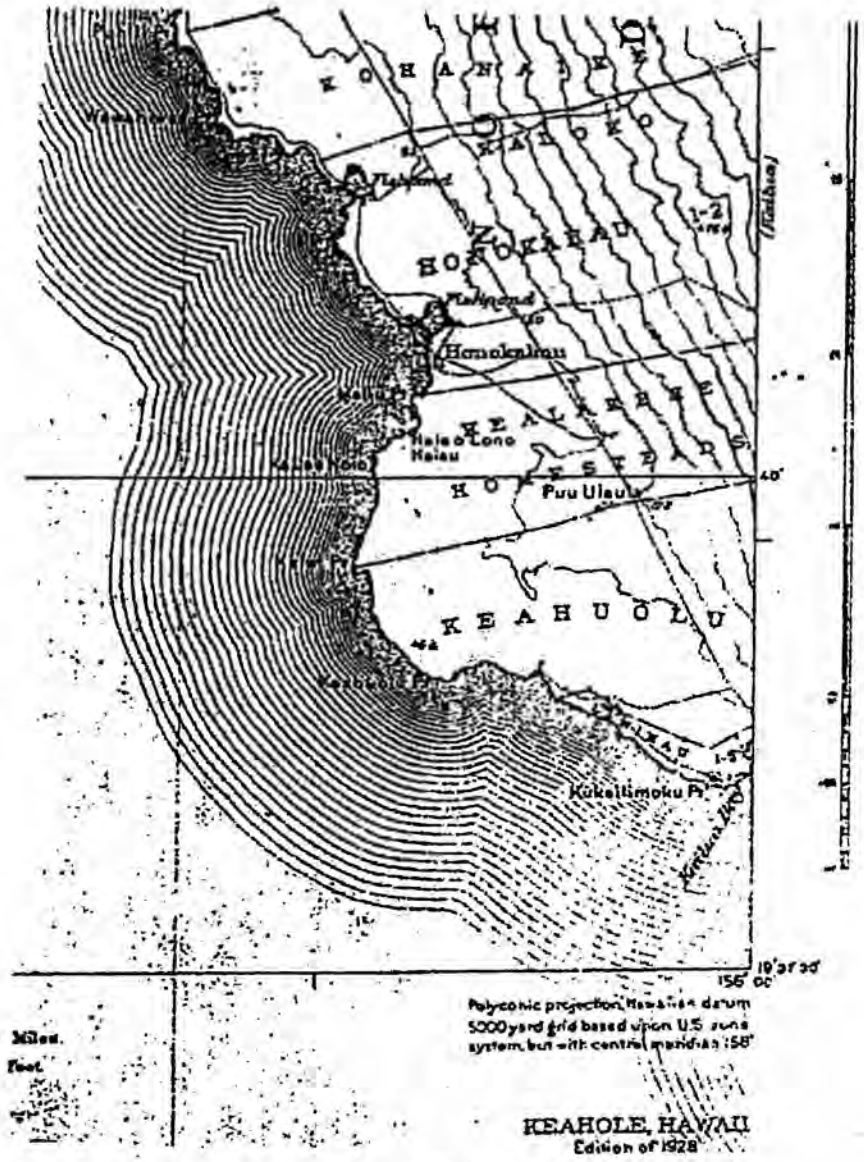


Illustration 116. Map of Keahole, Hawai'i, 1928. Note houses and church in Honokohau Settlement. Courtesy Hawaii State Library, Honolulu.
(click on image for an enlargement in a new window)

b) Pu'u'oina (Hale-o-Mano) Heiau

Pu'u'oina temple, sometimes referred to as Hale-o-Mano, stands just inland from Maliu Point and measures about 50 by 145 feet. It is considered the finest example of a platform *heiau* in Kona. Oral tradition states that this was an operations and dwelling area for warrior priests. [71] Standing on the south shore of Honokohau Bay, at the south side of 'Ai'opio Fishtrap, the *heiau's* huge waterworn boulders form an impressive structure. Some appropriation of stones for construction of a fence has taken place, and stone from the north side has been used to build nearby houses. Steps are located in the structure's east wall. The surface of the temple is divided into several segments, including raised platforms, a paved depression, and an area of waterworn boulders. Some later alterations are apparent in the structure. Found on the surface level at the

east end are a house platform and a canoe platform. The *heiau* may have utilized the small brackish pool on its south side in connection with its ceremonies. Northwest of the *heiau* is a large burial platform and just north of the graves a platform ruin lies in the water. The seawall of 'Ai'opio Fishtrap begins at the *heiau's* northeast corner. Another small platform ruin exists in the water a few yards east. Another platform, on which a hut has been erected, is located at the east end of the seawall. [72] There is no known documented relationship between the fishtrap and this temple, although oral tradition presented earlier did identify the trap as a holding area supervised by the chief living at Pu'u'oina.

It is thought that Pu'u'oina was an important base of operations for those governing Honokohau and North Kona. Its importance derived from its location near the ocean and the 'Ai'opio Fishtrap, which facilitated directing the community's important fishing activities. [73]

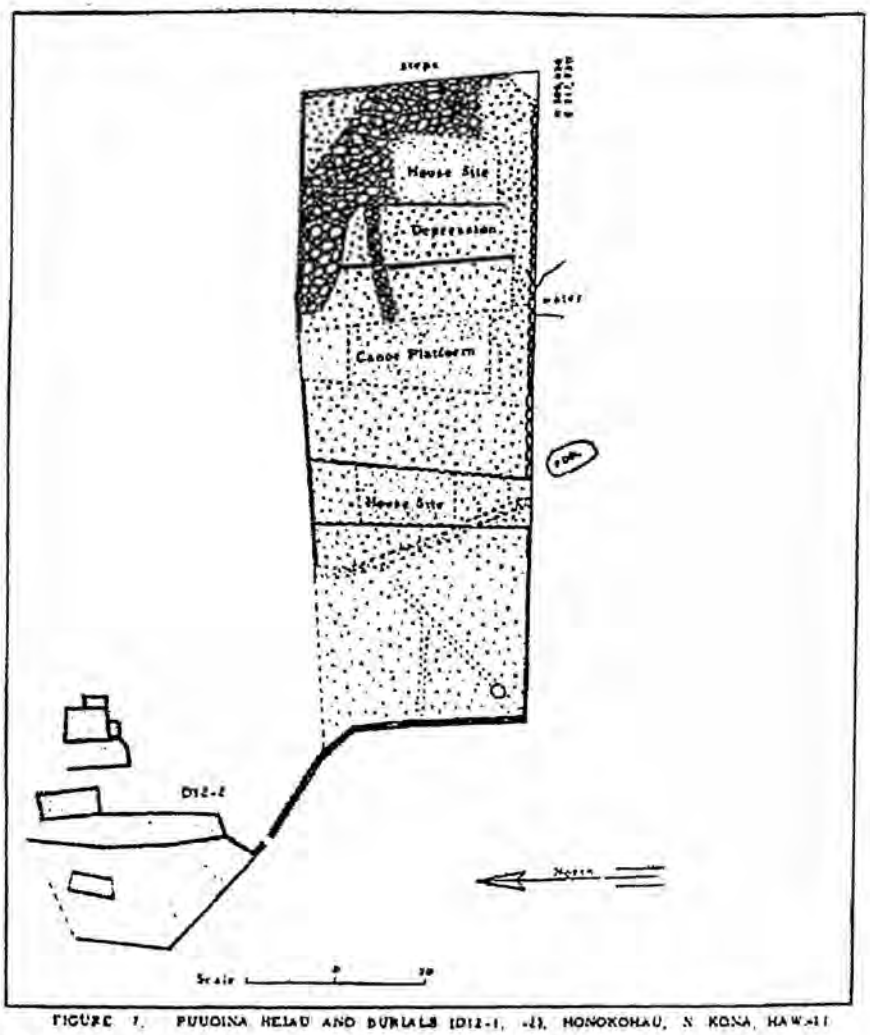


Illustration 117. Pu'u'oina Heiau and associated features. Figure 7 in Emory and Soehren, *Archaeological and Historical Survey, Honokohau Area,* p. 16.
(click on image for an enlargement in a new window)

Illustration 118. Pu'u'oina Heiau, east end. Area of walled fishtrap enclosures is in foreground. NPS photo, 1989.

Illustration 119. Fishermen's huts at west end of Pu'u'oina Heiau. NPS photo, 1989.

Illustration 120. South wall of Pu'u'onia Heiau. Note differences in wall construction. NPS photos, 1989.

Illustration 121. Maka'opio Heiau, view east. NPS photo, 1989.

Illustration 122. Maka'opio Heiau, view southwest. NPS photo, 1989.

G. Description of Resources (continued)

3. Graves

The significance of grave sites scattered throughout the Kaloko-Honokohau area was discussed earlier. Grave features in the park consist of burial cists, graves bordered with stones, pit burials,

burials in natural depressions in the *pahoehoe,* platform tombs, and graveyards and cemeteries. To disturb such sites would be a great sacrilege.

4. Trail Systems

Historian Russell Apple describes four major types of Hawaiian trails: Type A are single-file prehistoric paths; Type B came into use after European contact and the introduction of horses. They were a modification of Type A trails, with curbstones and causeways; Type C were two horse wide and built in straight lines between major points, cutting off the small coastal settlements. The Mamalahoa Trail, a straight, curbed, cut-and-fill path, is a good example of this type. They were commonly built by labor forces conscripted by the island governors during the mid-nineteenth century. With the introduction of wheeled vehicles, Type C trails were modified, widened, and realigned into Type D trails. [74]

In prehistoric as well as historic times, trail networks were important adjuncts to the Hawaiian social and economic systems. They served both as major routes between specific land units and social groups and as internal networks of lesser trails for transportation and communication within an *ahupua'a.* The earliest trails were designed only for foot traffic because the people had no draft animals or wheeled vehicles. They were not particularly smooth, flat, or easy to follow. Sometimes they meandered, based on the availability of rocks for marking the route. Residents of an *ahupua'a* built trails running *mauka-makal* as soon as they settled into an area to facilitate food gathering and goods exchange. These goods were transported by sling nets or carrying poles.

Major commercial trails between *ahupua'a,* villages, and towns running on the contour of the island along the coast were a necessity and were quickly incorporated into the overall trail system. Other major routes were built over the mountain ranges to connect communities on opposite sides of the island. One very important trail, the King's Highway, borders the Kona Coast and is still visible from the Queen Ka'ahumanu Highway between Kawaihae and Kailua. It was used for commerce, troop movements, carrying messages, collecting taxes, and other government activities. It was considered very safe for travel, being specifically under the auspices of King Kamehameha I's "law of the splintered paddle," which directed that any traveler could use the highway without fear of being molested. [75] It led from Kawaihae to Kiholo, upslope to Huehue, and down again to Kaloko, Honokohau, Kealakehe, and Kailua. [76]

The trails of Kekaha reflect various stages in the development of the region, as relations were established between coastal and inland villages and between coastal settlements. Several examples exist within this park of the most ancient footpaths of the area, comprised either of steppingstones of smooth waterworn cobbles brought from the seashore and placed three to four feet apart or of flat lava slabs laid over the rough *a'a* flows. White coral pebbles that reflected moonlight marked some paths for night travel. Other paths across *a'a* flows consisted of simple, worn, trough-like depressions formed by feet crushing clinkers into a pebble-sized bed. In some places these trails were modified in historic times for animal travel and thus some of their earliest integrity lost. Where no old foot trails existed to be modified, new horse trails were built in historic times, mainly for commercial purposes. [77]

In Kaloko-Honokohau the residents built a system of *mauka-makai* trails to travel and communicate with extended family members and friends. Other routes traversed the coast

laterally to transport food and other goods to neighboring *ahupua'a.* Several trails are found in the Kaloko-Honokohau area, mostly short footpaths comprising a local trail system, used both in the prehistoric and early historic (pre-1840) periods. Some prehistoric trails modified with curbs have been identified here, as well as new, probably post-1840, straight curbed trails. [78] Although a *mauka -makai* exchange system was used for many products, the produce of Kaloko and the other fishponds would not have been available for exchange and use by commoners. The public Mamalahoa Trail and the ancient coastal trail were two major routes around the island, leading south to Kailua-Kona and north to Keahole. In early times the coastal trail would have facilitated transportation of fish from this area to Kamakahonu — Kamehameha's court and primary political and economic center in Kailua — which probably consumed most of the products from the ponds in the area. The coastal trail ran right by 'Ai'opio Fishtrap. [79]

These trails are an important component of the park's cultural landscape, providing data on the linkages between communities. They comprise a record of local movement and sometimes include associated features such as small cairns placed as markers along the routes or petroglyphs (especially where smooth lava is found) that serve as pictorial signatures of people who passed by. Often caves or small walled shelters are found that served as resting places along longer trails. The Mamalahoa Trail is one of the most significant resources in the park, but all the trails are important in illustrating early communication, transportation, and commercial networks. Their importance to the prehistoric Hawaiian subsistence economy cannot be overlooked, because they were the lifelines for food exchange. They were a direct result of the belief that everyone had access rights to the products of the land and ocean for their sustenance.

The early Hawaiian trail system made this type of utilization possible within the land unit. [80] Along the leeward coasts these trails can still be seen and indeed many are still used today by fishermen and campers.

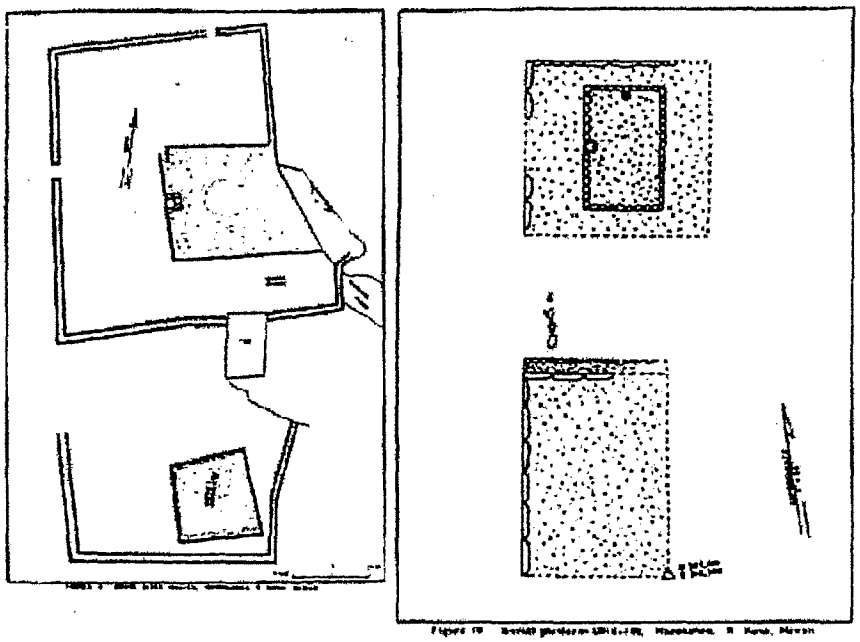


Illustration 123. Examples of two types of features found in the Honokohau area. Figures 9 and 10 from Emory and Soehren, *Archaeological and Historical Survey, Honokohau Area,* pp. 22, 24.

G. Description of Resources (continued)

5. *Ahu* (Cairns)

Near the boundary between Kaloko and Honokohau is a feature referred to as the "Queen's Bath." The site includes twelve lava mounds arranged in a rectangular form around a brackish pool hidden in the extremely rough *a'a* lava flow. Seven cairns in the southwest corner of the rectangle stand out because of their size and construction. They are graduated in height from ten feet to five feet, while the other mounds are smaller and more irregular in shape and construction. Each of the seven large structures is carefully faced with rough lava and all seven are crumbled on one side, possibly as a result of people climbing them. At the north end of the rectangle is an anchialine pond that has been modified into a bathing pool. A barely discernible trail leads to it from between the two largest cairns and continues on north. The sides of the pool have been cleared and leveled and the water lined with smooth lava blocks to form a sort of rectangular underwater bathtub. Smooth slabs have been set around the sides as seats. At the east end of the pool the lava was excavated to form an enclosure walled on three sides, the side facing the pool being open. Probably it was covered over and used as a bathing shelter. [81]

A traditional story is that "the queen" bathed here while guards on top of the cairns stood watch for intruders. Some traditions say she came by canoe to a landing nearby and was carried over the rough lava to the secluded and guarded pool in which smooth stone ledges had been placed for her comfort. [82] One local informant stated years ago that the pool was the private bathing place of Kamehameha, who stationed his guards by the *ahu*. Others have suggested these cairns are boundary markers. [83] Kelly recounts that one early ruler, Umi, used *ahu* like these as a way of taking census, requiring the population of each of his districts to erect an *ahu* to which each person living in that district contributed one stone. She knew of no such practice at Honokohau, however. [84] One informant stated that when she and her family stayed at Kaloko for weeks at a time, they bathed in this pool. [85]

The evidence for this pool actually being used as a bathing place for a "queen" in ancient times is tenuous. Cordy and his colleagues surmise that this complex has religious significance, perhaps as an *ahupua'a* shrine, but this may never be known with certainty. [86] The pool is used today by many people for bathing. Ongoing archeological survey work indicates the entire pool may be manmade.

Illustrations 124-26. Top: distant view of *ahu* surrounding "Queen's Bath." Middle: close-up view of an *ahu*. Bottom: anchialine pond referred to as "Queen's Bath." NPS photo, 1989.

Illustration 127. *Ahu* surrounding the temple of Kaili on the island of Hawai'i. From Wilkes *Atlas* (1845), facing p. 100.

Illustration 128. Agricultural enclosure near road to Kaloko Fishpond. NPS photo, 1989.

Illustration 129. Semicircular stone-walled enclosure, Kaloko area. NPS photo, 1989.

H. Significance of Resources and Establishment of a National Historical Park

In 1962 the Honokohau Settlement area, including Kaloko Fishpond, was designated a National Historic Landmark. [87] Kaloko-Honokohau National Historical Park was authorized on November 10, 1978, encompassing about the same area as the landmark. It was established to

preserve important aspects of traditional native Hawaiian culture and land use patterns in a location that contained numerous significant prehistoric and historical sites illustrating those activities. The fact that the area was preserved as a complete entity denotes the value accorded the entire grouping of structures in illustrating early Hawaiian lifeways. The area possesses strong cultural and religious associations in connection with ancient Hawaiian burial rituals, particularly those for *ali'i.* One very personal aspect of this close association with the dead — a unique characteristic of Hawaiian culture — concerns this being the traditional burial place of Hawai'i's most famous ruler, King Kamehameha I. [88]

The hundreds of virtually intact archeological sites in the park and surrounding area include *heiau,* fishponds, *ko'a* (fishing shrines), individual house platforms as well as complexes of structures, a *holua* (toboggan slide), several *papamu (konane* game boards), burials, petroglyphs, stone cairns, animal enclosures, more than 100 stone enclosures serving as agricultural planters, several *ahu* (stone mounds serving either as altars, shrines, or security towers), lava tube shelters, canoe landings, salt pans, and a *mauka-makai trail* network. There are more significant sites within this area, both in terms of number and physical condition, than anywhere else along the Kona Coast from Kailua to Ke'ahole Point. [89] Because little use of the land here has been made since early times, it is possible to gain a fairly reliable impression of the pattern of early settlement.

The resources of Kaloko-Honokohau possess esthetic, cultural, historic, economic, scientific, and emotional values for the Hawaiian people. The discussions centering around establishment of this park emphasized that it was necessary to view and evaluate its fragile resources through a sensitive and sympathetic understanding of the culture that had shaped them. Although many details of the Hawaiian religion, language, crafts, and other cultural aspects were recorded upon the creation of a written language, there is much tradition that was not recordable, but that is intangible, a part of the personal and private Hawaiian cultural makeup that is transmitted best through expressions, action, and the spoken word. It is clear that the significance of the resources in this area must be judged not only in the context of their obvious importance to the study of early Hawaiian culture but also in relation to their emotional value, their relationship to prevailing cultural attitudes that have been shaped by the experiences of the past. [90]

The hundreds of archeological sites identified in the park to date indicate prehistoric and historic occupation of the area by a large population, both *maka'ainana* (commoners) and high *ali'i* (chiefs). A very active religious-political center, its economic life, based in large part on its fishponds, was geared toward supporting the social and political status of the Kona chiefs. The remains illustrate maritime aspects of early Hawaiian culture, encompassing subsistence activities, residential patterns, social interactions, and religious practices, in addition to artistic achievements and recreational pastimes. The concentration of resources in Kaloko-Honokohau provides direct evidence that a larger population existed here than elsewhere along the coast, probably because of the presence of the fishponds, which are the only resources of this type left between Kailua and Ke'ahole Point. [91] The park is valuable to archeologists for the study of the activities of pre and early-contact Hawaiians and changes occuring in subsistence patterns and land ownership over time. For native Hawaiians, this is a sacred place, a place where revered ancestors lived and died. [92]

Future plans are to create an environment in which to educate Hawaiians about their culture; to stabilize selected, significant historic remains; to preserve fishponds; and to manage and interpret

these cultural resources in a meaningful and sensitive way to the public. The primary interpretive effort will address numerous aspects of the Hawaiian culture, including language, subsistence interactions with the land and sea, aquaculture, family systems, religious beliefs, and ancient dances, crafts, and other cultural activities. [93]

Illustrations 130-32. Significant cultural resources, Kaloko-Honokohau NHP. Top: petroglyphs. Middle: village site. Bottom: Mamalahoa Trail. NPS photo, 1989.

I. Archeological Research Accomplished

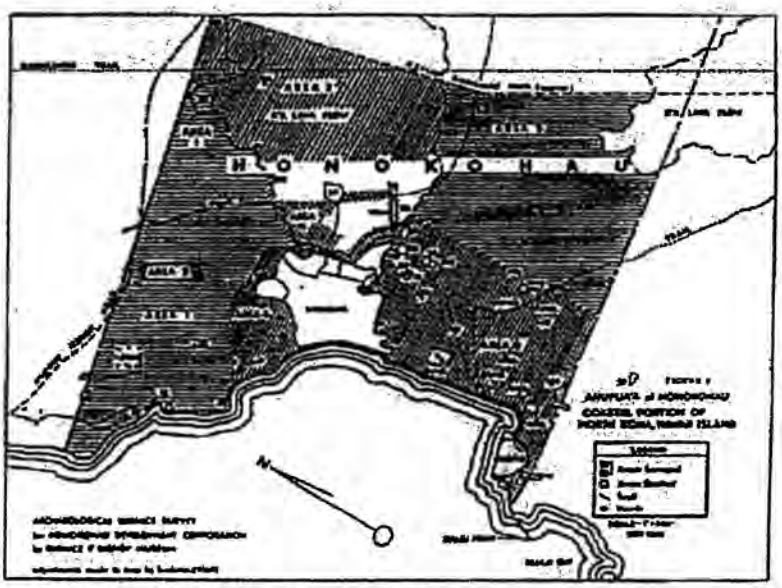
1. Honokohau Area

In 1969 the Lanihau Corporation contracted with the Bishop Museum for a survey of the Honokohau area within the landmark where the company planned commercial development. Deborah F. Cluff conducted this reconnaisance of the seaward portion of Honokohau, mapping and recording features. The following is some of the detailed information on resources she provided that enlarges on the descriptions presented earlier in this section.

Cluff noted 'Aimakapa Fishpond as a large and still functioning body of water surrounded by marsh and dense groundcover with a stretch of sandy beach on the west. She believed the area surrounding the pond offered potential for archaeological research on the adaptation of the aboriginal Hawaiians to the land and its various resources. [94] She mentioned finding numerous sites, including paved footpaths, rock shelters, walls, scattered graves, monumental *ahu,* a burial ground, walled enclosures, platforms, and the *holua.*

The area lying between 'Aimakapa Fishpond and 'Ai'opio Fishtrap and continuing east from there she found to be very important historically and archaeologically. Its features were more elaborately constructed and suggested more permanent occupation. Architectural styles indicated a culture in the process of change, as evidenced by the find of a cement tomb in the shape of an early grass house. She also found numerous petroglyphs depicting figures and objects common in prehistoric Hawai'i as well as Western motifs such as European ships and rifles. [95] Cluff wrote that 'Aimakapa Fishpond, with its population of birds, its petroglyphs, its *heiau,* house platforms, *holua, papamu,* trails, bait cups carved in *pahoehoe,* and burial ground, all located in one general area, provided a unique opportunity to view numerous components of an ancient Hawaiian village. [96]

Cluff summarized that her findings substantiated that the region was important in both prehistoric and early historic Hawai'i. The importance of Honokohau's coastal portion lay in its fishponds. Her survey showed extensive use of the available land, including placement of shelters and burials on the rugged *a'a* beds and of crude shelters as well as better constructed house platforms and a *heiau,* bait cups, *papamu,* and petroglyphs on the *pahoehoe.* These areas contain information on many of the activities of early Hawaiian culture — especially house construction, religious ceremonies, and burial practices. Some of the small enclosures she found appeared to have been used for horticulture, although she believed the primary reliance for food rested on marine resources. The social system was well established, Cluff surmised, with commoners living in the barren *a'a* and *pahoehoe* areas, while royalty utilized the flat region close to the fishponds and near the *heiau* and *holua.* The most recent occupation had been around the ponds where petroglyphs depict historic objects and cement was used in wall and grave construction. [97]



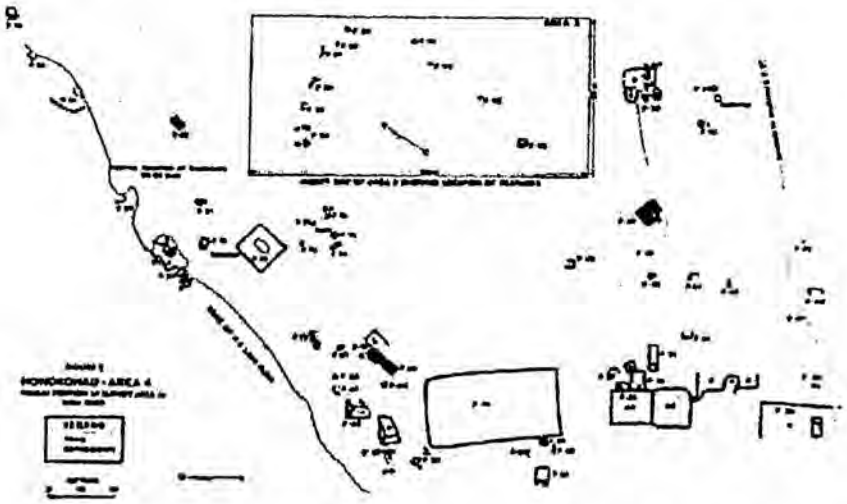


Figure 2. Map of Area 4 and Insert Map of Area 2, showing location of sites surveyed.

Illustration 133. Honokohau coastal area surveyed for archeological sites in 1969. Figures 1 and 2 in Cuff, *Archaeological Survey of the Seaward Portion of Honokohau #1 and #2*, pp. 4, 6.
(click on image for an enlargement in a new window)

I. Archeological Research Accomplished (continued)

2. Kaloko Area

a) Robert Renger's Work

In 1970 the Bishop Museum began work in the Kaloko area of the landmark under a contract with the Kona Coast Company (Huehue Ranch). The data was to be used in planning for a major hotel and residential complex at Kaloko. Robert Renger conducted the archeological reconnaissance of the area around and including Kaloko Fishpond.

Renger found at least three trails running *mauka-makai* and several sources of fresh water in the first area surveyed, encompassing the northwest corner of Kaloko *ahupua'a* and the area immediately around the fishpond. The pond itself consisted of five elements: a primary seawall facing on the ocean and the main pond area and four secondary pond walls built of faced lava fill and of varying widths. [98] Other sites recorded in the pond's vicinity included a walled area containing a coconut grove and the remains of a frame house and another frame structure — a fisherman's shack (net storage house — no longer extant) — on the edge of the fishpond. Fishermen and picnickers have impacted this area. The main pond seawall showed evidence of three different techniques in construction, repair, and modification. [99] Other features nearby included a house-platform complex on the southwest side of the pond arm, a house compound surrounded by a three- to four-foot-high wall on a knoll overlooking the fishpond, a second house complex, segments of a coral-paved *mauka-makai* trail, a *papamu,* walled enclosures, possible canoe house sites, platforms, and enclosures. [100]

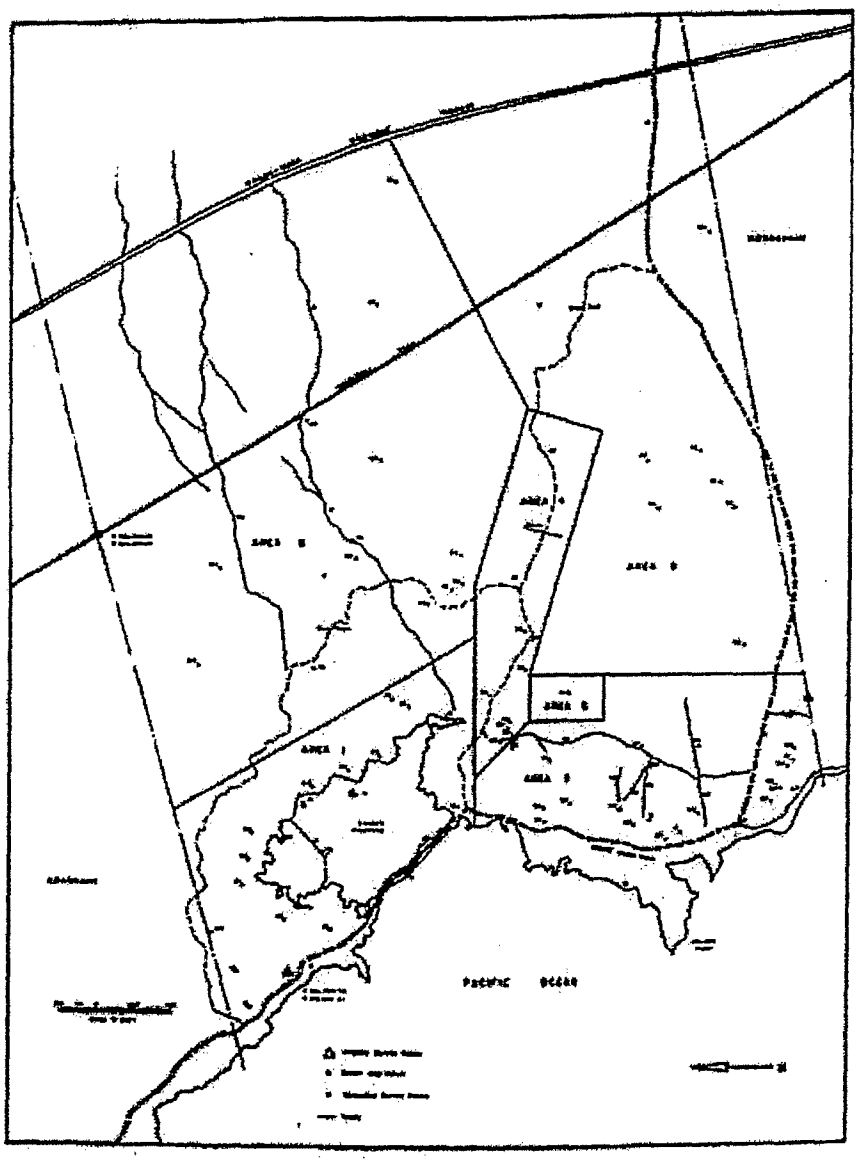


Fig. 1. ARCHAEOLOGICAL SITES IN THE COASTAL PORTION OF KALOKO.

Illustration 134. Archeological sites alogn coastal Kaloko. Figure 1 in Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I,* p. 4.
(click on image for an enlargement in a new window)

Renger found, in the area along the coast south of Kaloko Fishpond, two major trails paralleling the coast and one running *mauka-makai.* There were also several secondary trails connecting the structural complexes with main trails and wells. Most sites there occurred along the *mauka* edge of the low sand dunes on the edge of the *a'a* and ranged from crude slab shelters to very large paved platform complexes. Several small steppingstone trails led into the dense brakes along the edge of the *a'a.* Within the brakes Renger found several tube shelters and a possible pen structure. He assumed that other features were probably covered by undergrowth. Individual sites comprised house enclosures; platforms; wells; trails; a lava tube shelter and enclosure; a large complex with enclosures, platforms, *ahu,* leveled areas, hearths, slab shelters, and a tube shelter; circular enclosures; and other individual tube shelters. [101]

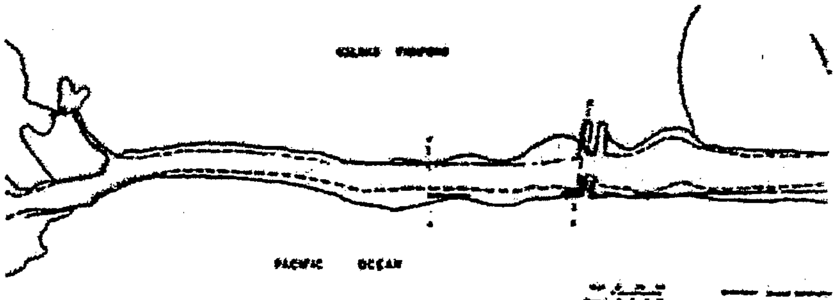


Fig. 7. DETAIL OF KALOKO [illegible].

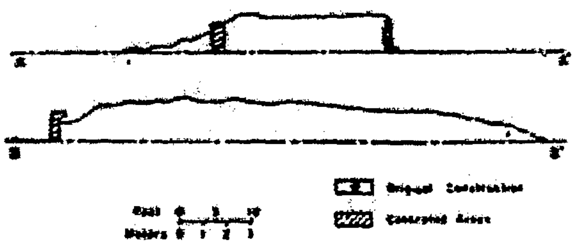


Fig. 8. [illegible] CROSS SECTIONS OF KALOKO FISHPOND [illegible].

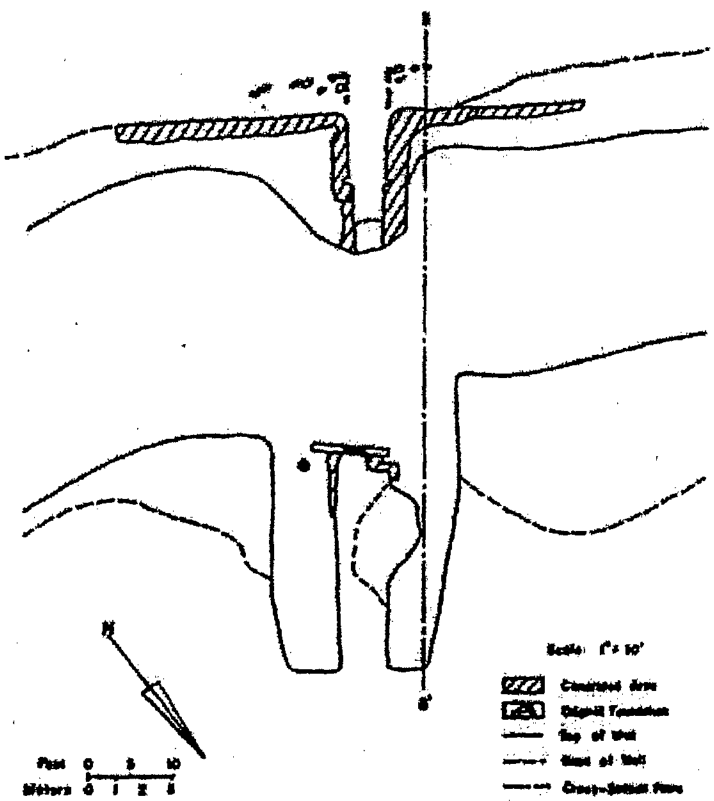


Fig. 9. DETAIL OF [illegible] KALOKO FISHPOND [illegible].

Illustration 135. Kaloko Fishpond features. Figures 8 and 9 in Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I,* pp. 9, 11.
(click on image for an enlargement in a new window)

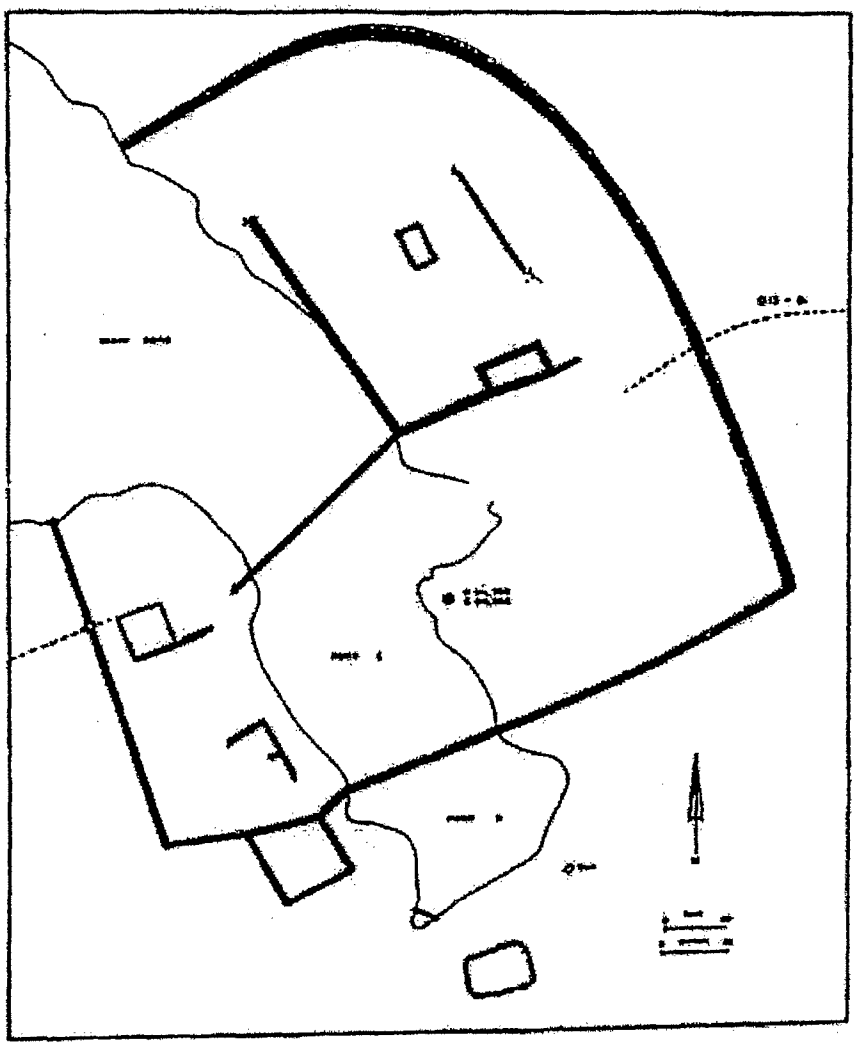


Illustration 136. A walled-structure complex comprising a house platform unit on the southwest side of Kalokok Fishpond joined by walls with a larger complex on the east side of the pond arm. Figure 10 in Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I,* p. 12.
(click on image for an enlargement in a new window)

A smaller surveyed portion inland of the area described above contained a large quantity and high density of features, mostly burials. Renger found more than ten well-built platforms, several leveled areas, *ahu,* and two caves with more than thirty burials between them, many disturbed. The ground was composed of rough ridges of *a'a* forming a plateau overlooking the coast. One of the caves contained seven people buried intact in an extended position — the only instance found in the area of this form of burial practice. The other cave contained seventeen secondary burials, a post-contact coffin burial, and a possible bundle burial. [102]

The next section surveyed was the northern edge of the *a'a* flow covering the southern half of Kaloko. There Renger found doorless enclosures, petroglyphs, a few house floors, and four tube shelters. [103] More than fifty small enclosures, about three feet high, exist there, their walls constructed of *a'a* chunks. A jeep trail runs *mauka-makai* down the entire length of the area, seemingly following the path of an earlier trail. [104] (This is probably the jeep trail constructed to take fish to market, maybe an earlier donkey trail.)

Another area surveyed, in the southern half of Kaloko, was composed of rough *a'a* running *mauka* from the burial plateau. The *mauka-makai* jeep trail, Huehue Ranch road, and Mamalahoa Trail all cross the northern portion of this area. Archeological sites there consisted of one burial, six enclosures, and one possible house foundation. [105]

The last area surveyed comprised the entire northeast corner of coastal Kaloko, bisected by the Mamalahoa Trail. In addition there were two major *mauka-makai* trails found, one of which forked just *mauka* of the Mamalahoa Trail. Indications existed that these were still used by fishermen and horsemen. Archeological features included two low platforms, several *ahu,* two stone circles, several enclosures, and two wall segments. [106]

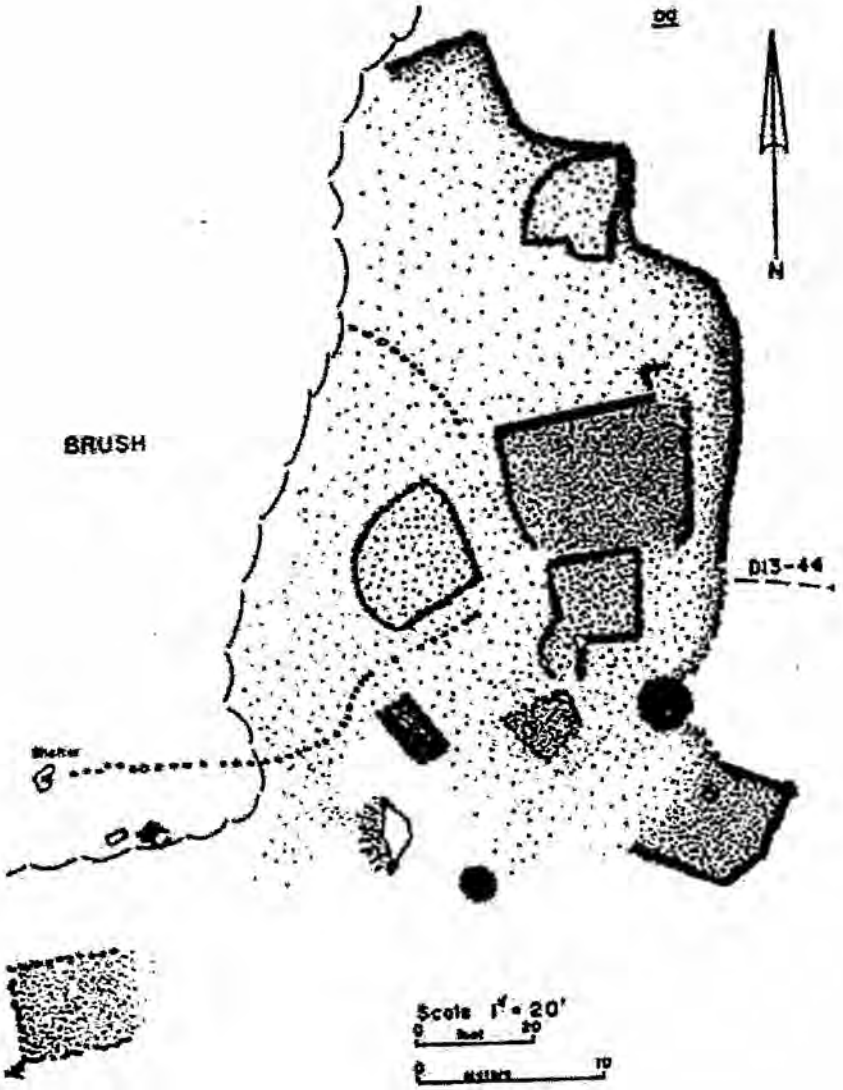


Fig. 17. MAP OF COMPLEX IN SITE D13-42, KALOKO.

Illustration 137. A large complex of enclosures, platforms, *ahu,* level areas, hearths, and slab and tube shelters. Figure 17 in Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I,* p. 20.
(click on image for an enlargement in a new window)

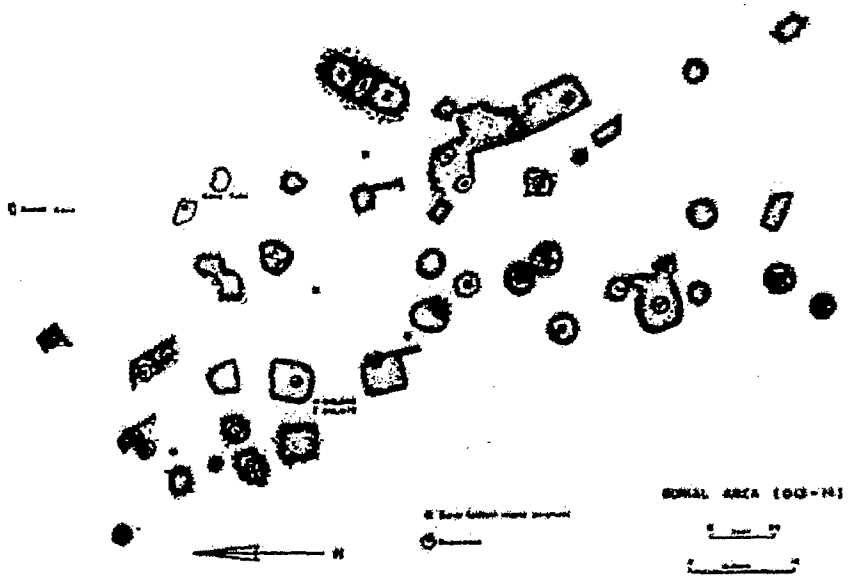


Illustration 138. Burial area in Kaloko. Figure 18 in Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I*, p. 23.
(click on image for an enlargement in a new window)

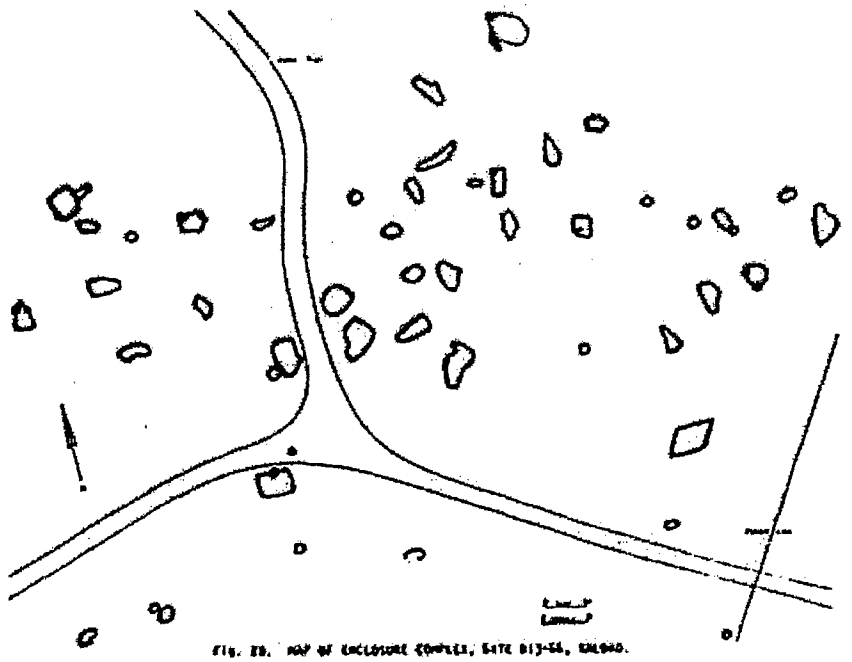


Illustration 139. Large *makai* enclosure complex in Kaloko. Figure 20 in Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I*, p. 25.
(click on image for an enlargement in a new window)

In summary, Renger stated that the density and variety of features in coastal Kaloko provided many good illustrations of the types of environmental adaptation practiced by early Hawaiians. The high concentration of features, the density of the shell midden, and the number of artifacts found along the coast and around the fishpond indicated to Renger that the people exploited their

maritime and fishpond resources intensively. He theorized that many of the small enclosures found were constructed for dry-land horticulture, while major trails running *maukai-makai* provided access to vegetables and other resources on Hualalai. The types of structures he found and their distribution provided him with some indication of social conditions there in early times. The presence of carefully constructed, massive structures and complexes around the fishpond and on the *pahoehoe,* for instance, suggested to him that the *ali'i* lived in those areas. [107] The simple shelters and platforms on the *a'a,* however, were probably residences of commoners. Society within the settlement must have been based on a hierarchical social system, he explained, because the size of the *kuapa* across the mouth of the fishpond would have necessitated a considerable labor force over an extended period of time for its construction. Controlling and supporting with food and shelter such a sizeable body of workmen would have required a stable and well-organized social system. More recent occupation of the area had also centered around the fishpond and focused on use of marine resources. [108]

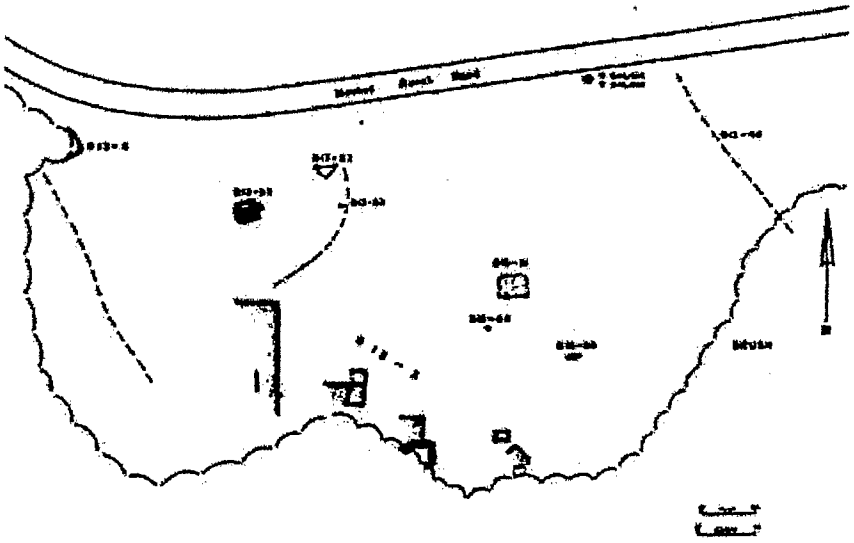


Illustration 140. Surveyed sectionof Kaloko containing a square platform, a slab shelter, a level paved area, a tidal water well, an *ahu,* and a stepping-stone trail. Figure 16 in Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I,* p. 19.
(click on image for an enlargement in a new window)

b) New Study by Ross Cordy, Joseph Tainter, Robert Renger, and Robert Hitchcock

The new study of Kaloko *ahupua'a* recently completed by Ross Cordy et al. presents the results of recent fieldwork in the coastal Kaloko area. It contains some revised site descriptions, records additional major features at previously recorded sites, reclassifies known sites, and provides data on some completely new sites. The authors identify fifty-eight sites in the Kaloko coastal zone, comprising twenty site types, plus five inland-oriented trails. [109] According to their findings, sites used during the nineteenth century include the coastal *cross-ahupua'a* trail, Kaloko Fishpond, and several sites around it, including walled residential lots with associated trail branches, a residential complex, solitary houses, and miscellaneous walled structures. None of the sites, excluding the fishpond, the shoreline trail, and some of the walled house lots, was in

use by the 1880s to 1900s. Only one house lot at a time was occupied, presumably by the pond's caretaker. [110]

J. Contributing and Non-Contributing Elements

All archeological features, the fishponds, and the trail system are significant park resources. There are, in addition, natural and cultural elements that do not contribute to the significance of the area. Alien vegetation, such as *kiawe,* exists within the park. Wooden cabins hug the shore in Honokohau *ahupua'a,* and several modern jeep roads cross the settlement area. A paved secondary road provides public access from the Queen Ka'ahumanu Highway to the Honokohau Harbor, while a narrow, unimproved road leads from the major highway to Kaloko Fishpond. The physical remains of early Hawaiian culture inside the park, however, remain essentially untouched today. [111]

K. Threats to Resources

As with other previously undeveloped areas along the Hawaiian coastline, Kaloko has undergone its share of planning for resort, recreational, and housing purposes. Construction of houses has taken place *mauka* over the last few years, and it was the possibility of resort development starting on the coast that caused the concern, discussion, and study leading to establishment of the national park. Now another resort/development phase is underway. Construction of houses is going forward in the uplands at the same time industrial structures and warehouse facilities are spreading out along the *mauka* side of the Queen Ka'ahumanu Highway. Consideration is being given to expansion of Honokohau Harbor, with plans being drawn for more resorts, condominiums, and other recreational facilities along the coastline north of Kailua. Viewed within this context, Kaloko and Honokohau as a national historical park may well soon be the only remaining sizable enclave in the Greater Kailua region where the coastal archaeological remains of past centuries can be viewed as a whole." [112] This situation, of course, greatly increases the park's value.

Of particular concern, then, are the possibilities of uncontrolled use of the area and the loss of significant resources that are still in private ownership. Many of the Filipino fishermen living in the area of 'Ai'opio Fishtrap, for instance, have established houses on top of ancient *heiau* platforms. The presence of a nude bathing area along the coast near the "Queen's Bath" attracts many visitors who picnic, fish, swim, and participate in other water-related activities. This type of use will undoubtedly increase, especially with expansion of the harbor facilities, and poses a potential threat to this fragile and unique environment.

L. Management Recommendations

This section has attempted to stress the significant research, interpretive, and educational value of cultural resources within Kaloko-Honokohau NHP. Because of the scarcity of fishponds in Hawai'i, those in this park should without question be preserved to illustrate the original character, type of land use, and cultural landscape of the area. In addition, they provide information on the techniques of aquaculture, which might be modified and put into use today or at the very least be a means of passing on knowledge of ancient engineering skills to the present generation to help in comprehension of their cultural heritage. These resources provide lessons in environmental adaptation as well as structural engineering. Kaloko would be a major interpretive

feature if restored as an authentic fishpond after studies to determine its original form and components.

All archeological features in the park should be preserved, preferably in their present state. The variety of features, their location in one area of the coast, and the amount of historical documentation and archeological survey results available make this an ideal interpretive and educational area. Many of the features around 'Aimakapa Fishpond and 'Ai'opio Fishtrap are unique. Even though little documentary evidence exists, and no historical descriptions of the area have been found, these remain a valuable model from which to gain information and form hypotheses about the Hawaiian heritage. All resources can contribute to providing a holistic view of early Hawaiian lifeways.

Several house platforms and Maka'opio Heiau, located in the vicinity of Honokohau Harbor on state land, should be interpreted. The NPS is trying to work out a cooperative agreement with the state to restore this heiau. The state could plan for this area a unique park setting within which significant resources could be preserved, providing an unusual educational opportunity for harbor users.

Currently, vegetation in the park consists of grasses, exotic thorn trees, and shrubs covering the ancient *pahoehoe* lava flow. Behind this, spreading up toward Hualalai, is the more recent covering of *a'a* lava. A Cultural Landscape Report should be programmed to determine the types of plants and shrubs originally present and the changes in vegetation over the years. This report would help determine a treatment plan (removal/control) for introduced alien species and for native plant maintenance. Any clearing of the pond and shore areas will undoubtedly uncover more archeological resources, possibly enabling more accurate dating of pond construction and adding to the research value and educational opportunities of the park.

It has been recommended that 'Aimakapa Fishpond be preserved as a wildlife refuge. Two species of native waterbirds found there are federally listed as endangered species; 'Aimakapa provides an important habitat for them. It has also been recommended that if Kaloko is restored as a fishpond, concessions should be made to foster waterbird use there as well. Because endangered waterbirds are present in the Kaloko wetlands, the Endangered Species Act will have some affect on the kind of activities that can take place there. Planned non-native vegetation removal should be considered a high management priority for wetland habitat restoration. [113]

Later sites, such as the salt pans, house ruins, and foundations of the Honokohau community church around the fishtrap are also important educational tools because they illustrate changing land use and habitation patterns. These features resulted from a variety of economic, social, and political pressures and should be retained as showing continuing adaptation by residents of the area, both native Hawaiians and immigrant ethnic groups, to meet subsistence needs.

Preservation and stabilization of significant archeological resources in the park, such as the fishponds, the village site, the tombs and associated structures near the holua, and the *heiau,* is an NPS management responsibility. The NPS should be intent on preserving the present appearance of these ruins and interpreting pre-European contact and historical values at each site. The full-range of activities in the area by early populations can be transmitted clearly and well through interpretive devices that do not affect the integrity of the ruins or their research value in the future.

It is recommended that development within the park be held to a minimum to preclude intrusion on the area's visual integrity and destruction of the prehistoric and historic scene. Necessary facilities for visitor use could ideally be restricted to areas outside the park boundaries, except for interpretive devices needed to explain the area's significance, essential facilities such as restrooms and designated picnic areas, and whatever minimal structures are needed for visitor and resource protection in what will undoubtedly become a high-use visitor area. (A draft General Management Plan is now in press that defines development plans for the park.)

M. Further Research Needs

Fishponds and associated archeological sites are valuable educational resources. Kaloko-Honokohau is an especially important area because

Near other fishponds, in districts and areas traditionally and historically classified as being settlements of nobility and as serving as court areas, any such archeological remains have been destroyed, leaving little or no evidence of the settlement patterns which once existed. [114]

This frequent lack of associated archeological sites has made dating fishponds very problematical. The presence of so many house sites and other structures near the ponds in this park that can be surveyed and tested give this area added significance. Much archaeological work and documentary research focusing on the park area has been accomplished in the last thirty years, resulting in extensive knowledge of the location and nature of sites and of the historical background of the Kaloko area in particular.

The archeological significance of this area lies in its high research potential due to the density of sites and to the broad cross-section of Hawaiian culture that they represent. Studies to date have provided significant details about the culture along this important section of the Kona Coast and about ancient Hawaiian society in general. Kaloko-Honokohau particularly offers an opportunity to gather data on the sea-related aspects of early Hawaiian culture. Studies on the structures here and their spatial distribution can provide data on their functional uses and on the social interactions of the community. The cultural deposits could help in organizing the sequence of adaptations to the environment and help refine our present chronology of Hawaiian occupation of the islands. [115]

The interpretive value of cultural resources in this park is unique in the islands. The resources here are in such close proximity to each other and in such good condition that they can be interpreted with minimum effort. The park area exemplifies early Hawaiian coastal settlements that supported typical subsistence and social activities, although this area also sustained an active religious/political component associated with the presence of *ali'i*. Nowhere else on the Kona Coast does such a a diversity of sites exist, including habitations illustrating residential patterns and social hierarchies, petroglyphs providing a glimpse of ancient communication forms and motifs, *heiau* and burials exemplifying religious and supernatural beliefs, fishponds exhibiting a specialized subsistence technique, and a feature like the *holua* that represents royal recreational activity. [116]

Cordy et al., in their new report, suggest that further study of the Huehue Ranch operations that moved into Kaloko beginning in 1906 would be appropriate relative to location of buildings, walls, roads, and associated evidence of ranch operations. [117]

Basic data collection, mapping, and documentation of features should continue as new sites are found. An Archeological Base Map is needed as are available for the other two parks in this study. In addition, funding should be sought for a Park Administrative History documenting circumstances leading to the park's establishment, land acquisition procedures, and planning efforts to date. An Ethnographic Overview and Assessment and an ethnohistory should also be programmed.

ENDNOTES

CHAPTER VIII

---

1. Marion Kelly, *Kekaha: 'Aina Malo'o. Historical Survey and Background of Kaloko and Kuki'o Ahupua'a, North Kona, Hawaii,* Report 71-2 (Honolulu: Bishop Museum, Department of Anthropology, 1971), pp. 2-3.

2. Hono-ko-hau Study Advisory Commission, "The Spirit of Ka-loko Hono-ko-hau," A Proposal for the Establishment of a Ka-loko Hono-ko-hau National Cultural Park, Island of Hawaii, State of Hawaii, published by Department of the Interior, National Park Service, 1974, pp. 4-7.

3. *Ibid.*, p. 8.

4. Renger, "Human Adaptation," p. 202.

5. Ross Cordy, Joseph Tainter, Robert Renger, and Robert Hitchcock, *An Ahupua'a Study: The 1971 Archaeological Work at Kaloko Ahupua'a, North Kona, Hawaii: Archaeology at Kaloko-Honokohau National Historical Park,* Western Archeological and Conservation Center Publications in Anthropology No. 58 (Tucson: National Park Service, 1991), pp. 574-79.

6. *Ibid.*, pp. 566, 570, 579.

7. Study Commission, "The Spirit of Ka-loko Hono-ko-hau pp. 9,17.

8. Kelly, *Historical Survey and Background of Kaloko,* pp. 4-6. Kelly has researched land claims, *kuleana* awards, tax records, and other legal documents for information on land ownership and use of Kaloko *ahupua'a,* which she presents in more detail in the work cited and to which the reader is referred.

9. *Ibid.*, p. 7. This report contains more detailed information on these land awards, including the names of awardees.

10. *Ibid.*, p. 14.

11. *Ibid.*, pp. 10-11.

12. Cordy et al., *An Ahupua'a Study,* pp. 566, 569.

13. Kelly, *Historical Survey and Background of Kaloko,* p. 12. The Greenwell family, for instance, came to Hawai'i Island in the 1850s. Of the family of ten children, the three oldest became involved in ranching activities. In 1875 H.N. Greenwell began raising cattle in Kona, continually expanding his holdings until his death in 1891. By the 1920s, the enterprise had developed into three ranches. The Frank Greenwell Ranch (Honokohau Ranch, Hualalai Ranch) comprised thousands of acres in North Kona, stretching from the sea *mauka* to about 5,400 feet. Two other Greenwell family ranches were active in the 1920s, one with land in both North and South Kona, and the other only in South Kona. Kelly, *Gardens of Kona, p.* 81.

14. Kelly, *Historical Survey and Background of Kaloko,* p. 27.

15. *Ibid.*, p. 29.

16. Cordy et al., *An Ahupua'a Study,* pp. 570-71, 573, 580.

17. The Emerson map is filed in the Hawaii State Land Surveyor's office, State Office Building, Honolulu . See Kelly, *Historical Survey and Background of Kaloko,* pp. 14 and 15 (Fig. 6).

18. Cordy et al., *An Ahupua'a Study,* pp. 570-71, 580.

19. Holland, "Land and Livelihood," p. 63.

20. Kelly, *Gardens of Kona,* pp. 85-86.

21. Renger, "Human Adaptation," p. 34.

22. U.S. Department of the Interior, National Park Service, Western Region, and the Hono-ko-hau Study Advisory Commission, *Draft Environmental Statement, Proposed Ka-loko, Hono-ko-hau National Cultural Park, Hawaii* (n.p., 1975), p. 64.

23. Renger, "Human Adaptation," pp. 200-1.

24. Kinney, *Island of Hawaii,* pp. 57, 59.

25. Barrère et al., *Hawaii Aboriginal Culture,* p. 92.

26. Renger, "Human Adaptation," p. 35.

27. Cordy et al., *An Ahupua'a Study,* p. 580.

28. Gavan Daws, "Hawaii, Guarding the 'Islands of the King,'" *Historic Preservation* 25, no. 2 (1973): 7.

29. Thompson, *Pacific Ocean Engineers,* p. 253; Ching, *Archaeology of South Kohala and North Kona,* p. 38.

30. Study Commission, "The Spirit of Ka-loko Hono-ko-hau p. 17.

31. Cordy, *A Study of Prehistoric Social Change,* pp. 144, 180.

32. L. 'A'alaonaona Roy and J. Ku'ualoha Nahale, "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," typescript, 86 pages, no date (1970s?), in files, Pacific Area Office, NPS, Honolulu, pp. 46-51.

33. Renger, "Human Adaptation," pp. 202-3.

34. Sunao Kido, "A Report on Kaloko Fishpond and the Honokohau Settlement National Historic Landmark," October 15, 1971, typescript. 21 pages, in files, Pacific Area Office, NPS, Honolulu, p. 10.

35. Ross Cordy, Joseph Tainter, Robert Renger, and Robert Hitchcock, "Archaeology of Kaloko: A Generalized Model of a Hawaiian Community's Social Organization and Adaptation, MS, 51 pp., n.p., 1977, pp. 35-37. Oral histories have stated that although the produce of 'A'imakapa could be used by commoners in need of food, that of Kaloko could not. Roy and Nahale, "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko,' p. 18.

36. Kamakau quoted in Renger, "Human Adaptation," pp. 31-32. Tradition states that these spies reported their observations to the keepers of the Mailekini Heiau at Kawaihae, who were also spies for Kamalalawalu. Kelly, *Historical Survey and Background of Kaloko,* p. 22.

37. Kelly, *Historical Survey and Background of Kaloko,* p. 22.

38. Kikuchi and Belshe, "Examination and Evaluation of Fishponds," p. B22.

39. Kelly, *Historical Survey and Background of Kaloko,* pp. 22-23.

40. Kamakau, *People of Old,* p. 41. Kelly notes in regard to this statement that Kame'eiamoku, Kamehameha's counsellor, predeceased the king, excluding him as one of the funeral members. *Historical Survey and Background of Kaloko,* p. 23. It is impossible to verify whether all these people are actually buried at Kaloko, although most local residents still believe that the remains of King Kamehemeha are there. One of the reasons given for Kahekili's burial at Kaloko is that he was actually Kamehameha's natural father rather than Keoua-kupuapaikalani as has been traditionally accepted. An interesting discussion of this question is provided in *ibid,* p. 24. Fornander states that Kahekili's age at the time of his death was not known, "but as by all native accounts he was the reputed, if not the legitimate and acknowledged, father of Kamehameha I., he could not well have been less than eighty years old, and was probably some years older." *Account of the Polynesian Race,* 2:260. Dorothy Barrère presents a lengthy discussion of the possible burial places of Kamehameha in her work *Kamehameha in Kona,* providing numerous historical accounts of the concealment of Kamehameha's bones, many at variance with each other. Those pinpointing Kaloko as his burial place refer both to an underwater cave at Kaloko Fishpond and to a secret burial cave elsewhere in Kaloko. Informants have told Kelly that the Kaloko burial caves were not near the fishpond but farther inland. *Historical Survey and Background of Kaloko,* p. 25.

41. Barrère, *Kamehameha in Kona,* p. 70.

42. *Ibid.*, p. 73.

43. Levin, "Overthrow of the *Kapu* System in Hawaii," p. 424.

44. Ching, *Archaeology of South Kohala and North Kona,* p. 245.

45. Kikuchi and Belshe, "Examination and Evaluation of Fishponds," pp. 15-16.

46. *Ibid.*, p. B11.

47. Apple and Kikuchi, *Ancient Hawaii Shore Zone Fishponds,* p. 59.

48. *Ibid.*, pp. 60-61.

49. Renger, "Human Adaptation," p. vii.

50. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 49.

51. Robert C. Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I, North Kona, Hawaii* (Honolulu: Bernice P. Bishop Museum, Department of Anthropology, 1970), p. 31.

52. Kikuchi and Belshe, "Examination and Evaluation of Fishponds p. B22.

53. *Ibid.,"* pp. 18, B20. See Kenneth P. Emory and Lloyd J. Soehren, *Archaeological and Historical Survey, Honokohau Area, North Kona, Hawaii,* rev. ed. (Honolulu: Bernice P. Bishop Museum, Department of Anthropology, 1971), pp. 28-35, for detailed descriptions of the archeological features in the Kaloko Fishpond area. This report was originally published in 1961. Other more recent survey findings will appear later in this section.

54. Cordy et al., *An Ahupua'a Study,* p. 288.

55. *Historical Survey and Background of Kaloko,* pp. 29-35.

56. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 50.

57. Kelly, *Historical Survey and Background of Kaloko,* p. 27.

58. *Ibid.*, p. 29. Local informants told Roy and Nahale that Kaloko Fishpond is still considered *kapu-kapu* (very sacred), a much higher status that that accorded other ponds in the area and requiring special care and treatment of the pond and surrounding area. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 34. These individuals also mentioned two stones near the south end of the pond, one said to be a likeness of the *mo'o* and the other a flat stone on which offerings have been laid. *Ibid.*, pp. 35-36.

59. Kikuchi and Belshe, "Examination and Evaluation of Fishponds," p. B13.

60. u.s. Department of the Interior and Study Commission, *Draft Environmental Statement,* pp. 47, 49.

61. *Ibid.,* p. 49; Importance and Description Section, National Survey of Historic Sites and Buildings form for Honokohau Settlement, 1962. The NPS has mapped and stabilized the holua near 'Aimakapa.

62. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 49. See Emory and Soehren, *Archaeological and Historical Survey, Honokohau Area,* pp. 19-27, for detailed descriptions of sites around 'Aimakapa Fishpond.

63. Kikuchi and Belshe, "Examination and Evaluation of Fishponds," p. B14.

64. Roy and Nahale mention a small unnamed *heiau* just northeast of Pu'u'oina, referred to as Kahakuloa Heiau. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko,' p. 20. They further relate being told of a *ko'a heiau* at the beach below the "Queen's Bath," near 'Aimakapa. This was an important shrine used for ceremonies of thanksgiving after the fishermen returned to shore. Inland of this *heiau,* "across the small channel entrance to the [canoe] landing," are remains of a walled platform used for prayers requesting luck and a bountiful harvest prior to sailing. *Ibid.,* p. 22. 'Aimakapa Fishpond contains another large stone platform near its north end that served as a shrine. Roy and Nahale, "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 22. Another informant mentioned to Roy and Nahale the small but powerful "bad" *heiau* situated along the coast at various points all the way to 'Anaeho'omalu. *Ibid.,* p. 86.

65. Study Commission, "The Spirit of Ka-loko Hono-ko-hau," p. 6.

66. Kikuchi and Belshe, "Examination and Evaluation of Fishponds," p. B9.

67. *Ibid.,* p. 18. According to Kelly, an informant told, her that the Honokohau ponds once formed a single, large pond, whose wall stretched from the west end of 'Ai'opio north to the headland about 800 feet beyond the present northernmost limits of 'Aimakapa Fishpond. *Historical Survey and Background of Kaloko,* p. 18.

68. Kikuchi and Belshe, "Examination and Evaluation of Fishponds," p. 510. See Emory and Soehren, *Archaeological and Historical Survey, Honokohau Area,* pp. 15-19, for detailed descriptions of features in the 'Ai'opio Fishpond area. Informants mentioned these salt pans to Roy and Nahale, describing how the salt was evaporated and then skimmed off for use in drying fish. The researchers were told that some people have attributed other uses to these pans, such as for drying fish or for crushing the herbs used by fishermen to stun fish and enable their easy capture. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," pp. 24-25. Plate 5A in Emory and Soehren is a photograph taken in 1918 from Pu'u'oina Heiau looking northeast toward 'Ai'opio Fishtrap. Along the shoreline are the houses and church of the Honokohau Settlement. Some of these houses, as well as the church, were still shown on a 1928 map. Archeologists believe that the walls and foundations associated with these structures are still present in the park.

69. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 47.

70. *Ibid.,* p. 49. According to local informants, Maka'opio was built in the time of Lono'i'ka'makahiki. The tall stones set the standards of height for warriors sent into battle. Roy and Nahale, "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 50.

71. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 49.

72. Emory and Soehren, *Archaeological and Historical Survey, Honokohau Area,* pp. 15-17. According to one of Roy and Nahale's informants, five natural pools adjacent to Pu'u'oina Heiau on the south were holding areas for specific kinds of fish the ruling chief desired. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 18.

73. Study Commission, "The Spirit of Ka-loko Hono-ko-hau," p. 6.

74. Kirch, *Feathered Gods and Fishhooks,* pp. 267, 270. See Russell A. Apple, *Trails: From Steppingstones to Kerbstones,* Bernice P. Bishop Museum Special Publication 53 (Honolulu: Bishop Museum Press, 1965).

75. Joseph Chang, Sr., "Ancient Hawaiian Trails and Access in Kohala," in *Kohala Keia (This is Kohala)* (n.p., 1977), pp. 101-2.

76. Roy and Nahale, "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 51.

77. Rosendahl, *Archaeological Salvage of the Ke-ahole to Anaehoomalu Section,* p. 78; Kirch, *Feathered Gods and Fishhooks,* p. 267.

78. Cordy et al., *An Ahupua'a Study,* p. 462.

79. Kikuchi and Belshe, "Examination and Evaluation of Fishponds," pp. B11, B15, B22; Cordy et al., *An Ahupua'a Study,* p. 403. The latter point out that the Mamalahoa Trail (Lower Government Road), "the major seaward road through the region of this period," bypassed the coast, indicating that area's lack of population by the mid-1800s. By 1888, however, that road's major period of use had also ended. Having replaced the coastal trail, it eventually gave way to the Upper Government Road, again indicating population and economic changes. That road then became the only major route through Kaloko, with shorter roads emanating to various places from the Kohanaiki Homesteads. The only *mauka-makai trail* used at this time was one leading from the Kohanaiki Homesteads to Kaloko Fishpond. Pp. 406,569, 572. Regarding the question of who could eat fish from these ponds, informants told Roy and Nahale that part of the harvest of the ponds was always distributed among the people, and that Kamehameha's armies were allowed to eat the fish from the ponds on their way through in times of war. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," P. 37.

80. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 51; Tuggle, "Hawaii," p. 172.

81. Description of Sites, (D13) Kaloko, in Emory and Soehren, *Archaeological and Historical Survey, Honokohau Area,* pp. 28-29.

82. Virginia Brooks, "The Demonstration Project: *Ala Kahakai (Trail by the Sea),"* in *Na Ala Hele (Trails for Walking)* (Honolulu: State of Hawaii, 1973), p. 30. informants gave Roy and Nahale the names of several women who used this bath, many being the wives of the ruling chiefs of the area. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 51.

83. Kelly, *Historical Survey and Background of Kaloko,* p. 48.

84. *Ibid.,* p. 49.

85. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 84.

86. *An Ahupua'a Study,* p. 579. The *ahupua'a* shrines were the places where the yearly tributes were collected during the *Makahiki* season.

87. The Honokohau Settlement Complex" included 'Aimakapa Fishpond and the cultural sites around it as well as Kaloko Fishpond.

88. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 1.

89. Sunao Kido, "A Report on Kaloko Fishpond and the Honokohau Settlement National Historic Landmark," October 29, 1971, typescript, 22 pages, p. 5; U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* p. 50.

90. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* pp. 46-47.

91. *Ibid.,* p. 50; Kido, "Report on Kaloko Fishpond and the Honokohau Settlement," October 15,1971, pp. 9-10, and October 29, 1971, p. 10.

92. U.S. Department of the Interior and Study Commission, *Draft Environmental Statement,* pp. 50-51.

93. *Ibid.,* pp. 1-2.

94. Deborah F. Cluff, *An Archaeological Survey of the Seaward Portion of Honokohau #1 and #2, North Kona, Hawaii Island,* rev. ed. (Honolulu: Bernice P. Bishop Museum, Department of Anthropology, 1971), p. 2. See this report for detailed descriptions of archeological sites within the coastal portion of the *ahupua'a* of Honokohau, pp. 7-14.

95. *Ibid.,* p. 13.

96. *Ibid.,* p. 14.

97. *Ibid.,* pp. 14-16.

98. Renger, *Archaeological Reconnaissance of Coastal Kaloko and Kukio I,* pp. 3-5.

99. *Ibid.,* p. 5.

100. *Ibid.*, pp. 10-16.

101. *Ibid.*, pp. 16-22.

102. *Ibid.*, p. 22.

103. *Ibid.*

104. *Ibid.*, p. 24.

105. *Ibid.*, p. 27.

106. *Ibid.*, p. 28.

107. *Ibid.*, p. 32.

108. *Ibid.*, pp. 32-33.

109. Cordy et al., *An Ahupua'a Study,* p. 275.

110. *Ibid.*, p. 473.

111. Kido, "Report on Kaloko Fishpond and the Honokohau Settlement," October 15,1971, p. 4. An informant told Roy and Nahale that one used to be able to see fires at Honokohau from Kaloko and at the coast from the uplands, supporting the contention that the original vegetative cover here was much less dense and overgrown. As mentioned earlier, tradition says that fires were used to signal impending danger to other areas along the coast, but local informants have stated that fires were part of the *mauka-makai* exchange system, signalling when a group of people needed food. "Ka Mo'olelo Ha'i Waha O Honokohau-Kaloko," p. 24.

112. Cordy et al., *An Ahupua'a Study,* p. 580.

113. Marie Morin, Research Assoc., to Frances Kuailani, Supt., Kaloho-Honokohau NHP, Nov. 25,1992, in DSC tiles.

114. Apple and Kikuchi, *Ancient Hawaii Shore Zone Fishponds,* p. 58.

115. Kido, "Report on Kaloko Fishpond and the Honokohau Settlement," October 15, 1971, p. 10.

116. *Ibid.*, p.11.

117. Cordy et al., *An Ahupua'a Study,* p. 573.

Appendix B

State Land Use Commission (September 2003), "Decision and Order" (Docket A00-730)

State Land Use Commission (January 2008), "Order Granting Motion to Amend Conditions and Extend Time for Compliance" (Docket A00-730)

DECISION AND ORDER

IT IS HEREBY ORDERED that the Property being the subject of Docket No. A00-730, filed by petitioner, Lanihau Properties, LLC, consisting of approximately 336.984 acres of land in the State Land Use conservation District at Hinokohau, North Kona, Island of Hawai'i, County of Hawai'i, State of Hawai'i, identified as Tax Map Key No. 7-4-8: 13 (por.) and 30, is hereby reclassified into the State Land Use Urban District, and the State land use district boundaries are amended accordingly, subject to the conditions of approval set forth herein.

This Commission is acutely aware that continuous development is planned for this coastline. Although each developer might claim that only a "small amount" of pollution will result from their development and that the area's ecosystem will dhow "little" effects, these developments and their impacts are cumulative and, absent strong mitigation measures, have the potential to devastate the fragile resources of the coastal and marine aquatic environments of the entire Kona coastal region.

Absent adequate, effective and enforceable conditions of approval, including removal of wastewater nutrients and surface runoff contaminants, Petitioner's Project has the potential to cause unacceptable adverse impacts to coastal resources, particularly the natural and cultural resources of the adjacent Park and the traditional and customary native Hawaiian practices that depend of the sensitive nature of such resources.

Based upon the findings of fact and conclusions of law stated herein, is it hereby determined that the customary and traditional native Hawaiian practices, the cultural resources, and the important natural systems and habitats of the Park that have been identified herein shall be adequately protected by the conditions of this decision and order.

To protect the exercise of customary and traditional native practices; to protect the historical and cultural resources of the coastal area including KAHO; to ensure the health and preservation of the natural systems and habitats of KAHO, including the endangered, threatened,

and endemic species and their habitat, the reclassification of the Property shall be subject to the following conditions:

Wastewater

1a. The Petition Area shall be developed with dry sewer lines for eventual connection to the Kealakehe WWTP.

1b. The Petition Area shall be required to connect to the WWTP, when such connection is available. The Petitioner, its successors, and assigns, shall collaborate with the County of Hawai'i to include the Petition Area within an improvement district, if one is developed, to fund the connection to the WWTP. The Petitioner or individual lot owners within the Petition Area shall pay for their fair share of the cost to fund such connection to the WWTP, whether or not an improvement district is established.

1c. Except for the existing quarry operations and the construction of the roads and utilities as provided for below, the Petitioner and/or any future owner(s) of the Petition Area shall refrain from constructing upon or occupying any portions of the Petition Area until such time as the portion (e.g., lot) to be constructed upon or occupied is connected to the WWTP, unless in the interim, the portion to be constructed upon or occupied has installed a septic tank system or other Individual Wastewater System (IWS) designed to remove no less than 60% Total Nitrogen from the treatment system (e.g., septic tank with FAST, Biofilter, Recirculation Filters, Sequential Batch Reactor, or comparable technology) and an absorption field of import material which is constructed in a manner to achieve no less than 89% reduction of Nitrogen and 90% reduction in phosphorous; featuring adequate percolation rate. The existing quarry operation shall have in place an IWS as described above within one year of the date of issuance of boundary reclassification. Installation is the subject to conditions of approval imposed by the Director of the Hawai'i State Department of Health and Hawai'i Administrative Rules (HAR) Title 11 Chapter 62. When connection to the WWTP becomes available, all portions of the

Petition Area, including all individual lots therein, shall connect to the WWTP, whether or not an interim wastewater treatment system has been installed.

1d. Utilization of the IWS described above in Condition 1c shall be limited to no more than 40 lots to be developed in the Petition Area.

1e. The owner of the IWS shall certify with the Hawai'i State Department of Health that the IWS shall be operated and maintained in accordance with all of the provisions of the operation and maintenance manual developed pursuant to HAR 11-62. The certification shall include that upon the sale or transfer of ownership of the IWS, the sale or transfer will include the appropriate transfer documents and provisions binding the new owner to the operation and maintenance manual.

1f. Petitioner and/or each individual lot owner(s) shall develop and participate in a Wastewater Treatment System Maintenance Agreement, before constructing upon or occupying any portion of the Petition Area, that shall provide for safe and effective operation and maintenance of the treatment unit(s), whether shared or individual, and/or the temporary sewage line. The Maintenance Agreement shall require a contract with a wastewater professional to regularly inspect, maintain and certify that the IWS unit(s) installed in the Petition Area are operating correctly. Necessary repairs shall be performed promptly and record of repairs shall be kept. This requirement shall be included in the conditions of sale of any lot and/or parcel in the Petition Area.

1g. Should the NPS elect to pursue installation of a temporary sewage line to the WWTP for the KAHO Visitor Center construction project, the Petitioner may elect, subject to prior authorization by the NPS, to dispose of wastewater from not more than 20 lots in the Petition Area, via such temporary line to the WWTP. In no event shall the temporary sewage connection be in place and utilized for longer than five (5) years from the date of completion of construction of such temporary line expect at the sole discretion of the NPS. The Petitioner shall pay its fair share cost to fund such temporary connection to the WWTP, as determined by the

NPS, the Petitioner and the County of Hawai'i. When connection to the WWTP becomes available through permanent sewer lines, all portions of the Petition Area, including all individual lots that may have been connected to the above described temporary sewage line, shall connect to the WWTP through permanent lines, whether or not one or more lots were connected via the temporary sewage line. Connection of not more than twenty (20) lots to the WWTP via such temporary sewage line does not release any other individual lots within the Petition Area from compliance with any other condition(s) of this decision and order.

Storm water and Surface Water Run-off

2a. To the extent possible, all storm and surface water runoff shall be captured on the premises. To the extent possible, all runoff entering the ground shall be first treated to remove all industrial waste so that no industrial pollutants will reach KAHO or enter the water table. Petitioner shall be subject to and prepare covenants, conditions, and restrictions for the Petition Area and each lot into which the Petition Area may be subdivided, to contain spills and prevent materials associated with industrial uses attributable to the operations of the Property, including petroleum products, chemicals or other pollutants from leaching or draining into the ground or subsurface storm drain collection areas. Said covenants shall be subject to the approval of the DOH, upon consultation with the NPS, and the County of Hawai'i. The Petitioner and/or tenant shall obtain all required permits and construct required improvements for storm water discharge on and from the Property. These conditions shall include the following:

2b. Prior to the occupancy of any part of the Petition Area, the Petitioner shall engineer, construct (or require to be constructed) and maintain surface water/storm water containment systems that ensure no Federal, State, or Country water quality standards will be violated. The foregoing is not applicable to uses permissible under the existing quarry permit.

2c. No injection wells shall be constructed as an element of a surface water/storm water containment system in the Petition Area unless, prior to the start of any

construction, appropriate requirements of HAR chapter 11-23 are satisfied and the Hawai'i State Department of Health issues an UIC (Underground Injection Control) permit. Contaminants shall be monitored and removed with best efforts prior to entering injection wells. Monitoring protocols for injection wells shall be established in the Pollution Prevention Plan, pursuant to Condition 3b. All monitoring wells shall be maintained and made available to the DOH, the County, and the NPS, upon request.

2d. If a large void, such as a lava tube or solution cavity, is encountered during drilling, where the drill rod drops more than three feet, measures shall be taken to prevent migration of the injected fluids to KAHO to the satisfaction of the Hawai'i State Department of Health as described in HAR §11-23-09(f).

2e. All injection wells established in the Petition Area shall be operated in such a manner that they do not violate any of the DOH's administrative rules under title 11 HAR, regulating various aspects of the water quality and pollution, and chapters 342-B, 342-D, 342-F, 342-H, 342-J, 342-L, and 342-N, HRS. Relevant HAR include but, are not limited to: i. Chapter 11-20, "Rules Relating to Potable Water Systems"; ii. Chapter 11-62', "Wastewater Systems"; and iii. Chapter 11-55, "Water Pollution Control".

2f. The operator of any injection well or wells in the Petition Area shall keep detailed records of the operation of the well or wells, including, but not limited to, the type and quantity of injected fluids, and the method and rate of injection for each well. Such records will be available for inspection or review by the Hawai'i State Department of Health as specified under appropriate section of HAR Chapter 11-28.

2g. Any person who violates any of these conditions shall be subject to penalties as prescribed in appropriate chapters of HRS and HAR as they relate to (but are not limited to): Potable Water Systems; Wastewater Systems; Water Pollution Control; Safe Drinking Water; and Underground Injection Control.

2h. The Petitioner, successors and/or individual lot owners in the Petition Area shall ensure that all drainage injection wells or subsurface drainage structures are designed with an appropriate size debris catch basin to allow the detention and periodic removal of rubbish and sediments deposited by runoff. Storm water runoff shall first enter the debris catch basin before flowing into the drainage well. The debris catch basin shall be periodically inspected and cleaned accordingly. Oil/water separators shall be utilized where petroleum products are used.

2i. The Petitioner shall establish an owners' association with the power to oversee and report violations as a second line of defense against pollution violations.

Pollution Prevention

3a. Petitioner currently operates a quarry in a portion of the Petition Area. Any further public or private industrial development within the Petition Area which could be considered a new source of pollution or an increased source of pollution shall, in its initial project design and subsequent construction, provide the highest and best degree of waste treatment practicable under existing technology.

3b. Except for the existing quarry operation and the construction of roads and utilities, before constructing upon or occupying any portion of the Petition Area, a Pollution Prevention Plan (PPP), after consultation with the NPS, shall be developed that addresses each of the types of uses permissible in the Petition Area, by specifically designating Best Management Practices (BMPs) tailored to each specific use. Emphasis shall be given to structural BMPs to prevent any and all pollutants that may be associated with such industries from being released into the environment, including reaching the groundwater. Structural BMPs shall include, but shall not be limited to, oil/water separators, detention ponds, lined containment pits, and storm water filtration units designed to contain and remove industrial contamination. The PPP shall include, but not be limited to: i. All cleaning, repairs, and maintenance of equipment involving

the use of industrial liquids, such as gasoline, diesel, solvent, motor oil, hydraulic oil, gear oil, brake fluid, acidic or caustic liquids, antifreeze, detergents, degreasers, etc. shall be conducted on a concrete floor, whether roofed or unroofed. The concrete floor shall be constructed to contain any drip or spills and to provide for the recovery of any spilled liquid. Water drainage from these concrete floors, if necessary, shall pass through a separator sump before being discharged. The PPP may identify exceptions to this rule under specific circumstances, provided that adequate alternative BMPs (structural or otherwise) are identified and utilized for containment. ii. Any containers used for storage of used oil or other industrial liquids shall be kept on a concrete surface. The surface shall be bermed to prevent the loss of liquid in the event of spills or leaks. The containers shall be sealed and kept under shelter from the rain. (The Department of Labor and Industrial Relations' Occupational Safety and Health regulations, sections titled, "Housekeeping Standards" and Storage of Flammable or Combustible Liquids," shall be followed along with the local fire code.) iii. All employees shall be informed to immediately collect and contain any industrial liquid spills on the concrete floor and should be informed against discharging or spilling any industrial liquids. Employees shall be aware to prevent any industrial spill onto the bare ground. In the event that the Petitioner and the NPS cannot agree upon a mutually agreeable final PPP within 12 months of the date of issuance of the boundary reclassification, the Commission shall review the draft PPP, along with written comments from Petitioner, the NPS and the other parties, and shall issue a final PPP. In no event shall the Petitioner and/or individual lot owner(s) construct upon or occupy any portion of the Petition Area until such time as the final PPP is complete. The final PPP shall be recorded and shall run with the land within the Petition Area in the same manner as all conditions of approval imposed by the Commission. In the event that a specific use is proposed for the Petition Area that is not specifically addressed in the final PPP, the Petitioner and/or the individual lot owner(s)

proposing such use shall consult with the NPS to establish a set of BMPs appropriate for such proposed use and consistent with the goal of preventing any and all pollutants from being released into the environment.

3c. The Petitioner, its successors or individual lot owners shall provide signage for all drainage/injection wells in the Petition Area with warnings such as the following: DUMP NO WASTES. GOES TO GROUNDWATER AND OCEAN. HELP PROTECT HAWAI'I'S ENVIRONMENT. Signage shall be either stand-up (legible from at least 30 feet, permanently posted at an effective and safe height) or painted on the ground next to the drainage well's inlet.

3d. For parking areas, BMPs will be established as covenants running with the land, which emphasize pollution prevention rather than treatment. All large vehicles such as buses, trucks, or construction equipment shall utilize drip pans to avoid release of petroleum onto paved or graveled surfaces or, in the alternative, all parking areas for large vehicles shall include grassed or vegetative swales to capture drainage from such parking areas. Areas used primarily for automobile parking shall be periodically checked and cleaned to avoid build up of oil or other automotive fluids. Protocol for cleaning parking areas shall be established in the Pollution Prevention Plan, pursuant to Condition 3b. Maintenance work other than emergency work on vehicles will be banned in parking areas.

3e. Where site geometry permits, the Petitioner, its successors or individual lot owners shall design and construct (or require to be constructed) landscaped areas, including grassed or vegetative swales to capture storm water drainage from all perimeter lots, facilities, and parking areas of the Petition Area. For all vegetative swales, Petitioner and/or individual lot owners may apply only the minimum required nutrients (fertilizer) to maintain the vegetation without causing significant nutrient runoff, and the water used for irrigation purposed shall not exceed the amount necessary to maintain the vegetation.

3f. Owner or operator covenants developed for the Petition Area shall expressly disclose to all future individual lot owner(s) the existence of the National Park System Resource Protection Act, 16 U.S.C. Sections 19jj-19jj-4, and the consequences of violation of such act. In particular, future land owners shall be made aware that any person who destroys, causes the loss of, or injures any park system resource is liable to the United States for response costs and damages resulting from such destruction, loss, or injury.

3g. In performing the requirements of this Condition 3, the Petitioner shall consider and, to the extent practical, incorporate the information and ideas brought forth in the regional (Kaloko-Honokohau) pollution prevention forum convened by the Commission on November 4, 2002. The information and ideas at the forum included: pollution prevention planning; best available control technologies (BACT); structural and operation BMPs addressed to the type of uses permissible in an industrial park, and formulas for determining fair share and reasonable pro-rata share costs relating to any groundwater monitoring program.

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI'I

In the Matter of the Petition of	)	DOCKET NO. A00-730
	)	
LANIHAU PROPERTIES, LLC	)	ORDER GRANTING MOTION TO
	)	AMEND CONDITIONS AND
To Amend the Conservation Land Use	)	EXTEND TIME FOR COMPLIANCE
District Boundary into the Urban Land	)	
Use District for Approximately 336.984	)	
Acres at Honokohau, North Kona, Hawaii,	)	
	)	
Tax Map Key Nos.: 7-4-08: portion of	)	
13 and 7-4-08: 30	)	
	)	

ORDER GRANTING MOTION TO AMEND CONDITIONS AND EXTEND TIME FOR COMPLIANCE

This is to certify that this is a true and correct copy of the document on file in the office of the State Land Use Commission, Honolulu, Hawaii.

JAN 31 2008 by _____
Date Interim Executive Officer

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI`I

In the Matter of the Petition of	)	DOCKET NO. A00-730
	)	
LANIHAU PROPERTIES, LLC	)	ORDER GRANTING MOTION TO
	)	AMEND CONDITIONS AND
To Amend the Conservation Land Use	)	EXTEND TIME FOR COMPLIANCE
District Boundary into the Urban Land	)	
Use District for Approximately 336.984	)	
Acres at Honokohau, North Kona, Hawaii,	)	
	)	
Tax Map Key Nos.: 7-4-08: portion of	)	
13 and 7-4-08: 30	)	
	)	

ORDER GRANTING MOTION TO AMEND CONDITIONS AND EXTEND TIME FOR COMPLIANCE

The Land Use Commission ("Commission"), considered the Motion To Amend Conditions and Extend Time For Compliance ("Motion") filed on August 24, 2007, by West Hawaii Business Park, LLC, successor to Lanihau Properties, LLC ("Petitioner"), relating to the Findings of Fact, Conclusions of Law, and Decision and Order filed herein on September 26, 2003 ("Decision and Order"), at its meeting on September 7, 2007, at Kailua-Kona, Hawaii. R. Ben Tsukazaki, Esq. appeared on behalf of Petitioner. Brooks Bancroft, Esq., and Norman Hayashi appeared on behalf of the County of Hawaii Planning Department ("County"). Bryan C. Yee, Esq. and Abe Mitsuda appeared on behalf of the State office of Planning ("OP"). Richard Boston and

Sallie Beavers appeared on behalf of Intervenor Koloko Honokohau National Historical Park, National Park Service.

On September 7, 2007, the Intervenor submitted a response to the Motion with respect to Condition 1c.

The Petitioner argued that the requested amendment to Condition 1c will clarify that the respective standards for reduction of phosphorus and nitrogen are understood to apply to the reduction of total nitrogen pursuant to the design of the individual wastewater systems, and, separately, the reduction of the phosphorus pursuant to the design of the absorption field in combination with treatment in the individual wastewater system. With respect to condition 2a, the Department of Health has declined to approve various covenants, conditions and restrictions required to ensure that future development on lots within the Petition Area will include mitigation measures to protect against potential run-off containing industrial pollutant reaching Koloko Honokohau National Historical Park. Consequently, Petitioner cannot comply with the condition unless it is amended. With respect to Condition 7, Petitioner argued that there is no basis in the Decision and Order to require Petitioner to develop a financial plan for satisfying the fair-share contribution requirements agreed to by Petitioner. Petitioner acknowledged that there were fair-share contribution requirements in the Decision and Order and that it intended to comply with them.

The County had no objection to the Motion.

The OP stated that it (i) had no objection to the request for extension of time; (ii) had no position and no opposition to the deletion of Condition 7; (iii) supported the Amendment to Condition 2a in light of the position of the Department of Health; and (iv) suggested deferring action on the amendment to Condition 1c until the Intervenor could get an attorney involved.

The Intervenor stated that it did not have any objection to the proposed language change in Condition 1c although it did not believe the change was necessary. Intervenor took no position with respect to the rest of the Motion.

After considering the Motion, the memorandum in support of motion filed by Petitioner, and the Intervenor's response, and having examined the record and considered the arguments by counsel on behalf of West Hawaii Business Park, LLC, the OP, the County, and by representatives of Intervenor, a motion was made and seconded to grant Petitioner's motion. There being a vote tally of 6 ayes and 1 absent, the motion carried.

ORDER

A motion having been made at a hearing on September 7, 2007, in Kailua-Kona, Hawaii, and the motion having received the affirmative votes required by section 15-15-13, HAR, this Commission hereby GRANTS Petitioner's Motion. The Decision and Order is amended as follows:

1. CONDITION 1c is amended to read as follows:

"1c. Except for the existing quarry operations and the construction of the roads and utilities as provided for below, the Petitioner and / or any future owner(s) of the Petition Area shall refrain from constructing upon or occupying any portion of the Petition Area until such time as the portion (e.g., lot) to be constructed upon or occupied is connected to the WTTP, unless in the interim, the portion to be constructed upon or occupied has installed a septic tank system or other Individual Wastewater System (IWS) designed to remove no less than 80% Total Nitrogen from the treatment system (e.g., septic tank with FAST, Biofilter, Recirculation Filters, Sequential Batch Reactor, or comparable technology) and an absorption field of import material which is constructed in a manner to achieve no less than 90% reduction in phosphorous, featuring adequate percolation rate. The existing quarry operation shall have in place an IWS as described above within one year of the date of issuance of boundary reclassification. Installation is subject to conditions of approval dictated by the Director of the Hawaii State Department of Health and Hawaii Administrative Rules (HAR) Title 11 Chapter 62. When connection to the WTTP becomes available, all portions of the Petition Area, including all individual lots therein, shall connect to the WTTP, whether or not an interim wastewater treatment system has been installed."

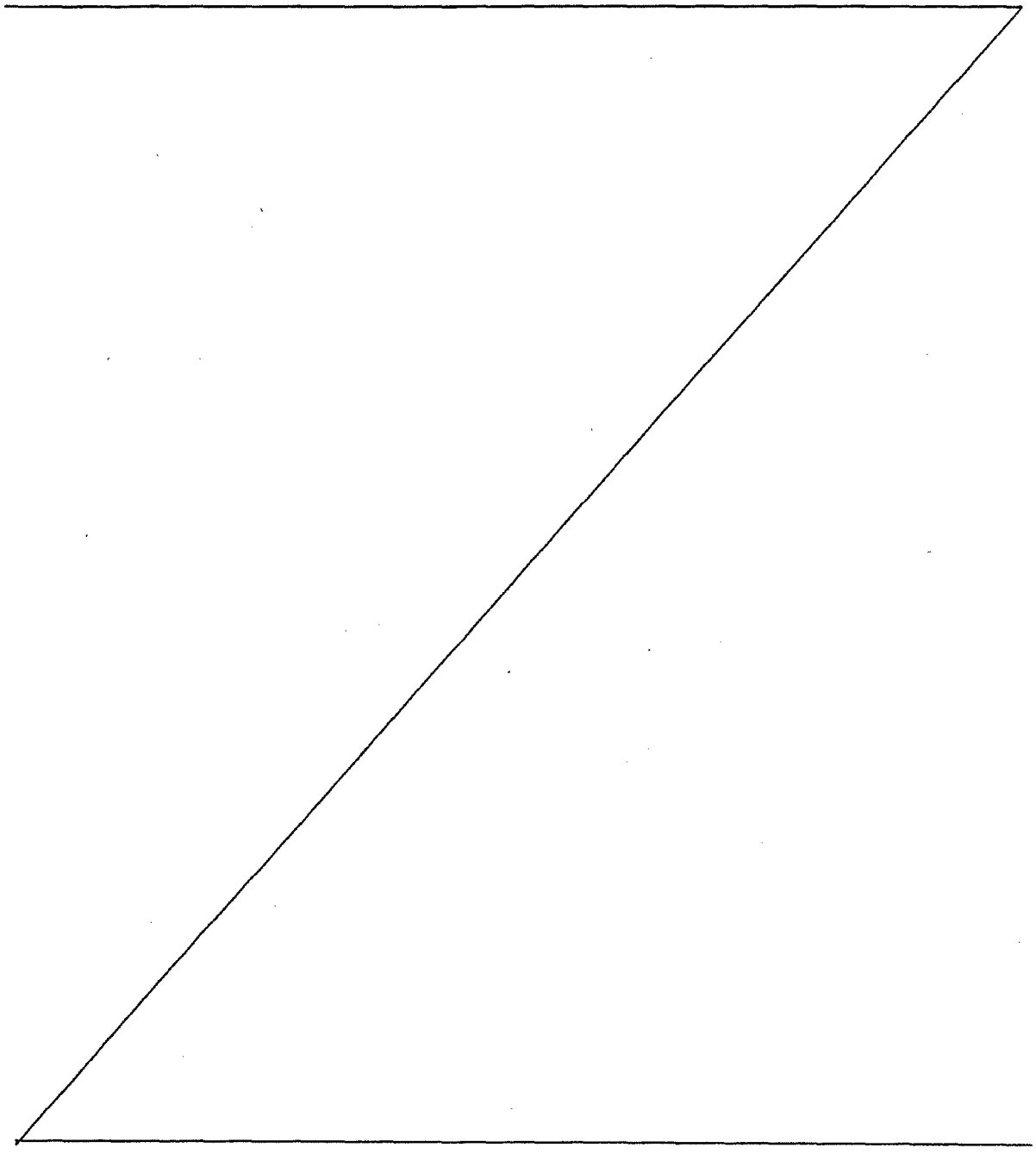
2. CONDITION 2 is amended by amending 2a to read as follows:

"2a. To the extent possible, all storm and surface water runoff shall be captured on the premises. To the extent possible, all runoff entering the ground shall be first treated to remove all industrial waste so that no industrial pollutants will reach KAHO or enter the water table. Petitioner shall be subject to and prepare covenants, conditions, and restrictions for the Petition Area to contain spills and prevent materials associated with industrial uses attributable to the operations of property, including petroleum products, chemicals, or other pollutants from leaching or draining into the ground or subsurface storm drain collection areas. Said covenants shall be prepared by Petitioner upon consultation with the NPS and the County of Hawai'i. The Petitioner and/or tenant shall obtain all required permits and construct required improvements for storm water discharge on and from the property. These conditions shall include the following:"

3. CONDITION 7 is deleted.

4. The time of compliance with Conditions 1c and 2a, as amended, shall be extended to August 31, 2008.

All other findings of fact, conclusions of law, and conditions in the Decision and Order are affirmed and continue in full force and effect.



ADOPTION OF ORDER

The undersigned Commissioners, being familiar with the record and proceedings, hereby adopt and approve the foregoing ORDER this 31st day of January, 2008. This ORDER and its ADOPTION shall take effect upon the date this ORDER is certified and filed by this Commission.

Done at Honolulu, Hawai`i, this 31st day of January, 2008, per motion on September 7, 2007.

APPROVED AS TO FORM

Deputy Attorney General

LAND USE COMMISSION
STATE OF HAWAI`I

By Lisa M. Judge
LISA M. JUDGE
Chairperson and Commissioner

By
DUANE KANUHA
Vice Chair and Commissioner

By
THOMAS CONTRADES
Commissioner

By _____
VLADIMIR PAUL DEVENS
Commissioner

By _____
RANSOM PILTZ
Commissioner

By (absent)
NICHOLAS W. TEVES, JR.
Commissioner

Filed and effective on:
JAN 31 2008

By _____
REUBEN S.F. WONG
Commissioner

Certified by:

_____
Interim Executive Officer

BEFORE THE LAND USE COMMISSION

OF THE STATE OF HAWAI`I

In the Matter of the Petition of	)	DOCKET NO. A00-730
	)	
LANIHAU PROPERTIES, LLC	)	CERTIFICATE OF SERVICE
	)	
To Amend the Conservation Land Use District Boundary into the Urban Land Use District for Approximately 336.984 Acres at Honokohau, North Kona, Hawaii,	)	
	)	
Tax Map Key Nos.: 7-4-08: portion of 13 and 7-4-08: 30	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that a copy of the Order Granting Motion To Amend Conditions And Extend Time For Compliance was served upon the following by either hand delivery or depositing the same in the U. S. Postal Service by regular or certified mail as noted:

DEL. MARY LOU KOBAYASHI, Acting Director
Office of Planning
P. O. Box 2359
Honolulu, Hawaii 96804-2359

BRYAN C. YEE, Esq.
Deputy Attorney General
Hale Auhau, Third Floor
425 Queen Street
Honolulu, Hawaii 96813

LINCOLN ASHIDA, Esq.
BROOKS BANCROFT, Esq.
Corporation Counsel
County of Hawaii
101 Aupuni Street, Suite 325
Hilo, Hawaii 96720

CHRISTOPHER YUEN, Director
County of Hawaii, Planning Department
Aupuni Center
101 Pauahi Street, Suite 3
Hilo, Hawaii 96720

CERT. R. BEN TSUKAZAKI, Esq.
Tsukazaki Yeh & Moore
85 W. Lanikaula Street
Hilo, Hawaii 96720

Dated: Honolulu, Hawaii, JAN 31 2008.

RODNEY A. MAILE
Interim Executive Officer

Appendix C

Specific Chemicals Found in Contaminants of Concern