

DAVID Y. IGE

GOVERNOR OF HAWAII



STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF STATE PARKS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 9, 2015

Ms. Jessica Wooley, Director
Office of Environmental Quality Control
Department of Health, State of Hawai'i
235 S. Beretania Street, Room 702
Honolulu, HI 96813

Re: Environmental Impact Statement Preparation Notice (EISPN) for Hā'ena State Park Master Plan

Dear Director Wooley:

Under the provisions of Act 172 (12), the State of Hawai'i, Department of Land and Natural Resources, Division of State Parks has determined at the outset that an environmental impact statement is required for the Master Plan of Hā'ena State Park situated at (4) 5-9-08:001 and 5-9-001:002, in the District of Hanalei on the island of Kaua'i. A completed Bulletin Publication Form and an EISPN that summarizes the proposed action is enclosed. An electronic copy is also provided herein on Compact Disk (CD).

Pursuant to the requirements of Section 11-200-3 and Section 11-200-15, Hawai'i Administrative Rules, we request that you publish notice of this statutory determination in the next available periodic bulletin (Environmental Notice) for the public to submit comments to State Parks during a thirty-day public comment period.

Very truly yours,

EP

Daniel S. Quinn
State Parks Administrator

CARTY S. CHANG
INTERIM CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DANIEL S. QUINN
INTERIM FIRST DEPUTY

W. ROY HARDY
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION

LAND
STATE PARKS

OFC. OF ENVIRONMENTAL
QUALITY CONTROL

15 FEB 10 3:47

RECEIVED

FILE COPY

FEB 23 2015

Encl. Completed OEQC Publication Form
EISPN

**AGENCY ACTION
SECTION 343-5(B), HRS
PUBLICATION FORM (FEBRUARY 2013 REVISION)**

Hā'ena State Park Master Plan

Island: Kaua'i

District: Hanalei

TMK: (4) 5-9-008:001, (4) 5-9-001:025, (4) 5-9-001:022 (por)

Permits: Compliance with Chapter 343, HRS; Special Management Use Area; Conservation District Use Permit; Shoreline Setback Determination. Possibility of Stream Channel Alteration Permit; Stream Diversion Works; and/or Petition to Amend Instream Flow Standards

Proposing/Determination

Agency: State of Hawai'i, Department of Land and Natural Resources, Division of State Parks; Contact: Dan Quinn, Administrator; Telephone: (808) 587-0290

Accepting

Authority: Governor, State of Hawai'i, c/o OEQC, (808) 586-4185

Consultant: PBR HAWAII & Associates, Inc., 1001 Bishop Street, Suite 650, Honolulu, HI 96813-3484; Attn: Catie Cullison; (808) 521-5631

Status (check one only):

- DEA-AFNSI** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of DEA, a completed OEQC publication form, along with an electronic word processing summary and a PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day comment period ensues upon publication in the periodic bulletin.
- FEA-FONSI** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and a PDF copy (send both summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
- FEA-EISPN** Submit the proposing agency notice of determination/transmittal on agency letterhead, a hard copy of the FEA, an OEQC publication form, along with an electronic word processing summary and PDF copy (you may send both summary and PDF to oeqchawaii@doh.hawaii.gov); a 30-day consultation period ensues upon publication in the periodic bulletin.
- Act 172-12 EISPN** Submit the proposing agency notice of determination on agency letterhead, an OEQC publication form, and an electronic word processing summary (you may send the summary to oeqchawaii@doh.hawaii.gov). NO environmental assessment is required and a 30-day consultation period upon publication in the periodic bulletin.
- DEIS** The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the DEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the DEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); a 45-day comment period ensues upon publication in the periodic bulletin.
- FEIS** The proposing agency simultaneously transmits to both the OEQC and the accepting authority, a hard copy of the FEIS, a completed OEQC publication form, a distribution list, along with an electronic word processing summary and PDF copy of the FEIS (you may send both the summary and PDF to oeqchawaii@doh.hawaii.gov); no comment period ensues upon publication in the periodic bulletin.
- Section 11-200-23 Determination** The accepting authority simultaneously transmits its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS to both OEQC and the proposing agency. No comment period ensues upon publication in the periodic bulletin.
- Section 11-200-27 Determination** The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously

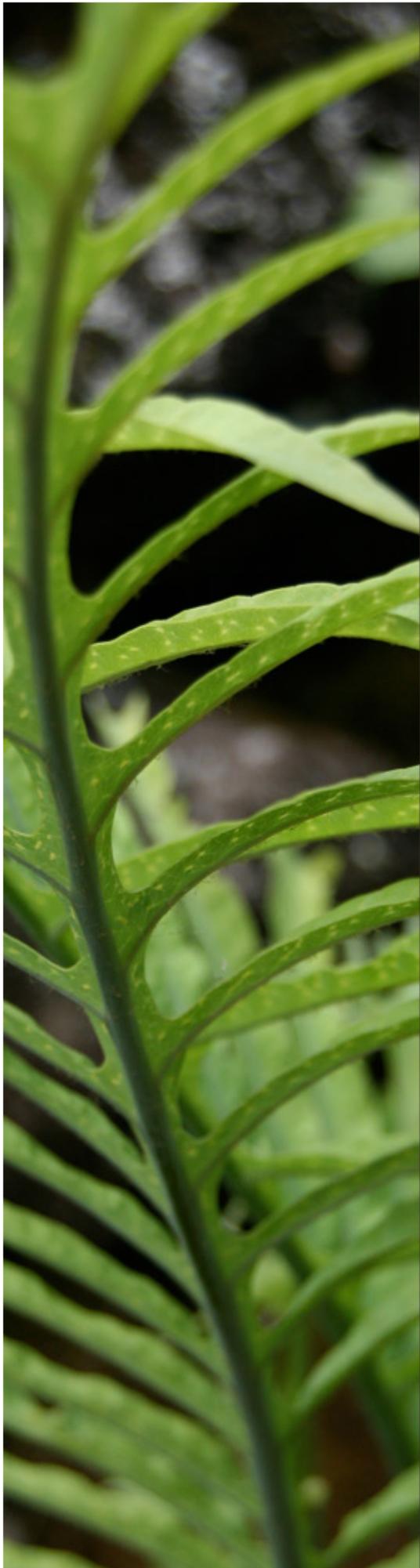
accepted FEIS and determines that a supplemental EIS is not required. No EA is required and no comment period ensues upon publication in the periodic bulletin.

___Withdrawal (explain)

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

Hā'ena State Park is culturally and ecologically significant and its beaches and scenic resources make it a popular visitor attraction. This mix of resources gives rise to the need to develop a conscientious and comprehensive master plan in order to balance conservation, recreation, cultural interpretation, and preservation.

In 2001, after several years of research, community meetings and interviews, a draft park plan was prepared for the DLNR, Division of State Parks. It included extensive background information and was the starting point for the current effort. The updated Master Plan utilizes existing and previously prepared data, including updated historic, cultural and ecological information where necessary, along with continued community input. The alternatives that will be evaluated in the Draft EIS include the alternative of doing nothing, the 2001 Draft Park Plan, and the 2015 Draft Master Plan. Additionally, the 2015 Draft Master Plan presents a number of operational and management options that will be evaluated in the EIS.



Environmental Impact Statement Preparation Notice

Prepared in Accordance with Chapter 343,
Hawai'i Revised Statutes and Title 11,
Chapter 200, Hawai'i Administrative Rules

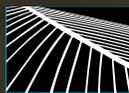
Hā'ena State Park Master Plan

Prepared for



State of Hawai'i,
Department of Land and Natural Resources,
Division of State Parks

Prepared by



PBR HAWAII
& ASSOCIATES, INC.

February 2015

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1-1
1.1	PROJECT SUMMARY	1-1
1.2	LOCATION.....	1-2
1.3	LAND OWNERSHIP	1-2
1.4	IDENTIFICATION OF APPLICANT.....	1-2
1.5	IDENTIFICATION OF ENVIRONMENTAL CONSULTANT	1-2
1.6	IDENTIFICATION OF ACCEPTING AUTHORITY.....	1-3
1.7	COMPLIANCE WITH STATE AND COUNTY ENVIRONMENTAL LAWS	1-3
1.8	IDENTIFICATION OF AGENCIES AND COMMUNITY GROUPS CONSULTED.....	1-4
1.9	STUDIES CONTRIBUTING TO THE ENVIRONMENTAL IMPACT STATEMENT	1-6
2.0	PROJECT DESCRIPTION	2-1
2.1	BACKGROUND INFORMATION.....	2-1
2.1.1	Hā'ena State Park Land Ownership.....	2-1
2.1.2	Project Need.....	2-1
2.1.3	Project Objectives	2-2
2.1.4	Alternatives.....	2-2
2.2	EXISTING USES.....	2-3
2.3	MANAGEMENT	2-4
2.4	SURROUNDING USES.....	2-4
2.5	DESCRIPTION OF THE PREFERRED ALTERNATIVE SITE IMPROVEMENTS	2-8
2.5.1	Near-Term Plan for the Entry Complex.....	2-8
2.5.2	Long-Term Plan for Park Entry, Turnaround and New Main Gate	2-9
2.5.3	Education and Cultural Center	2-10
2.5.4	Traditional Hale, Demonstration Gardens, Picnic Areas and Outdoor Event Space	2-11
2.5.5	Parking	2-11
2.5.6	Reconstructed Hale and Lo'i Interpretive Site.....	2-12
2.5.7	Caretaker's Cottage and Baseyard.....	2-12
2.5.8	DLNR Helipad and Baseyard/Staging Area.....	2-13
2.5.9	Limited Access Corridor.....	2-13
2.5.10	Hula Complex	2-13
2.5.11	Dune Restoration.....	2-14
2.5.12	Lifeguard Tower	2-15
2.5.13	ADA/Special Access Parking Area	2-15
2.5.14	Picnic Area at Kē'ē	2-15
2.5.15	Loko and Wetland Restoration.....	2-15
2.5.16	Limahuli Stream Restoration	2-16
2.5.17	Agricultural Complex.....	2-16
2.5.18	Montgomery House	2-17
2.5.19	Cultural Gathering Place and Hālau Wa'a.....	2-17
2.5.20	Poi Mill.....	2-18
2.5.21	Cemetery Areas.....	2-18
2.5.22	Pedestrian Trails.....	2-18
2.5.23	Bicycle Facilities.....	2-19
2.5.24	Hazard Mitigation Measures	2-19
2.5.25	Infrastructure Improvements.....	2-20
2.6	PHASING OF ACTIONS	2-23
2.7	COST ESTIMATES	2-23

3.0	LAND USE CONFORMANCE	3-1
3.1	FEDERAL	3-1
3.1.1	Americans with Disabilities Act (ADA) of 1990, as Amended	3-1
3.1.2	National and State Registers of Historic Places	3-1
3.1.3	Endangered Species Act	3-3
3.1.4	Land and Water Conservation Fund (LWCF)	3-3
3.2	STATE OF HAWAI'I	3-4
3.2.1	State Environmental Review Law (Chapter 343, HRS and Section 11-200, HAR)	3-4
3.2.2	State Land Use Law (Chapter 205, Hawai'i Revised Statutes)	3-4
3.2.3	Coastal Zone Management (Chapter 205A, Hawai'i Revised Statutes)	3-5
3.3	COUNTY OF KAUA'I	3-8
3.3.1	The Kaua'i General Plan	3-8
3.3.2	North Shore Development Plan.....	3-9
3.3.3	County Zoning	3-10
3.3.4	Special Management Area	3-10
3.3.5	County Shoreline Setback.....	3-10
3.3.6	County Flood Plain Management Ordinance	3-10
3.4	APPROVALS AND PERMITS	3-11
4.0	DESCRIPTION OF THE AFFECTED NATURAL ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES.....	4-1
4.1	CLIMATE	4-1
4.2	GEOLOGY AND TOPOGRAPHY	4-2
4.3	SOILS.....	4-3
4.3.1	Natural Resource Conservation Service	4-3
4.3.2	Land Study Bureau Detailed Land Classification	4-4
4.3.3	Agricultural Lands of Importance to the State of Hawai'i.....	4-4
4.4	GROUND AND SURFACE WATER	4-4
4.4.1	Ground Water.....	4-4
4.4.2	Surface Water	4-4
4.5	WETLANDS.....	4-7
4.6	MARINE ENVIRONMENT	4-9
4.7	MARINE BIOLOGICAL RESOURCES	4-18
4.8	TERRESTRIAL FLORA	4-19
4.10	TERRESTRIAL AND FRESHWATER FAUNA	4-24
4.11	NATURAL HAZARDS.....	4-26
4.11.1	Flood Hazard.....	4-26
4.11.2	Wind and Storm Hazards.....	4-27
4.11.3	Tsunami Hazard	4-27
4.11.4	Shoreline Erosion.....	4-27
4.11.5	Rockfall Hazard	4-28
5.0	ASSESSMENT OF EXISTING HUMAN ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES.....	5-1
5.1	ARCHAEOLOGICAL AND HISTORIC RESOURCES	5-1
5.2	CULTURAL RESOURCES.....	5-7
5.3	NOISE	5-8
5.4	AIR QUALITY	5-8
5.5	SCENIC RESOURCES	5-9
5.6	SOCIO-ECONOMIC CHARACTERISTICS.....	5-15

5.6.1	Community Character.....	5-15
5.6.2	Economy.....	5-16
5.7	INFRASTRUCTURE.....	5-16
5.7.1	Vehicle Facilities.....	5-16
5.7.2	Parking Configuration and Materials.....	5-22
5.7.3	Public Transit.....	5-22
5.7.4	Pedestrian and Bicycle Facilities.....	5-23
5.7.5	Water.....	5-28
5.7.6	Wastewater.....	5-30
5.7.7	Drainage.....	5-32
5.7.8	Electrical and Communication Systems.....	5-34
5.7.9	Solid Waste Disposal.....	5-35
5.8	PUBLIC SERVICES.....	5-35
5.8.1	Police and Fire Protection.....	5-35
5.8.2	Education.....	5-36
5.8.3	Health Care Services.....	5-36
5.8.4	Recreational Facilities.....	5-37
6.0	CONSULTATION.....	6-1
6.1	PRE-CONSULTATION.....	6-1
6.2	CONSULTATION THROUGH THE MASTER PLANNING PROCESS.....	6-4
6.3	EIS CONSULTATION.....	6-4
7.0	REFERENCES.....	7-1

LIST OF TABLES

TABLE 1	TAX MAP KEY AND OWNERSHIP.....	1-2
TABLE 2	PUBLIC AND COMMUNITY ADVISORY COMMITTEE MEETINGS.....	1-4
TABLE 3	ANTICIPATED PHASING PLAN.....	2-25
TABLE 4	COUNTY SHORELINE SETBACK REQUIREMENTS.....	3-10
TABLE 5	APPROVALS AND PERMITS.....	3-11
TABLE 6	REGISTERED DIVERSIONS FROM LIMAHULI STREAM.....	4-5
TABLE 7	2010 CENSUS DATA.....	5-15
TABLE 8	SUMMARY TABLE OF DAILY VISITOR COUNTS.....	5-18
TABLE 9	EXAMPLE ENTRY AND PARKING FEES FOR HAWAII PARKS, 2012.....	5-25
TABLE 10	OPTIONS FOR FEES.....	5-27
TABLE 11	TYPES OF PASSES.....	5-28
TABLE 12	PRE-CONSULTATION CONTACTS.....	6-1

LIST OF FIGURES

FIGURE 1 REGIONAL LOCATION MAP	1-7
FIGURE 2 TAX MAP.....	1-9
FIGURE 3 EXISTING SITE	2-5
FIGURE 4 SITE PHOTOS.....	2-6
FIGURE 5 MARINE MANAGEMENT AREAS	2-7
FIGURE 6 SITE ANALYSIS	2-27
FIGURE 7 MASTER PLAN	2-28
FIGURE 8 NEAR-TERM PLAN FOR ENTRY COMPLEX.....	2-29
FIGURE 9 DETAILED VIEW OF THE MAIN VISITOR ENTRY COMPLEX.....	2-30
FIGURE 10 KEKAHUNA’S 1959 DRAWING OF KA ULU A PAOA HEIAU	2-31
FIGURE 11 STATE LAND USE.....	3-6
FIGURE 12 CONSERVATION DISTRICT SUBZONES.....	3-7
FIGURE 13 GENERAL PLAN - LAND USE MAP.....	3-12
FIGURE 14 GENERAL PLAN – HERITAGE RESOURCES MAP	3-13
FIGURE 15 NORTH SHORE DEVELOPMENT PLAN UPDATE.....	3-14
FIGURE 16 SPECIAL MANAGEMENT AREA	3-15
FIGURE 17 TOPOGRAPHY AND DRAINAGE	4-7
FIGURE 18 NRCS SOILS	4-1
FIGURE 19 LAND STUDY BUREAU CLASSIFICATIONS	4-2
FIGURE 20 AGRICULTURAL LANDS OF IMPORTANCE	4-3
FIGURE 21 WETLANDS	4-13
FIGURE 22 REEF ENVIRONMENT AND SURF BREAKS	4-15
FIGURE 23 SOEST SHORELINE EROSION RATES	4-16
FIGURE 24 DOH WATER QUALITY.....	4-17
FIGURE 25 VEGETATION ZONES – 1991 AND 2009	4-23
FIGURE 26 FLOOD INSURANCE RATE MAP.....	4-31
FIGURE 27 TSUNAMI EVACUATION ZONE	4-32
FIGURE 28 ROCKFALL HAZARDS.....	4-33
FIGURE 29 ARCHAEOLOGICAL SENSITIVITY AREAS	5-5
FIGURE 30 MAJOR VIEWS.....	5-11
FIGURE 31 SCENIC RESOURCES	5-12
FIGURE 32 CONSTRAINTS TO SCENIC RESOURCES.....	5-13
FIGURE 33 VIEW CORRIDORS AND SCENIC LOOKOUTS.....	5-14

LIST OF APPENDICES

APPENDIX A:	COMMUNITY MEETING NOTES
APPENDIX B:	PRE-CONSULTATION CORRESPONDENCE
APPENDIX C:	ROCKFALL HAZARD ASSESSMENT
APPENDIX D:	BIOLOGICAL SURVEY
APPENDIX E:	MARINE NATURAL RESOURCES AND RECREATION ASSESSMENT
APPENDIX F:	CULTURAL IMPACT ASSESSMENT
APPENDIX G:	TRAFFIC IMPACT ASSESSMENT REPORT
APPENDIX H:	CIVIL BASELINE REPORT
APPENDIX I:	WASTEWATER PRELIMINARY ENGINEERING REPORT
APPENDIX J:	2001 DRAFT PARK PLAN

ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act of 1990, as Amended
ALISH	Agricultural Lands to Importance of the State of Hawai‘i
ATA	Austin, Tsutsumi and Associates
BLNR	Board of Land and Natural Resources
cfs	Cubic Feet Per Second
CWRM	Commission on Water Resource Management, DLNR
CGP	Cultural Gathering Place
CIA	Cultural Impact Assessment
CDP	Census Designated Place
DAR	Division of Aquatic Resources, DLNR
DCAB	Disability and Communication Access Board
DLNR	Department of Land and Natural Resources
DOH	Department of Health
DOT	Department of Transportation
ECC	Education and Cultural Center
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FEIS	Final Environmental Impact Statement
FIRM	Flood Insurance Rate Map
GP	County of Kaua‘i General Plan
gpd	Gallons Per Day
HAR	Hawai‘i Administrative Rules
HCBSF	Hā‘ena Community-Based Subsistence Fishery
HRS	Hawai‘i Revised Statutes
KIUC	Kaua‘i Island Utility Cooperative
LSB	University of Hawai‘i Land Study Bureau
LWCF	Land and Water Conservation Fund
MPAC	Master Plan Advisory Committee
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration

NRCS	Natural Resource Conservation Service, U.S. Department of Agriculture
NWI	National Wetlands Inventory
OCCL	Office of Conservation and Coastal Lands, DLNR
PV	Photovoltaic
SHPD	State Historic Preservation Division, DLNR
SMA	Special Management Area
SOEST	University of Hawai‘i, School of Oceanography and Earth Science and Technology
TIAR	Traffic Impact Analysis Report
TMK	Tax Map Key
USFWS	U.S. Fish and Wildlife Service
USACOE	U.S. Army Corps of Engineers
UV	Ultraviolet (light)

This page intentionally left blank.

PROJECT OVERVIEW

Hā‘ena State Park (“the Park”) is a scenic wildland park measuring approximately 63.7 acres in area. The Park contains significant cultural and ecological resources, and its beaches and scenic resources make it a popular visitor attraction. The Park features a beach for swimming and sunbathing, archaeological features that include a heiau and hula platform, wet caves, and the trailhead to Kalalau Trail and the Nāpali Coast State Wilderness Park.

In 2001, after several years of research, community meetings and interviews, a draft report entitled, *Hā‘ena State Park Master Plan and Draft Environmental Impact Statement* was prepared for the State of Hawai‘i Department of Land and Natural Resources, Division of State Parks (“State Parks”). This report included extensive background information as well as a site plan. However, the Master Plan was never completed or adopted.

In 2008, State Parks contracted with PBR HAWAII to complete the Master Plan for Hā‘ena State Park. PBR HAWAII was tasked to refine the community preferred alternative described in the 2001 draft Master Plan with an emphasis on the cultural and historic significance of Hā‘ena and to consider alternatives for future development including transportation and parking.

With considerable input from the community, including a thirty-two-member Master Plan Advisory Committee, an updated 2014 Draft Park Plan has been developed.

This Environmental Impact Statement Preparation Notice provides a description of the human and natural environment and evaluates the potential effects of the Preferred Alternative from the 2014 Draft Park Plan.

This page intentionally left blank.

1.0 INTRODUCTION

This Environmental Impact Statement Preparation Notice (EISPN) has been prepared in compliance with Chapter 343, Hawai‘i Revised Statutes (HRS).

1.1 PROJECT SUMMARY

Project Name:	Hā‘ena State Park Master Plan	
Location:	Hā‘ena State Park, Hā‘ena Ahupua‘a, Kaua‘i, Hawai‘i	
Applicant:	State of Hawai‘i, Department of Land and Natural Resources, Division of State Parks	
Landowner:	State of Hawai‘i and County of Kaua‘i	
Tax Map Keys:	(4) 5-9-008:001, (4) 5-9-001:025 and (4) 5-9-001:022 (por.)	
Project Area:	Approximately 63.7 acres	
Existing Uses:	State Park. Outdoor recreation includes beach activities, picnicking, sightseeing and a hiking trailhead. Other uses include traditional agriculture, fishing, hula and care of cemetery.	
Proposed Uses:	Education and cultural center; interpretive corridor and associated interpretive devices; Caretaker’s Cottage; baseyard; picnic area; Hālau Wa‘a; reconfigured parking and access; relocated lifeguard tower; ecosystem and agricultural restoration activities.	
Land Use Designations:	<i>State Land Use:</i>	Conservation
	<i>Kaua‘i General Plan:</i>	Park
	<i>County Zoning:</i>	None
Special Management Area:	Within the Special Management Area	
Need for Statement:	Compliance with Chapter 343, HRS <ul style="list-style-type: none"> - Use of State lands and funds - Use within a Historic site as designated on the Hawai‘i and National Registers of Historic Places - Land uses within the Conservation District 	
Permits/Approvals Required:	Compliance with Chapter 343, HRS; Special Management Area Use Permit; Conservation District Use Permit; Shoreline Setback	

Determination; and dependent on extent of instream activities pursued, Stream Channel Alteration Permit; Stream Diversion Works and/or Petition to Amend Instream Flow Standard

Accepting Authority:

State of Hawai‘i, Board of Land and Natural Resources

1.2 LOCATION

Hā‘ena State Park (“the Park”) is located in the ahupua‘a of Hā‘ena on the north shore of the island of Kaua‘i. Figure 1 is a regional location map.

1.3 LAND OWNERSHIP

Hā‘ena State Park encompasses approximately 63.7 acres. It is composed of three parcels, two of which are owned by the State of Hawai‘i, Department of Land and Natural Resources (DLNR) (see Table 1 below and Figure 2, Tax Map). A small parcel owned by the County of Kaua‘i encompasses Ka Ulu a Paoa heiau and Ke Ahu a Laka hula platform. This parcel is surrounded by the State Park-owned parcels.

Parcel 01 of TMK 5-9-008 is approximately 50 acres and entirely within the Park boundary. Roughly thirteen acres of parcel 22 of TMK 5-9-001 is located within Hā‘ena State Park. The remaining 167 acres falls within the Nāpali Coast State Wilderness Park.

**TABLE 1
TAX MAP KEY AND OWNERSHIP**

TMK	Area (in acres)	Owner
(4)-5-9-008:01	50.38	State of Hawai‘i
(4)-5-9-001:22 (por.)	12.64*	State of Hawai‘i
(4)-5-9-001:25	0.68	County of Kaua‘i
*Note: The entire parcel is 180.23 acres. Only a narrow portion of the parcel to the south of Kūhiō Highway is within Hā‘ena State Park.		

1.4 IDENTIFICATION OF APPLICANT

The applicant is the State of Hawai‘i, Department of Land and Natural Resources, Division of State Parks.

Contact: Dan Quinn, Administrator
 Department of Land and Natural Resources
 Division of State Parks
 Telephone: (808) 587-0290

1.5 IDENTIFICATION OF ENVIRONMENTAL CONSULTANT

The State of Hawai‘i, Department of Land and Natural Resources’ consultant for the project is PBR HAWAII & Associates, Inc.

Contact: Catie Cullison, AICP, Associate
 PBR HAWAII & Associates, Inc.
 1001 Bishop Street, Suite 650
 Honolulu, Hawai‘i 96813
 Telephone: (808) 521-5631
 Fax: (808) 523-1402

1.6 IDENTIFICATION OF ACCEPTING AUTHORITY

In accordance with Chapter 343, HRS, the Accepting Authority is the governor or the governor’s authorized representative whenever an action proposes the use of state lands or the use of state funds. Acceptance of a required Final Environmental Impact Statement (FEIS) shall be a condition precedent to implementation of the proposed action. For this action, the governor’s authorized representative is the Board of Land and Natural Resources (BLNR).

Contact: Chairperson
 Telephone: (808) 587-0404
 Fax: (808) 587-0390

1.7 COMPLIANCE WITH STATE AND COUNTY ENVIRONMENTAL LAWS

This document has been prepared in accordance with the provisions of the State of Hawai‘i’s Environmental Impact Statement Law, Chapter 343, HRS and Hawai‘i Administrative Rules (HAR) Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules. Section 343-5, HRS, establishes nine (9) “triggers,” which require the environmental review process. Implementation of the Hā‘ena State Park Master Plan will involve: 1) the use of state land and funds, 2) the use of state lands classified as a Conservation District; and 3) use within a Historic District as designated in the Hawai‘i and National Registers of Historic Places.

The park is located within the State’s Conservation District and the County’s Special Management Area (SMA), thus, improvements within the Park may necessitate a Conservation District Use Permit and a SMA Use Permit. A more detailed discussion of federal, state and county permits potentially required for implementation of the Master Plan can be found in Section 3.0, Land Use Conformance.

1.8 IDENTIFICATION OF AGENCIES AND COMMUNITY GROUPS CONSULTED

Throughout the planning process for this project, the County of Kaua‘i and State of Hawai‘i agencies as well as community groups, organizations and individuals were consulted. A thirty-two member Master Plan Advisory Committee (MPAC) provided recommendations to the physical plan and park management. At the onset of the project, pre-consultation letters were issued soliciting input into the Master Plan and environmental documents, and periodically through the process, general public open houses and meetings were held to keep the greater community informed of the concepts being considered for the Park. Appendix A includes a record of public meetings held with community members regarding this project. Appendix B contains pre-consultation correspondence.

TABLE 2
PUBLIC AND COMMUNITY ADVISORY COMMITTEE MEETINGS

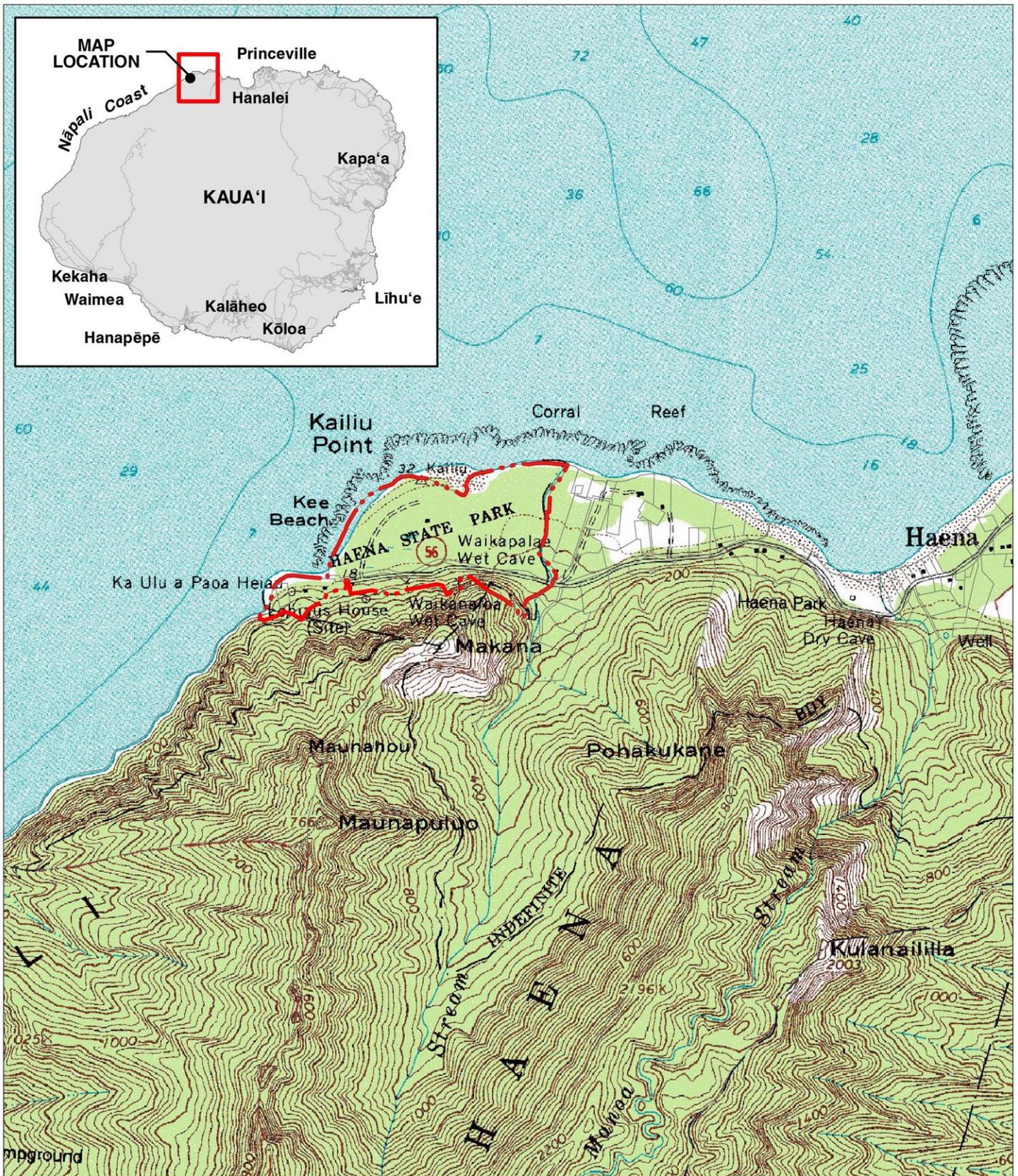
Date	Location	Participants	Purpose
August 14 and 15, 2008	Hā‘ena State Park	Various stakeholders	Field visit
October 16, 2008	Honolulu	Debbie Gowensmith, Community Conservation Network	Learn more about the Hā‘ena community-based subsistence fishery project
October 24, 2008	Hanalei	Maka‘ala Ka‘aumoana	Learn more about the 1990’s effort to master plan Hā‘ena State Park and about her work at Hā‘ena and with the Hanalei Watershed Hui
October 24-25, 2008	Limahuli Gardens and County Planning Commission Room	Public	Open house
February 4, 2009	Teleconference	Chad Listman, County of Kaua‘i Lifeguard	Discuss issues at the Park with Kē‘ē head lifeguard
October 14, 2009	Limahuli Gardens	SMA interveners that entered into resolution agreement with State Parks regarding comfort station	Final design for constructed wetlands and update on Master Plan progress

Date	Location	Participants	Purpose
March 10, 2010	Honolulu	Debbie Gowensmith, Hawai'i Community Stewardship Network (HCSN)	Community coordination
April 17, 2010	Hanalei Elementary School	MPAC	Introductory meeting
May 8, 2010	Hanalei Elementary School	MPAC	Master Plan revisions and management issues
May 15, 2010	Hanalei Elementary School	MPAC	Master Plan revisions and management issues, continued
July 10, 2010	Hanalei	Public	Overview of process and Master Plan revisions
October 14, 2010	Land Board Conference Room, Kalanimoku Building	BLNR	Request the BLNR to accept recommendations proposed in draft Master Plan and endorse preparation of an EIS
February 17, 2011	Various	MPAC	Site visit to potential shuttle stop locations
March 1, 2011	Hanalei Community Center	Transportation and Parking Working Group	Transportation and Parking Working Group
March 18, 2011	Teleconference	Jean Souza, Hawaiian Islands Humpback Whale Marine Sanctuary	Hawaiian Islands Humpback Whale Marine Sanctuary and environmental interpretive tools
March 19, 2011	Hanalei Community Center	MPAC	Transportation issues
March 1, 2012	University of Hawai'i	Carlos Andrade, Konia Frietas	Learn about a conceptual initiative being discussed at Hawaiian Studies program
December 10, 2012	Hā'ena State Park	MPAC	View the pre-final Master Plan, discuss a near-term plan for the entry complex and discuss management strategies
December 26, 2012	Teleconference	Sue Kanohe, Kaua'i Visitors Bureau	Discuss potential visitor limits at Hā'ena State Park and potential effects on visitor industry

Date	Location	Participants	Purpose
January 10, 2013	Hā'ena State Park	MPAC	Revised plan and continuation of management issues
January 21, 2013	Hā'ena State Park	MPAC	Discuss proposed visitor limits, view pre-final Master Plan, and discuss capital improvement projects
February 7, 2013	Hā'ena State Park	MPAC	Review revised plan, capital improvement projects, and next steps
April 22, 2013	Hā'ena State Park	Hui Maka'āinana o Makana	Rockfall hazard mitigation
May 3, 2013	Hā'ena State Park	MPAC	Pedestrian walkway alternatives, rockfall mitigation, and next steps
August 27, 2014	Hā'ena State Park	MPAC	Review of latest changes to plan, kickoff for EIS

1.9 STUDIES CONTRIBUTING TO THE ENVIRONMENTAL IMPACT STATEMENT

The information contained in this document has been gathered from agency and community consultations, document and historical research, site visits, technical studies and generally available information regarding the characteristics of the site and surrounding area. Consultant technical reports are included as appendices to this document. References can be found in Section 7.0 of this document.



LEGEND

 Hā'ena State Park Project Boundary

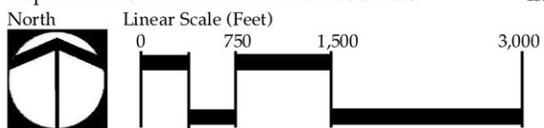
FIGURE 1

Regional Location Map

HĀ'ENA STATE PARK

Department of Land and Natural Resources

Island of Kaua'i



Source: U.S. Geological Survey (2009)
 Disclaimer: This graphic has been prepared for general planning purposes only.
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

This page intentionally left blank.

This page intentionally left blank.

2.0 PROJECT DESCRIPTION

This section provides background information, identifies the project’s goals and objectives, and describes the proposed improvements.

2.1 BACKGROUND INFORMATION

2.1.1 HĀ’ENA STATE PARK LAND OWNERSHIP

Land title research conducted by Silva and Orr is summarized as follows. In 1824 when control of Kaua’i lands were transferred to ali’i of O’ahu and Maui, the Hā’ena Ahupua’a was awarded to Abner Kuho’oheliheipahu Pākī. In approximately 1837 Kekela’akalaniwahikapa’a (Kekela) was appointed konohiki (land manager) of Hā’ena. During the Great Mahele in 1848, ten kuleana awards comprising 13 parcels within what is now the Park boundaries were awarded. Those kuleana parcels awarded to native tenants were then excluded from Pākī’s award. Of the ten claimants, only three trace their claims to the lands before 1824, and there are no clear records of the dispossessed chiefs of this area prior to this date. Pākī’s daughter, Bernice Pauahi Bishop, inherited their lands but soon after sold Hā’ena to W. H. Pease, a surveyor, in 1858. Kekela had one claim of her own within what are now the Park boundaries.

After Pease’s death in 1871, the administrators of his estate conveyed Hā’ena to William Kinney in 1872 who then sold Hā’ena to Kenoi Kaukaha and 37 other individuals, referred to as the Hā’ena Hui (Hui Ku’ai’ainana o Hā’ena), as tenants in common in 1875. In 1955, Hā’ena Hui members John Gregg Allerton and Paul G. Rice filed a petition for partition and dissolution of the Hui. As a result of the partition, the County of Kaua’i received parcels within the current park site, which included Wai a Kanaloa and Waiakapala’e wet caves and Lohi’au’s house site. Title to another parcel was given to Allerton with the condition that he maintain and preserve a five-foot wide path for public access to the heiau and hula site. Forty acres were also given to the State at that time for a park. Four un-awarded lots were auctioned to cover the legal costs of the partition. Also during the late 1960s through the early 1970s, Howard Taylor, actress Elizabeth Taylor’s brother, purchased a large parcel along the Hā’ena coast. A transient community arose at the area called “Taylor Camp,” which was condemned by the State in 1975 due to unsanitary conditions and added to the Park’s inventory. There are no known ceded lands within the Park boundaries.

2.1.2 PROJECT NEED

Hā’ena State Park is culturally and ecologically significant and its beaches and scenic resources make it a popular visitor attraction. This mix of recreational, cultural and environmental resources gives rise to the need to develop a conscientious and comprehensive master plan in order to balance conservation, recreation, cultural interpretation, and preservation.

In 2001, after several years of research, community meetings and interviews, a draft report entitled, *Hā'ena State Park Master Plan and Draft Environmental Impact Statement* was prepared for the DLNR, Division of State Parks. It included extensive background information as well as the development and evaluation of four master plan alternatives (three different development scenarios and one “no change” alternative). While the 2001 master plan was never completed or adopted, it contains valuable information and was the starting point for this effort. As part of the previous master planning effort, a social impact analysis (SIA) was conducted by Earthplan (1996). The SIA indicated a need to elevate consideration of Hā'ena State Park's interlaced cultural and natural resources in the planning process. References are made to the document throughout this report as the “2001 draft park plan” and updated information provided where appropriate.

In 2008, State Parks contracted with PBR HAWAII to complete the Master Plan and environmental impact statement (EIS) for Hā'ena State Park. PBR HAWAII was tasked to refine the community preferred alternative described in the 2001 draft park plan with an emphasis on the cultural and historic significance of Hā'ena and to consider alternatives for future development including transportation and parking.

The updated draft Master Plan for Hā'ena State Park includes management and development strategies that bring the significant historic, cultural and ecological resources of the Park to the forefront and balance the protection of those resources with recreational and community uses. The current Master Plan utilizes existing and previously prepared data, including updated historic, cultural and ecological information where necessary, along with continued community input.

2.1.3 PROJECT OBJECTIVES

The goals and vision for the Hā'ena State Park Master Plan were developed with State Parks staff and the MPAC during the initial meetings held in April and May 2010. There are five main goals that have guided the development of the physical Master Plan and the proposed management strategies. They are:

- Recognize that the entire park is culturally significant.
- Restore Hā'ena State Park as a living place... cleanse, restore and revive cultural practices again.
- Involve the original families and reconnect the local community to the place.
- Uphold State Parks' responsibility for the public's safety, access, and welfare.
- Balance the provision of recreational opportunities with the preservation of the significant natural and cultural resources.

2.1.4 ALTERNATIVES

The alternatives that will be evaluated in the Draft EIS are:

- The do nothing alternative
- The 2001 Draft Park Plan

- The 2015 Draft Master Plan

Additionally, the 2015 Draft Master Plan presents a number of operational and management options that will be evaluated in the EIS.

2.2 EXISTING USES

Hā'ena State Park is accessed from Kūhiō Highway, which serves as the Park's only road right-of-way. One of the Park's main features is Kē'ē Beach, a popular place for swimming, snorkeling and sunbathing. Fishermen/women also utilize the nearshore waters at Hā'ena. A lifeguard stand is located at the terminus of the highway, overlooking Kē'ē Beach and Lagoon. The park contains extensive historical, archaeological and cultural features, such as the Ke Ahu a Laka hula platform; Ka Ulu a Paoa heiau; Loh'iau's house platform; known burials and cemeteries; a historic house site; wet caves; restored taro lo'i; as well as unrestored Agricultural Complex walls and 'auwai. The hula platform and heiau are used by cultural practitioners. Community members, organized through Hui Maka'āinana o Makana (hereafter "the Hui"), work in the restored lo'i to plant, tend and harvest taro. Descendants and community members also care for the known burials and cemeteries within the Park.

Additionally, within the Park is the trailhead to the Kalalau Trail, which is part of the Nāpali Coast State Wilderness Park. Thus, Hā'ena State Park facilities such as parking, the comfort station and shower service both State Park areas. Day hikers utilize the trail from the trailhead to Hanakāpī'ai Falls without need of a permit. Overnight hiking and hunting beyond Hanakāpī'ai is allowed by permits issued by State Parks.

Park support facilities include two parking areas, a comfort station with potable water, a payphone, helipad, garbage cans and signage. The parking areas include a gravel lot approximately 750 feet from the entry which can accommodate approximately 100 vehicles. The second parking area is an off-street parking area located at the end of Kūhiō Highway near Kē'ē Beach. Based on a rough count, between 50 and 70 cars park in this area. Neither parking area is paved nor are any of the parking stalls striped except for the four accessible parking spaces located at the Kē'ē Beach parking area. "No Parking" signs are located along Kūhiō Highway within the Park and are routinely ignored on busy days when the parking areas are full. The helipad is located adjacent to the gravel parking area.

The park's comfort station was reconstructed in 2008/2009, in compliance with standards for the Americans with Disabilities Act (ADA) of 1990, as amended. A constructed wetland was installed to treat wastewater from this facility in 2010. An interpretive sign is located near the trailhead and ocean safety signs are posted at Kē'ē. Visitor counts and comfort station use counts indicate that the Park and supporting facilities are actively used throughout the year. In 1993, park use ranged from 1,500 visitors in off-peak months to as many as 10,600 visitors during the high season month of August. In 1999, the DLNR reported approximately 1,700 visitors daily to Kē'ē, of which approximately 450 continued on to the Kalalau Trail

(Stepath 2006). A traffic count, performed in August 2008, found roughly 780 vehicles per day entering and exiting the Park.

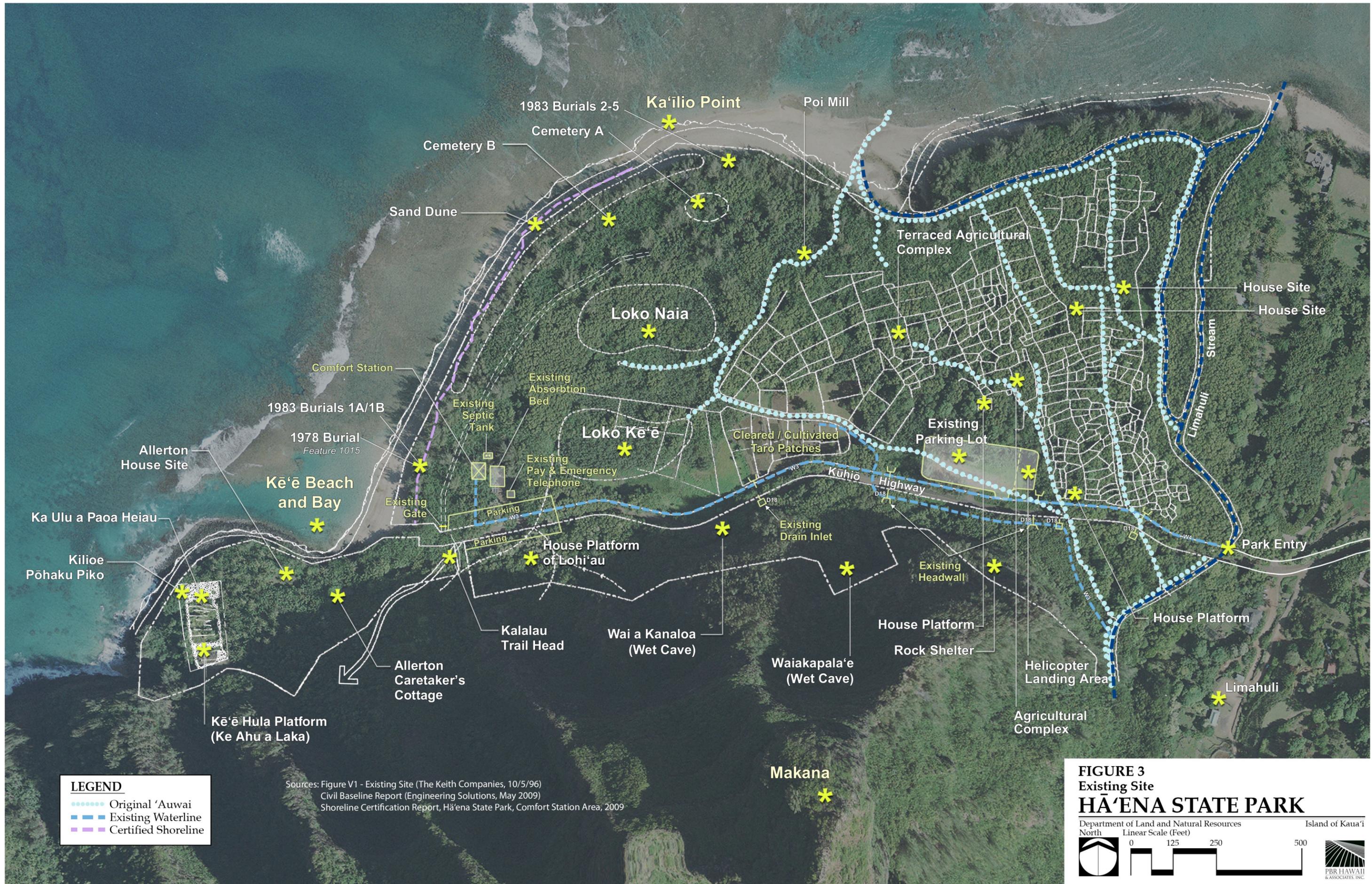
Figure 3 is a plan showing existing features. Figure 4 contains site photos.

2.3 MANAGEMENT

State Parks is responsible for the management of Hā'ena State Park. Curatorship of the Park's Agricultural Complex and Hula Complex is currently provided by the Hui. Nearshore waters are managed through the Hā'ena Community-based Subsistence Fishery (HCBSF), which was established through the State's rulemaking process, and is a separate effort from this Master Plan. Further makai of the HCBSF is the Hawaiian Humpback Whale National Marine Sanctuary, which is managed jointly by the National Oceanic and Atmospheric Administration (NOAA) and the State of Hawai'i (Figure 5).

2.4 SURROUNDING USES

The Park is surrounded by lands designated by the State as being in the Conservation District. East of the Park, land is developed at very low densities with single family dwellings. These residences include wood-frame cottages and large dwellings that serve as permanent and part-time residences. Mauka of Kūhiō Highway (southeast of the Park) is the Limahuli National Tropical Botanical Garden and Preserve. Hā'ena State Park serves as the pedestrian entrance to Nāpali Coast State Wilderness Park, which occupies the lands south and west of Hā'ena State Park.



LEGEND

- Original 'Auwai
- Existing Waterline
- - - Certified Shoreline

Sources: Figure V1 - Existing Site (The Keith Companies, 10/5/96)
 Civil Baseline Report (Engineering Solutions, May 2009)
 Shoreline Certification Report, Hā'ena State Park, Comfort Station Area, 2009

FIGURE 3
Existing Site
HĀ'ENA STATE PARK

Department of Land and Natural Resources
 North
 Linear Scale (Feet)

0 125 250 500

Island of Kaua'i
 PBR HAWAII & ASSOCIATES, INC.



Park Entrance & Limahuli Stream



Makana



Kē'ē Beach looking toward Ka'ilio Point



Waiakanaloa wet cave



Kē'ē Beach looking toward Nāpali



Kē'ē Beach from trail to Allerton Caretaker Cottage



Vehicles at Kē'ē Beach



Parking pattern



Lo'i



Lohi'au's House Site



Kalalau Trailhead Signage



Laua'e at Ke Ahu A Laka



Allerton Caretaker Cottage



Ke Ahu A Laka



At Ke Ahu A Laka



Coastal dunes covered by non-native ironwood & false kamani forests

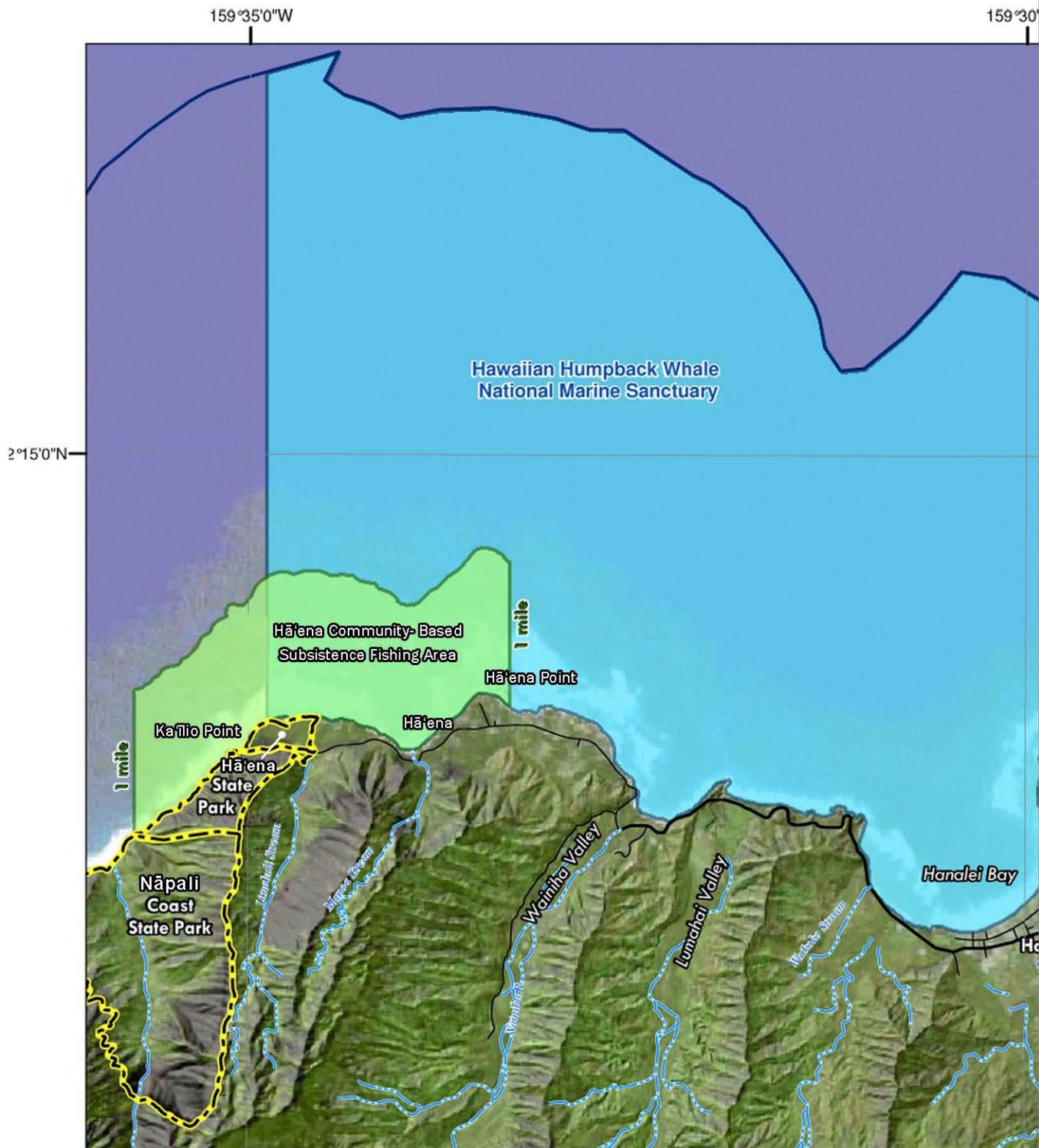
FIGURE 4
Site Photos

HĀ'ENA STATE PARK

Department of Land and Natural Resources

Island of Kaua'i





Source: State of Hawaii GIS; NOAA; PDC
 Whale Sanctuary: 15 CFR 992.41
 Subsistence Fishing Area: S.B. 2501 Act 241 June 26, 2006 revising HRS 188 Part II

LEGEND

- Hā'ena Community-Based Subsistence Fishing Area
- Hawaiian Humpback Whale National Marine Sanctuary Boundary
- State Parks
- 600' Bathymetric Contour

FIGURE 5
 Marine Management Areas
HĀ'ENA STATE PARK

Department of Land and Natural Resources Island of Kaua'i

NORTH LINEAR SCALE (Miles)

PBR HAWAII
 & ASSOCIATES, INC.

Source: SWCA Environmental Consultants (2009)
 Disclaimer: This graphic has been prepared for general planning purpose only. Diacriticals have also been added for Hawaiian spelling.

2.5 DESCRIPTION OF THE PREFERRED ALTERNATIVE SITE IMPROVEMENTS

A Site Analysis Plan was prepared to help guide locations of Master Plan park elements and is included as Figure 6. The Master Plan, Figure 7, shows the full build-out and is the preferred alternative. Foundational components of the plan involve changes to the park entry; vehicle circulation and parking; and pedestrian circulation. One of the most notable changes is limiting vehicular access on Kūhi‘ō Highway within the Park. To facilitate the initiation of the circulation changes while maintaining park operations, a “Near-term Plan for the Entry Complex” was developed and is described in Section 2.5.1 and Figure 8. Sections 2.5.2 through Section 2.5.25 describe the full build-out of the Park.

2.5.1 NEAR-TERM PLAN FOR THE ENTRY COMPLEX

A near-term plan for the entry complex is presented in Figure 8 (“the Near-Term Plan”). It offers an interim plan to help manage access and improve safety within the Park. In the vicinity of the park entry, rockfall hazard is a concern. AECOM prepared a map showing the location beyond which the potential for simulated rockfalls diminishes to a 0% chance based on computer modeling (Appendix C). The Near-Term Plan as well as the Master Plan locates all the proposed visitor facilities makai of this line. The exact alignment and materials used to construct the facilities should be designed with input from rockfall engineers, State Parks archaeologists, and the Hui.

2.5.1.1 Welcome Pavilion

The Near-Term Plan includes a Welcome Pavilion where the main entry to the Park can be managed prior to the construction of the Education and Cultural Center (described in Section 2.5.3). The primary function of the Welcome Pavilion is to provide orientation for all visitors prior to park entry. Public comfort stations and an information desk are also included in the structure. Areas for interpretive displays, exhibits, picnic tables, and bicycle parking are provided outside of the pavilion. The leach field for the comfort station will be located beneath the parking lot and dual waterlines installed for the comfort station and the lo‘i.

2.5.1.2 Entry and Turnaround

In the Near-Term Plan, a large vehicle turnaround is provided at the entry and provides separate, gated accesses to and from the main parking lot, as well as access to the special access parking at Kē‘ē, and a separate staging area that could be used by State Parks or the Hui.

The central island of the turnaround will be landscaped, highlighted by a large hala tree or other native tree of significance to Hā‘ena. An alternative for the centerpiece could be a sculpture depicting something of significance to Hā‘ena or created by a Hā‘ena artist. The turnaround also would include sheltered seating areas to accommodate visitor drop offs and pickups and shuttles/transit stops, as appropriate.

2.5.1.3 Parking

In the Near-Term Plan, most of the visitor parking is consolidated into the main visitor parking lot as much of the highway will be closed to general traffic and a small special access parking area will be established at Kē‘ē. The preferred medium for the parking lot is permeable pavement or structural grass over the entire parking lot or at least half of the parking lot so it can be used for multiple purposes. The exact surface will be determined when construction plans are prepared based on soil drainage and material availability. The parking lot as shown in the plan is large enough to park roughly 100 vehicles. However, to encourage use of the shuttle or transit system being planned for the North Shore, the number of available stalls may be reduced and the grassed areas of the lot can be used for outdoor activities, staging areas, or educational purposes. The area shaded in a darker green in the plans shows how the parking lot could be partitioned for the different uses. If the transit system proves successful, the area may no longer need parking and could permanently be converted into other park uses such as additional educational gardens and picnic areas, event space with a grand entry lawn, or expanded staging areas.

2.5.1.4 Interpretive Path

Due to the potential for rockfall hazards along the highway, an Interpretive Path will be provided makai of the highway, connecting the Welcome Pavilion to Kē‘ē Beach. It will traverse the lo‘i along the first berm separating the first two rows of lo‘i and then turn north to avoid the wetlands. It will cross an ‘auwai over a footbridge and connect to a path through the hau tunnel. This path will then connect to the trail behind the dunes and turn south, leading visitors past the lifeguard tower to Kē‘ē.

Interpretive displays and wayside exhibits will be installed along this path, including directional signage and educational information for the varied sights along this trail. The portion of the path which traverses the lo‘i will be elevated with handrails and a viewing platform will be provided where the path turns. From here, distant views of Wai a Kanaloa can be seen as well as spectacular views of Makana, the lo‘i, loko, and the wetlands. The path is proposed to be a minimum of eight to ten feet wide to accommodate bicycles without being overly intrusive upon the lo‘i. Pathway footings are proposed to avoid structural impacts to lo‘i walls. The path will be designed to be ADA accessible and made with lightweight, durable, easy-to-maintain, and vandal-proof or vandal-resistant materials. Directional and ocean safety signs are proposed to be posted appropriately along the path.

The exact alignment and materials used to construct the path will be determined when construction plans are prepared based on input from rockfall engineers, State Parks archaeologists, and the Hui.

2.5.2 LONG-TERM PLAN FOR PARK ENTRY, TURNAROUND AND NEW MAIN GATE

A new main gate is proposed to be installed and the highway is proposed to be closed to general vehicle traffic. In addition, a large turnaround and Entry Kiosk will be installed to

control the gates to the main parking lot, the special vehicle access to Kē‘ē, or the staging area. A detailed view of the main visitor entry complex is illustrated in Figure 9. The gate will limit access along the highway to minimize visitor exposure to the rockfall hazards. Only those needing vehicular access to Kē‘ē, the cemeteries, and the Hula Complex will be allowed along the limited access portion of the highway. Warning signs will be installed at the gate. The gate across the highway could have a swing gate over the mauka half of the right-of-way that could be automated to open for exiting traffic only. Gate design will be included in construction drawings.

There are also three shade structures located at the turnaround. Both as shown are roughly 40 feet in length and can be used for general visitor drop-off and pick-up waiting areas or designated as a shuttle or bus stop when such services become available. Shuttle and transit schedules are proposed to be posted at the stop. Should shuttle or transit service to the Park become successful enough to eliminate or reduce the need for the parking lot, the shuttle stop area can be enlarged to accommodate the required passenger drop offs and pickups. The shade structures could also be designed with photovoltaic (PV) panels to help power the nearby facilities. Shade structure design is conceptual at this time.

2.5.3 EDUCATION AND CULTURAL CENTER

The Education and Cultural Center (ECC) is envisioned as the main gathering place for all who visit the Park. The ECC is anticipated to house administrative staff offices, comfort station facilities, auditorium/classroom space, meeting rooms, interpretive displays, storage rooms and other related spaces to support the Park’s outdoor recreation functions and activities. The ECC is proposed to be designed with covered outdoor lanai-type spaces to encourage indoor-outdoor experiences and learning spaces. The footprint as shown is roughly 2,000 square feet (s.f.). It incorporates the 1,200 s.f. footprint of the Welcome Pavilion from the Near-Term Plan and adds two 400 s.f. wings at the back of the structure. However, the final architectural program, design, and facility size will be determined during the detailed design stage of the ECC. Its exact location may also be moved further east into the graded area of the parking lot based on the size of the final parking lot needed at the Park. This will open up more park/event space makai of the facility and allow the smaller entry pavilion to operate while the ECC is constructed.

It is proposed that all visitors attend an educational session upon entering the Park similar to the Hanauma Bay Nature Preserve on O‘ahu. The sessions would be held at the Welcome Pavilion in the near term and at the ECC once built. These sessions would provide a brief overview of the Park’s extensive and sensitive natural and cultural resources and instruct visitors of the appropriate activities and behaviors allowed at the Park. General safety concerns such as ocean safety and rockfall hazards can also be included as well as up-to-the-minute ocean and weather conditions and instructions on what to do in the case of an emergency. Once visitors attend the orientation session, they will be able to enter the Park directly via the Interpretive Path.

Because of Hā‘ena’s remote location and limited access to infrastructure, all aspects of green design is proposed for consideration whenever feasible to help the ECC operate self-sufficiently. A rainwater catchment cistern is proposed to be installed to collect, filter, and reuse rainwater from the roof for irrigation, toilet flushing, and other possible uses. Renewable energy is also proposed and will be investigated during the building design process to help support the electrical demand of the facility. Solar, microwind, and microhydro power are potential alternatives that could be implemented.

2.5.4 TRADITIONAL HALE, DEMONSTRATION GARDENS, PICNIC AREAS AND OUTDOOR EVENT SPACE

On the grounds surrounding the ECC are various outdoor spaces that are proposed for use as demonstration gardens and lo‘i, tour staging areas, picnic areas, and outdoor event space. These areas are envisioned as flexible teaching spaces where outdoor demonstrations or classes could be held. They could also be landscaped with cultural and native plants, including kalo and Polynesian-introduced plants, to aid in educational programs and may be used as staging areas for tours, school groups and community work days. A traditional hale is proposed to be constructed as a shelter for these activities. Its proposed location is in an existing cleared area which cannot be put back into lo‘i production due to that area having previously abandoned cars and debris.

2.5.5 PARKING

The main parking lot is proposed to be regraded, resurfaced, and landscaped with striped parking stalls. The preferred medium is permeable pavement or structural grass over the entire parking lot or at least half of the parking lot so it can be used for multiple purposes. The exact surface will be determined based on soil drainage and material availability when construction plans are prepared. To encourage use of the shuttle or transit system being planned for the North Shore, the number of available stalls may be reduced and the grassed areas of the lot can be used for outdoor activities, staging areas, or educational purposes. The entire area is located outside of the estimated rockfall zone. In addition, should shuttle service to the Park prove successful, the parking lot could be reduced in size or eliminated and replaced with other park uses such as additional educational gardens, picnic areas, and event space with a grand entry lawn. Another option would be to move the ECC further east to open up the areas makai of the facility for outdoor uses. The smaller, 13-space special access parking lot will be located at Kē‘ē for ADA, lifeguards, and various cultural practitioners by special permit only and is discussed in more detail in Section 2.5.13.

Figure 7 shows an ‘auwai running along the mauka edge of the parking lot that is in roughly the same alignment as the original ‘auwai that used to traverse this area before it was cleared for the dirt parking lot. There have been requests by some members of the MPAC to determine whether it can be restored and made functional again, connecting to the rest of the ‘auwai system. If this design element is pursued, further investigation will be necessary prior to detailed design of the parking lot to see if the ‘auwai can be restored to serve the lo‘i without extreme requirements. The Master Plan states that if the ‘auwai can be restored, the

grading and landscaping of this area should be done so that stormwater runoff from the parking lot is diverted away from the ‘auwai and directed to flow across the grassed areas of the parking lot or bioswales and adjacent landscaped areas which could be designed as rain gardens. In addition, overflow drainage swales could be designed in this area to help mitigate larger rainfall flows that may overtop the ‘auwai. If it cannot be restored as an ‘auwai, another alternative is to aesthetically integrate its design into the drainage system and to see if it has potential for microhydro power generation. This area can also double as a catchment ditch for rockfall events. Hala trees could also be planted in a thick screen along the highway and parking lot as an added rockfall mitigation measure and to soften the view of the highway from the ECC and Interpretive Path.

Pedestrian paths are proposed to be provided throughout the parking lot and drop-off/pick up areas to clearly delineate where people should walk. The pedestrian path itself could be curbed or edged for easier maintenance and may be surfaced with permeable pavers or pavements or natural soil hardeners to increase rainwater infiltration while providing a stable, ADA-accessible surface. The exact surface will be determined when construction plans are prepared based on soil drainage and material availability.

The subterranean area of the parking lot will serve as an absorption bed for the proposed restroom facilities. This will minimize the amount of disturbed area required to service the proposed facilities.

2.5.6 RECONSTRUCTED HALE AND LO‘I INTERPRETIVE SITE

A traditional house foundation (Feature 8, Site 1600-8) is located on the northern side of the main parking lot. According to the State Parks archaeologists, it likely has been modified by the addition of a lanai in historic times. Recent reconnaissance of the site shows it to be in relatively good condition and provides an opportunity for a reconstructed hale pili and lo‘i interpretive site at the entrance to the Park. Final design of this area will be done once a more detailed condition analysis of the site is conducted and the feasibility of reconstruction is determined. The layout shown in the Master Plan is purely conceptual and subject to revision based on the condition analysis.

2.5.7 CARETAKER’S COTTAGE AND BASEYARD

The Caretaker’s Cottage is a feature from the 2001 Draft Park Plan that some members of the MPAC felt was absolutely critical to preserve in the 2015 Master Plan. Having a caretaker at the Park would provide a 24-hour presence at the Park for security as well as provide someone to unlock the gates for hikers who wish to exit when the Park is closed if the exit gate is not automated or is locked after hours.

The footprint of the Caretaker’s Cottage as shown on the Master Plan is roughly 1,200 s.f. under the main roof with about 500 s.f. of covered lanai space. There are two potential baseyard areas, one of which is the area immediately surrounding the Caretaker’s Cottage and measures over 6,400 s.f., but should include a protected buffer between the baseyard

uses and the lo‘i walls. The second area, which could also be used as a staging area or flexible space, measures roughly 4,800 s.f. and should similarly be buffered from the lo‘i and ‘auwai to the north and east, respectively.

These areas comprise previously disturbed land adjacent to the main parking lot. The final layout, location and sizing of the Caretaker’s Cottage and baseyard will be dependent on the condition and exact locations of the lo‘i walls, ‘auwai, and traditional house site discussed in Section 2.5.6. These details will be adjusted and finalized during the detailed design stage. However, the design should include a fence around the baseyards so they can be secured. Tall hedges or landscaping should be installed along the fences to screen the facilities from public view. Similar to the ECC, green design and renewable energy should be implemented and incorporated into the design whenever feasible. An intercom or hardline emergency phone should also be provided at the gate fronting the Caretaker’s Cottage so hikers who need help after hours or anyone needing emergency help can contact the Caretaker.

2.5.8 DLNR HELIPAD AND BASEYARD/STAGING AREA

The helipad and baseyard/staging area will be used by DLNR for maintenance of their facilities including the Nāpali trails and sites. Since it is infrequently used, the helicopter landing area can be designed as a level, grassed site. The parking lot, entry complex, and helipad staging area will undergo a detailed design process prior to finalization.

For emergency helicopter landings, the Fire Department tends to utilize the open grassy area near the Hui’s current shelter. This area may continue to be used as an emergency landing zone as it is unsuitable for lo‘i restoration and proposed to remain as an open grassy field for educational and special events makai of the Welcome Pavilion/ECC. However, it is noted that the Fire Department will land wherever they need to as appropriate for the emergency situation.

2.5.9 LIMITED ACCESS CORRIDOR

The highway between the turnaround and Kē‘ē will be closed to general vehicle traffic and used only for special vehicle access due to the potential rockfall hazard (Appendix C). The only vehicles that will be permitted beyond the gate will be special access vehicles such as the lifeguards, hula practitioners, family caretakers of the cemeteries and ADA vehicles (if the stall is available). Because the road is currently owned by the State Department of Transportation (DOT), it will either need to be transferred to State Parks or an agreement must be made between the two state agencies for the proposed closure.

2.5.10 HULA COMPLEX

The entire area makai of the Kalalau Trailhead and south of the highway has been designated as the Hula Complex. It is the first priority of the MPAC to restore the area and to develop a culturally appropriate management plan. The complex includes Ka Ulu a Paoa Heiau and Ke Ahu a Laka, the former Allerton property, and the State lands surrounding them. Restoration

of the heiau and Ke Ahu a Laka utilizing Kekahuna's map and all other available maps is recommended in the Master Plan (Figure 10).

The County is entering into an agreement with the Hui to care for the sites and is working with State Parks on access and coordination. It is recommended that appropriate cultural protocols be established as part of the management, access, and use of the area. Review by both the Kaua'i Historic Preservation Review Commission and the State Historic Preservation Division (SHPD) are required for any improvements and proposed management plans.

Rehabilitation of the historic Allerton Caretaker's Cottage is currently underway for reuse to support park use, including the Hula Complex. The Allerton house site and existing foundation is proposed in the Master Plan to be maintained as an open, grassed platform. State Parks notes that recent changes at the site may require short-term improvements to preserve it in place. If restroom facilities are provided within the area, potable water and an individual wastewater treatment system will be needed due to the remoteness of this facility. Sustainable design elements are proposed for consideration to make it as self-sufficient as possible including high efficiency fixtures, renewable energy, rainwater catchment, and wastewater treatment and reuse.

2.5.11 DUNE RESTORATION

The dunes and beach strand were identified by both the MPAC and biologists at Geometrician Associates (Appendix D) as priority sites for restoration. For the MPAC, it would be an opportunity to take care of the kupuna who are interred there. According to the biologists, the restoration of a native dune ecosystem would involve the removal of alien species and the planting of natives and Polynesian-introduced plants such as Pōhuehue, Naupaka, Nanea, Pōhinahina, Nehe, Pa'u-o-Hi'iaka, 'Aki'aki grass, Milo, Hala and Kou. Not only would they provide improved and more authentic vegetation but they could also be used to help reduce coastal erosion if carefully planted. Restoration of the dune system would also improve the habitat for common native shorebirds, including Kōlea or Pacific Golden Plover, 'Ūlili or Wandering Tattler, 'Akekeke or Ruddy Turnstone, Kioea or Bristle-thighed Curlew, Hunakai or Sanderling, and various other sandpipers (Terry and Hart 2009).

Also, because the beach is one of the primary recreational resources at the park, visitors should clearly be instructed to be careful as they walk along the coast, especially east of the proposed lifeguard station since shoreline erosion is unearthing iwi and other cultural resources. The formal picnic areas that were shown on the dunes with tables in the 2001 Draft Park Plan have been removed and a new picnic area will be located next to the ECC. Visitors, however, will still be permitted to picnic on the beach, but not on the dunes, and they will be encouraged to carry out all trash. The Master Plan further recommends that, to support dune restoration, recreational activities that impact the beach and dunes, such as driving on the sand (except for emergencies) and beachcombing, be prohibited.

2.5.12 LIFEGUARD TOWER

A new permanent location for the lifeguard tower has been identified for the Master Plan with input from the MPAC and the Kē‘ē lifeguards (Listman, 2008). As shown in Figure 7, it is roughly 50 feet north of the highway pavement and 50 feet mauka of the 2009 certified shoreline to allow views from the end of the path to open up to the ocean and improve visibility for the lifeguards. The site is located outside any known flood hazard zone or wetland. To avoid potential impact to subsurface resources, the foundation should be built up rather than excavating down into the dunes, if possible. Also, some of the existing ironwood trees may have to be cut.

2.5.13 ADA/SPECIAL ACCESS PARKING AREA

A small 13-stall parking area at Kē‘ē will be maintained to support ADA accessibility, as well as provide parking for the lifeguards, family members tending to the cemeteries, lawai‘a, and cultural practitioners visiting the Hula Complex. The two existing ADA stalls will be maintained and directly opposite the highway from them will be an 11-stall parking area. Bicycle racks should also be installed here if bicycles are permitted on the Interpretive Path.

Drainage improvements should be made in the area to prevent ponding, soil erosion, and beach washouts as has happened at Kē‘ē during heavy rainfall events. Access to this parking area will be managed by special permit or controlled by parking staff to minimize vehicle access along the limited access corridor.

2.5.14 PICNIC AREA AT KĒ‘Ē

Picnic tables will be located at the end of the former highway pavement at the entrance to Kē‘ē Beach. The area is shaded by trees and overlooks the beach and lagoon. The tables are proposed to be installed on the old highway pavement to provide ADA accessibility.

2.5.15 LOKO AND WETLAND RESTORATION

While lo‘i restoration will have ancillary benefits to wetland birds, creation of wetland habitat for endangered birds is not proposed as part of the Master Plan. Some members of the MPAC expressed a desire to restore the loko and wetland areas for endangered native birds and possible agricultural uses. Loko Naia is believed to have been a loko kalo and Loko Kē‘ē either a fishpond or loko kalo.

Restoration of the small wetlands on the property for the purpose of creating a native bird habitat is a possibility according to Geometrician Associates. However, they do not recommend modifying these areas specifically to attract endangered birds for practical and legal reasons. In order to do so, there are several binding agreements and permits that must be obtained with the U.S. Fish and Wildlife Service (USFWS), such as a Safe Harbor Agreement and associated enhancement of survival permit as well as increased responsibility to protect the native birds once they are established at the Park. They also caution its location near the main public corridor would increase the potential for endangered birds to be

harassed, injured or killed directly or indirectly by people or their pets and may be difficult to manage.

They do, however, recommend restoring the native flora which would increase native plant conservation and opportunities to educate the public. This may also indirectly support native birds including endangered and threatened species without a formal effort to create an endangered species habitat. The State could also consider a third party agreement with a local organization that may want to take on the responsibility of creating and maintaining such a habitat if a formal endangered species habitat is desired. If pursued, the wetlands should be protected through fringing vegetation that encourages viewing but discourages direct entry and possibly fencing shielded by the landscaping to help minimize access by predators (Appendix D).

2.5.16 LIMAHULI STREAM RESTORATION

Based on recommendations from Geometrician Associates in Appendix D, a natural area with potential for beneficial impact is restoration of the riparian areas around Limahuli Stream. The alien tree species that form a dense, closed canopy around the stream are especially problematic since they effectively prevent sunlight from reaching the ground and prevent the mid-canopy and ground cover layers in the forest from developing. This in turn increases sediment loading in the stream due to erosion and tree litter. Reduced sunlight also limits the growth of benthic algae in streams. The algae are a major food source for many rare and federally endangered native fish and invertebrates. A reduction in this important food source, coupled with increased sediment loading, could ultimately result in decreased quality of streams.

Careful clearing of the alien trees along Limahuli Stream and the planting of appropriate native and Polynesian-introduced plants to stabilize slopes are recommended. In order to prevent impacts to ‘Ōpe‘ape‘a, the Hawaiian Hoary Bat, State Parks should restrict any cutting of large shrubs or trees to periods outside the June 1 through September 15 breeding season for the ‘Ōpe‘ape‘a. Continued cooperation with the Division of Aquatic Resources (DAR) to keep new alien fish out of the ‘auwai and stream and in ridding the stream of periodic invasions of swordtails, guppies, and other alien fish is recommended. Details of stream and riparian restoration will be deferred until a restoration plan can be prepared.

2.5.17 AGRICULTURAL COMPLEX

In order to create a living cultural Agricultural Complex, community gardening practices restoring the lo‘i should be continued (Carpenter, 1996). The MPAC would like to allow for other cultural crops to be planted in addition to kalo. Historically, the complex was known to be flexible, allowing dryland cultivation to be done by simply redirecting water through different paths. ‘Uala, or sweet potatoes, were known to be grown in sandy areas and mai‘a, bananas, kō, sugar cane, and ‘awa (*Piper methysticum*) were grown in the valleys.

Restoration of the ‘auwai is also recommended wherever feasible, particularly in actively cultivated areas of the lo‘i. Special care, however, needs to be taken not to make a surface water connection between the lo‘i and ‘auwai back to Limahuli Stream to prevent the spread of apple snails. Limahuli Stream is one of the few places in the State that does not have apple snails and the snails are currently in the Park’s lo‘i.

The 2001 Draft Park Plan also included pedestrian and bicycle pathways throughout the lo‘i, primarily along and sometimes through the ‘auwai. This is no longer recommended since the goal is to reestablish the ‘auwai as the primary means of irrigating the lo‘i. The plan currently locates the Interpretive Path over the first berm within the lo‘i and will provide visitors an up-close view of the lo‘i on their way to Kē‘ē.

In addition, access to and/or through certain areas of the lo‘i is required for both people and equipment as a part of ongoing maintenance and harvesting. For safety reasons, access within the working lo‘i should therefore be managed and primarily reserved for those restoring the lo‘i as well as for educational and work groups tending to the lo‘i. Special tours for the public and educational groups guided by knowledgeable staff may also be arranged. These access ways shall be designed and constructed as the restoration of the lo‘i progresses in order to appropriately locate them within the complex.

2.5.18 MONTGOMERY HOUSE

Rehabilitation of the historic Montgomery House/Cottage situated within the Agricultural Complex is proposed to support agricultural activities or other park uses/operations. Similar to the Allerton Caretaker’s Cottage, if restroom facilities are provided, potable water and an individual wastewater treatment system will be needed. Sustainable design elements should be considered to make it as self-sufficient as possible including high efficiency fixtures, renewable energy, rainwater catchment, and wastewater treatment and reuse.

2.5.19 CULTURAL GATHERING PLACE AND HĀLAU WA‘A

Tucked between the lo‘i, Loko Naia and former coastal road, and up on higher ground, the Cultural Gathering Place is envisioned in the Master Plan as an outdoor gathering place to support community/educational groups and where overnight stays would be permitted. The Cultural Gathering Place is in an area of recent 20th century modification and encompasses the site of the historic poi mill.

An open hālau-type structure and Hālau Wa‘a, or canoe house, is also proposed to the east of the Cultural Gathering Place. Approximate locations of these facilities are shown in the Master Plan. However, because this area is located near potentially sensitive cultural sites, the exact extent of the area and location of the structures should be determined with input from archaeologists, the community and kupuna. In addition, the Hālau Wa‘a should be located as makai as possible without impacting sensitive sites and the dune system or being within areas of special flood and wave hazards. For infrastructure, potable water will be needed. Composting toilets should be considered as an option for restroom facilities or

temporary restrooms could be brought in and removed as necessary to serve the campers. Alien plant species are proposed to be removed from the area and replanted with native and Polynesian-introduced plants.

2.5.20 POI MILL

In the 2001 Draft Park Plan, interpretation of the historic poi mill is recommended. However, no cost estimates were included for any reconstruction work. As remnants of the concrete foundation still remain, the MPAC discussed whether the poi mill could be rebuilt in order to process harvests from the lo'i. However, the site is located in an area of potential flood hazard due to wave action, according to the Flood Insurance Rate Map (FIRM) and if State Parks or another entity wishes to reestablish a poi mill on site or within the park, additional studies are recommended to determine the most suitable location, design, and size for such a facility. Therefore, the site itself is recommended to be interpreted with signage or displays and included on guided tours.

2.5.21 CEMETERY AREAS

The two historic cemeteries that are just north of the loko are currently maintained by family members. In the 1996 Burial Treatment Plan (Carpenter, 1996), there are recommendations to install signage and fence or wall off and gate the cemetery areas, with access provided to lineal descendants and State personnel. However, during the MPAC meetings a request was made to eliminate the fencing and gates. Rather than using fences or walls, landscaping and the use of native and Polynesian-introduced plants should be considered as more natural buffers for the area. Any signage that is installed should be designed with input from the families of those buried there.

2.5.22 PEDESTRIAN TRAILS

As discussed in the Near-Term Plan, the Interpretive Path will serve as the main pedestrian route between the ECC and Kē'ē. It will be located outside the area of the known rockfall hazard and will also serve as the primary ADA-accessible route. The proposed alignment was developed with Hui leadership and the final design of the pathway is subject to refinement based on more detailed design which should include input from the Hui, State archaeologists, Cultural Advisory Group, and rockfall engineers.

The old coastal road behind the dune, which will be used for restricted vehicle access to the lo'i, cemetery and Cultural Gathering Place, is also proposed as a potential new pedestrian trail. Its location behind the dunes provides shelter from the winds and provides an alternate route to Poholoikeiki Channel, the Hālau Wa'a, and the historic poi mill site and passes by Loko Naia. In the Master Plan, this pathway is not envisioned as a paved, improved trail. However, it is used as an informal trail and ocean safety signage should be installed in this area. Interpretive displays and wayside exhibits should be installed as appropriate. Bicycles should not be permitted on this portion of the trail due to the sensitivity of the area.

Another potential pedestrian trail could be developed to connect the ECC directly to the Hālau Wa‘a site through the proposed native plant and lo‘i demonstration gardens along an existing path at the edge of the Phase I lo‘i restoration. These trails together will provide a pedestrian loop trail through the most active areas of the Park as well as opportunities for diverse interpretive experiences. Signage, landscaping and trail markings may be installed to direct visitors towards appropriate areas and away from sensitive or hazardous areas. This loop trail serves as an alternate route back to the ECC and main parking lot. The exact alignment of all trails should be developed with input from State archaeologists, the Hui leadership, and the Cultural Advisory Group.

Additional pedestrian loop trails on the eastern side of the Park should also be considered and designed in conjunction with the surveying and restoration of the lo‘i (Phases III and IV). All trails will need to be designed based on more detailed survey of the archaeological sites and to loop back to the ECC if access to these areas is to be managed.

2.5.23 BICYCLE FACILITIES

Bicycle racks will be provided at the ECC (and the Welcome Pavilion in the Near-Term Plan). They should also be installed at Kē‘ē near the special access parking lot if bicycling is permitted on the Interpretive Path. If bicycle riding is allowed on the Interpretive Path to Kē‘ē, riders will be required to travel at low speeds since this will also be the main pedestrian and ADA-accessible route. They will also be required to walk their bicycles between the large viewing platform on the Interpretive Path and Kē‘ē due to the sensitivities along the sand dune and potential for pedestrian-bicycle conflicts in the Hau Tunnel and at the viewing platform. If conflicts between pedestrians and bicyclists arise, bicycle riding on the Interpretive Path may be discontinued.

As an alternative, bicyclists could be allowed on the limited access portion of the former highway but they would be permitted at their own risk of rockfalls. If permitted, bicycle racks should be installed at Kē‘ē. To encourage bicycle access to the park, bicycle parking, according to the Pedestrian and Bicycling Information Center, should include sturdy racks that are visible (for security), accessible, easy to use, and convenient. Ideally, bicycle racks should support the whole bicycle and not just one wheel, and enable the user to lock the frame and wheels.

2.5.24 HAZARD MITIGATION MEASURES

Due to the potential for rockfalls along the highway, all of the major facilities including the Interpretive Path to Kē‘ē should be located outside of the high rockfall hazard zones as described by AECOM in their Rockfall Hazard Assessment report (Appendix C). These improvements should be considered part of the rockfall mitigation and prioritized in capital improvement project funding. In addition, warning signs should be installed at appropriate locations along the highway and safety instructions should be made during visitor orientation prior to park entry.

Ocean safety signs should also be posted at both the main entry points by the Welcome Pavilion/ECC as well as along the major pathways leading to shoreline areas such as at Kē‘ē Beach, near the Hālau Wa‘a, and at the Cultural Gathering Place. Additional safety signage should be installed as necessary throughout the Park in appropriate areas.

Emergency evacuation routes will be planned and shown on maps during the visitor orientation sessions as well as indicated on visitor brochures and materials. The loop paths through the lo‘i can be used as an emergency route between Kē‘ē and the Welcome Pavilion/ECC. If people need to be airlifted out of the park, the emergency helipad shown on the plan can be accessed from multiple locations.

2.5.25 INFRASTRUCTURE IMPROVEMENTS

The following recommendations for infrastructure improvements were developed by Kennedy/Jenks Consultants to support the goals of the proposed Master Plan and preferences of the MPAC. See Appendices H and I.

2.5.25.1 *Integrated Water/Wastewater/Drainage System*

Design considerations for integrated water/wastewater systems include:

- Using treated wastewater effluent and collected rainwater for irrigating the landscaping around the facilities such as the ECC, picnic area, Caretaker’s Cottage and baseyard. If effluent water quality is R-2, irrigation systems must be subsurface with no overground sprays. If treated to R-1, overground spray and drip systems can be installed.
- Using treated wastewater effluent and collected rainwater for toilet flushing at the ECC and Caretaker’s Cottage to conserve potable water.
- Reducing stream diversion by collecting, storing and using rainwater.
- Using nonpotable water for fire protection. Collected rainwater or even ocean water can be used for fire protection.
- Directing rainwater runoff from the main parking to landscaped areas and rain gardens. Where possible, collecting and storing rainwater for reuse such as irrigation and possibly toilet flushing.
- Redesigning Kūhiō Highway culverts so that rainwater that passes beneath it flows more naturally and can be filtered and used in the ‘auwai system.

Control measures to prevent the spread of apple snails from the Park’s lo‘i to Limahuli Stream should be included in any design or implementation of the ‘auwai and irrigation systems for the Agricultural Complex. Some suggestions include but are not limited to:

- Elevating and extending the outfall pipes from the Limahuli Stream diversions above the receiving ‘auwai so that the snails cannot crawl directly into the stream. The snails are known to dislike cold, fast-moving water, which is what flows from Limahuli Stream, and so the risk is minimized.
- Grading the ‘auwai to flow makai and away from Limahuli Stream so water does not flow back to Limahuli Stream.

For items specific to wastewater treatment:

- Treatment for wastewater should be to a minimum R-2 water quality, with aeration and non-chlorine treatment such as ultraviolet (UV) disinfection to improve effluent quality. Consider using renewable energy sources to provide power.
- Locate effluent absorption beds under parking lots and driveways.
- Provide aeration to the existing constructed wetlands primary treatment tanks, powered by a PV system.
- For remote, low use facilities, consider composting toilets or temporary/portable facilities as needed.
- Use non-chemical disinfectants and cleaning products for maintenance, particularly in composting toilets, to minimize impacts to wastewater treatment processes and effluent quality.
- Since the proposed wastewater facilities are currently not standard according to the State Department of Health (DOH), include maintenance manuals and provide instruction to ensure proper upkeep of all wastewater systems at the Park.

2.5.25.2 Electrical Power

Many of the proposed facilities will require electrical power. Kaua‘i Island Utility Cooperative (KIUC) service stops at the entrance to the Park and should be extended to the Welcome Pavilion/ECC and the Caretaker’s Cottage. The facilities requiring power, however, should also be designed to use renewable energy wherever and as much as possible. Potential renewable energy resources include but may not be limited to solar, wind and hydro power.

A cursory review of the potential renewable energy resources that may be available at Hā‘ena State Park was done based on readily available information. Because of the Park’s limited access to infrastructure and the dispersed locations of some of the proposed facilities, all sources of renewable energy should be investigated and pursued whenever feasible.

Solar hot water heaters and solar PV energy are well-established technologies that have been installed widely throughout the islands. According to data from the Hawai‘i Sugar Planters Association collected in 1985, an estimated 350 solar calories per square centimeter falls on the area per day. The higher the intensity, the better the resource is. The average for the island is 350 cal/cm²/day, with ranges from 0 to 500 cal/cm²/day. A solar hot water heater can be installed at the Caretaker’s Cottage, the ECC, and any of the other facilities that may require hot water, such as the Montgomery House and Allerton Cottage, once they are renovated. Solar PV panels could also be installed at all of these locations to provide a renewable source of power as well as double as a shade structure at the turnaround. Solar PV could also be installed at the comfort station at Kē‘ē to power any new equipment needed for an upgraded wastewater treatment system.

Micro wind and micro hydro are other sources of renewable energy that should be considered in addition to solar. There are smaller wind turbines that can be installed on rooftops at the

Park or those that rotate on a vertical instead of horizontal axis to minimize any impact to birds. There are also evolving wind technologies, such as the Humdinger Windbelt, developed by a Hawai'i-based company, that do not have rotating airfoils but capture energy from aeroelastic flutter (<http://www.humdingerwind.com>). As technology evolves, State Parks and DLNR should continue to look into viable alternatives as improvements are phased in and developed.

A micro hydro system needs a consistently running source of water (as little as two gallons per minute) and a relatively small elevation change (as little as two to three feet of head) to turn a turbine to create power. However, more of each will increase output. Micro hydro systems are more efficient the closer they are to the energy source and therefore Limahuli Stream, the only perennial stream at the park, could be investigated to provide a source for micro hydro. Neighboring Limahuli Gardens uses a micro hydro system to power their entire visitor center which runs on a 24V system and includes lights, a computer and cash register (Winter, personal communication 2011). Care must be taken, however, to size and locate the micro hydro to minimize impacts to the stream ecosystem and to account for periods of low stream flow.

2.5.25.3 Communications

In order to maintain communications and provide for public safety during emergencies, the existing hardline pay phone at Kē'ē Beach is proposed to be maintained. For similar reasons, hardline telephone service is proposed to be provided at the Caretaker's Cottage and Welcome Pavilion/ECC. A second pay phone or at least a closed-circuit phone which connects to the Caretaker also is proposed to be located on the outside of the Welcome Pavilion/ECC so that emergency calls can be made when the ECC is closed and hikers who need assistance can contact the Caretaker. The remote and mountainous location limits wireless communications. Wireless services should be considered for visitor convenience and may be required for certain parking management technologies.

2.5.25.4 Visitor Limits

Because of the extensive archaeological, natural and cultural resources at the Park and the proximity of the existing and proposed wastewater facilities to these resources, State Parks is proposing to limit the number of people in the Park to 900 people per day. This number is an initial visitor limit which State Parks may adjust over time depending on future improvements, improved/increased maintenance, and/or other studies such as impact studies, particularly if harmful impacts to the natural, cultural and archaeological resources arise. The preferred alternative includes a per day visitor limit. Currently, there are no visitor limits at the Park. Many on the MPAC and in the community felt the current number of visitors is far too many for the Park and that a limit should be set on the number of visitors to reduce impacts to the natural, cultural and scenic resources and to improve the overall visitor experience.

2.6 PHASING OF ACTIONS

On the following page is a preliminary phasing plan for the major tasks associated with implementing the Master Plan (Table 3). The table is not meant to be comprehensive but is intended to identify the major implementation milestones to help guide the improvements at the Park. For all improvements, appropriate permits, agency coordination, infrastructure improvements, landscaping, educational programming, and staff management and training will be required. Consultation with the Cultural Advisory Group should also be done on a regular basis throughout implementation.

2.7 COST ESTIMATES

Cost estimates for Master Plan elements and associated on-site infrastructure are in development and will be discussed in the Draft EIS.

This page intentionally left blank.

**TABLE 3
ANTICIPATED PHASING PLAN**

SHORT TERM (IMMEDIATE - 5 YEARS)		
Capital Improvements	Cultural Environment	Natural Environment
<ol style="list-style-type: none"> 1. Rehabilitate Montgomery House. 2. Mitigate immediate rockfall hazard above highway as mentioned in Section 2.5.24 and described in greater detail in Section 4.11.5. 3. Work with County and other agencies as appropriate to establish shuttle/transit services from the Princeville property. 4. Improve main parking lot, sized appropriately based on shuttle/transit service. Include new turnaround and Entry Kiosk. Make provisions for subgrade leach field. 5. Construct Welcome Pavilion. Ensure exit gate allows pedestrian and bicycle access even when locked for vehicles. 6. Install elevated Interpretive Path from ECC to Kē‘ē Beach. 7. Determine whether parking and/or entry fees should be collected. If so, install temporary facilities near the main parking lot to support fee collection and visitor orientation. 8. Install safety signage (as appropriate). 9. Plan for and make accommodations for future required infrastructure. 10. Coordinate with the DOT on closure of highway or eliminate vehicle traffic altogether. If decided, formalize transfer of this portion of the highway to State Parks. 	<ol style="list-style-type: none"> 1. Establish Cultural Advisory Group early, prior to any design and construction contract awards. 2. Complete rehabilitation of the Allerton Caretaker’s Cottage. 3. Work with County on management agreement for Ka Ulu a Paoa and Ke Ahu a Laka site and initiate solicitations for third-party management. 4. Prior to any improvements within the main parking lot, survey the extent of the traditional house site (Feature 1600-8). 5. Continue lo‘i restoration, kalo cultivation. 6. Update Interpretive Plan. Implement as appropriate. 7. Coordinate with Hui on relocation of staging areas prior to construction of new entry facilities. 8. Initiate visitor orientation sessions when new park entry facilities constructed, including appropriate behavioral conduct and cultural/historic/ archaeological resource protection. 	<ol style="list-style-type: none"> 1. Relocate Life Guard Tower. Establish safe swim zones and set up markers. 2. Restore and maintain Dune System, starting from Kē‘ē. 3. Plant dense native hala tree screen for rockfall mitigation along the highway and new parking lot. 4. Initiate visitor orientation sessions upon park entry including safety and natural resource protection information. 5. Start clearing invasive species in/around the loko. Review loko restoration requirements including water. Consider phasing restoration work starting with Loko Kē‘ē. Consider whether native bird habitat is feasible to establish at loko in consultation with the USFWS and provide ongoing maintenance. Restore with native plants and maintain.

MID RANGE (5 - 10 YEARS)		
Capital Improvements	Cultural Environment	Natural Environment
<ol style="list-style-type: none"> 1. Build Caretaker’s Cottage and Baseyard. 2. Improve pedestrian trails and install interpretive displays/wayside exhibits. 3. Improve drainage flows and install native plant bioswales to mitigate erosion/runoff problem areas. 	<ol style="list-style-type: none"> 1. Continue restoration and maintenance of Hula Complex. 2. Continue restoration and maintenance of lo’i. Design and implement restoration of ‘auwai in conjunction with main visitor complex. 3. Establish the Cultural Gathering Area. 4. Build Hālau Wa‘a. 5. Evaluate feasibility of/research potential restoration and development of Hale Interpretive Site (Feature 1600-8) located within entry complex. 6. Restore and maintain other cultural sites such as Lohi‘au’s House Platform and the Historic Poi Mill. 	<ol style="list-style-type: none"> 1. Continue work on the Dune System, continuing eastward. 2. Continue loko restoration. 3. Initiate stream restoration work along Limahuli Stream and maintain. 4. Maintain work above.
LONG RANGE (10 – 20 YEARS)		
Capital Improvements	Cultural Environment	Natural Environment
<ol style="list-style-type: none"> 1. Build ECC, Picnic Area, and surrounding grounds. Review visitor parking requirements and adjust parking lot as appropriate. Locate ECC eastward of Welcome Pavilion into graded area if smaller parking lot is needed. Reuse or relocate Welcome Pavilion structure for other park uses. 2. Refresh functionality of constructed wetland system at Kē‘ē and install additional aeration component. 	<ol style="list-style-type: none"> 1. Formalize visitor orientation sessions at ECC, including education on the cultural environment. 2. Continue restoration and maintenance of Hula Complex and other cultural sites. 3. Continue restoration and maintenance of lo’i and loko. 4. Continue expansion of cultural programs. 	<ol style="list-style-type: none"> 1. Formalize visitor orientation sessions at ECC, including education on the natural environment. 2. Clear remaining invasive species. Restore and maintain with natives. 3. Continue and maintain work above. 4. Continue expansion of educational programs.

LEGEND

- A** Ka Ulu a Paoa Heiau
- B** Bicycle Racks
- C** Ke'e Hula Platform - Ke Ahu a Laka
- D** Rehabilitate Allerton's Cottage for Hula Use
- E** Kalalau Trail Head
- F** Existing Comfort Station / Showers
- G** Proposed / Existing Gates
- H** Restored Hula Complex
- I** Interpretive Path to Ke'e
- J** Lifeguard Tower
- K** Caretaker's Cottage & Baseyard
- L** Landscaped Natural Drainage System / Bioswale
- M** Rehabilitate Montgomery House for Lo'i / Park Use (TBD)
- N** Picnic Areas w/ Tables
- O** Education and Cultural Center
- P** Parking Lot
- Q** DLNR Baseyard/Helicopter Landing Area
- R** Restore Agricultural Complex (Phases)
- S** Historic Poi Mill
- T** Turnaround
- U** Hālau Wa'a
- V** Proposed Cultural Gathering Area
- W** Rainwater Catchment Cisterns
- X** Rockfall Mitigation Measures
- Y** Rotating Display/Demonstration Gardens
- Z** Reconstructed Hale and Lo'i Interpretive Site
- ▲ Rockfall Hazard Warning Signs
- ★ Interpretive Displays
- Ocean Safety Signage

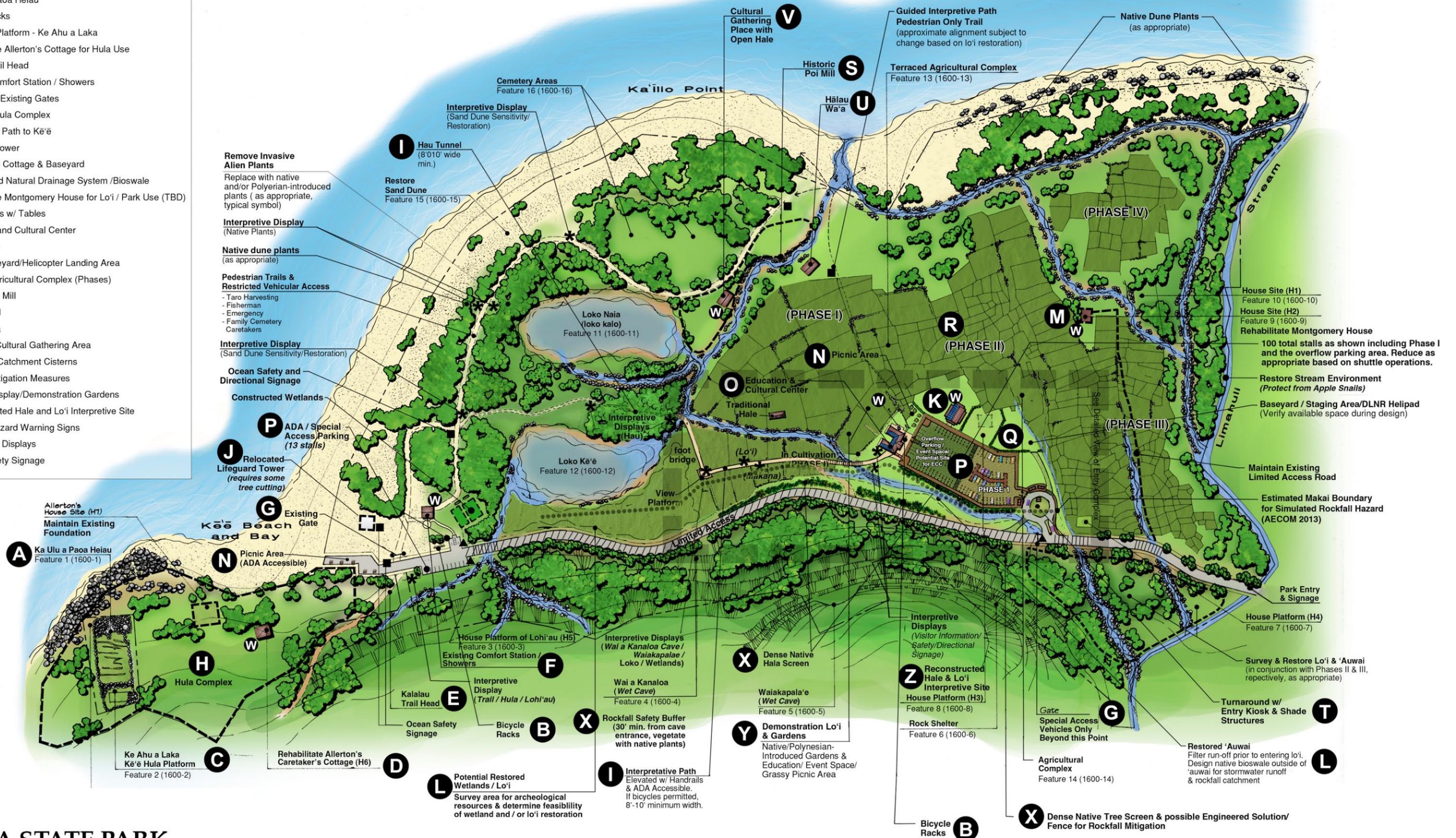
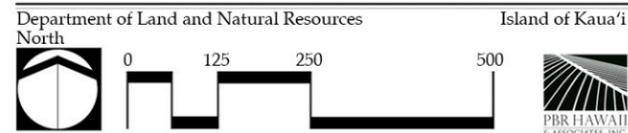


FIGURE 7
Master Plan
HĀ'ENA STATE PARK



Source: Based on 2001 Community Preferred Master Plan Prepared by The Keith Companies
 Disclaimer: This Graphic has been prepared for general Planning purposes only and should not be used for boundary Interpretations or other spatial analysis.

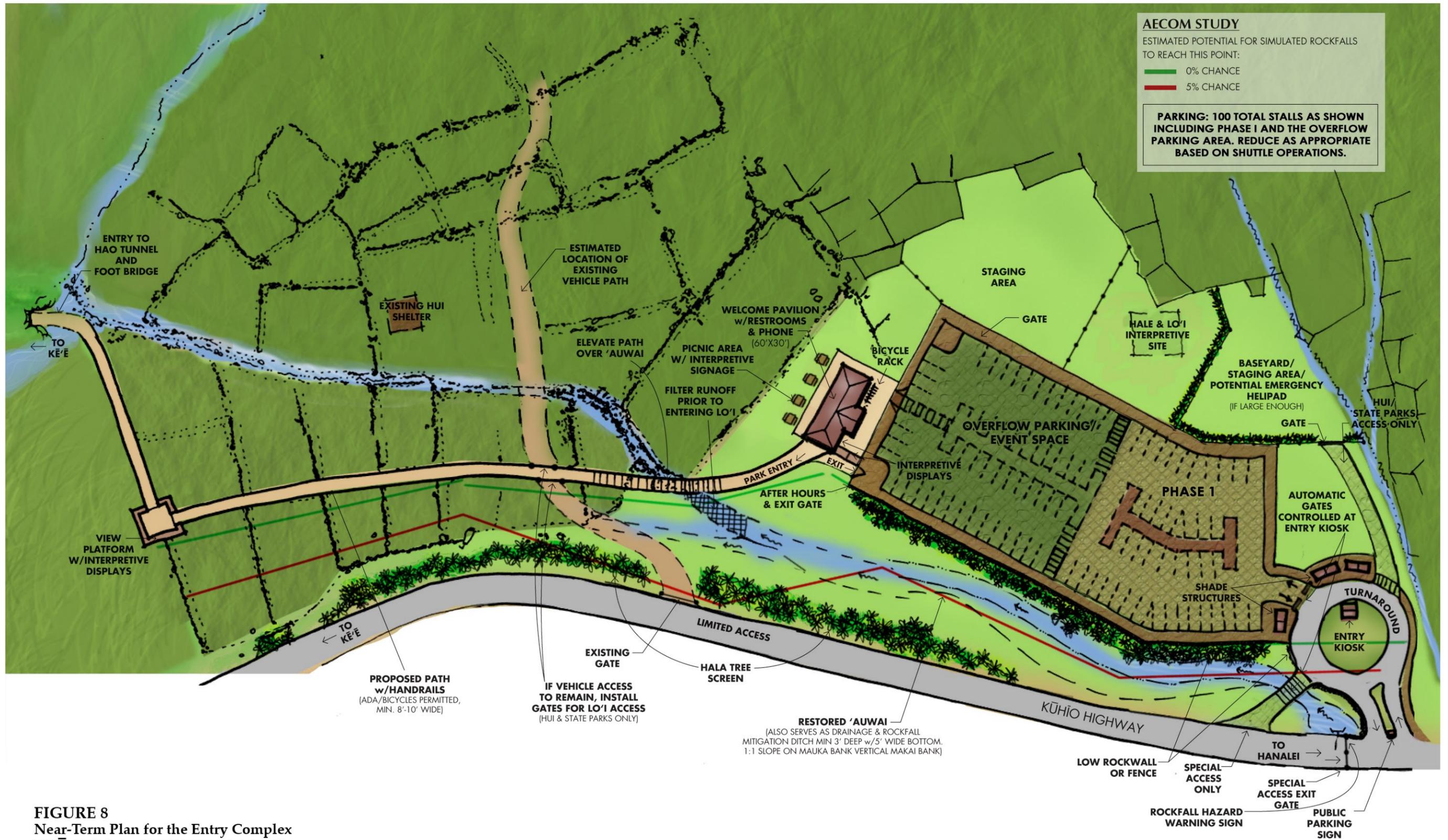
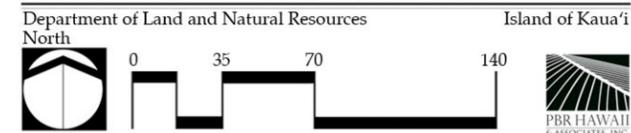


FIGURE 8
 Near-Term Plan for the Entry Complex
HA'ENA STATE PARK



Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.

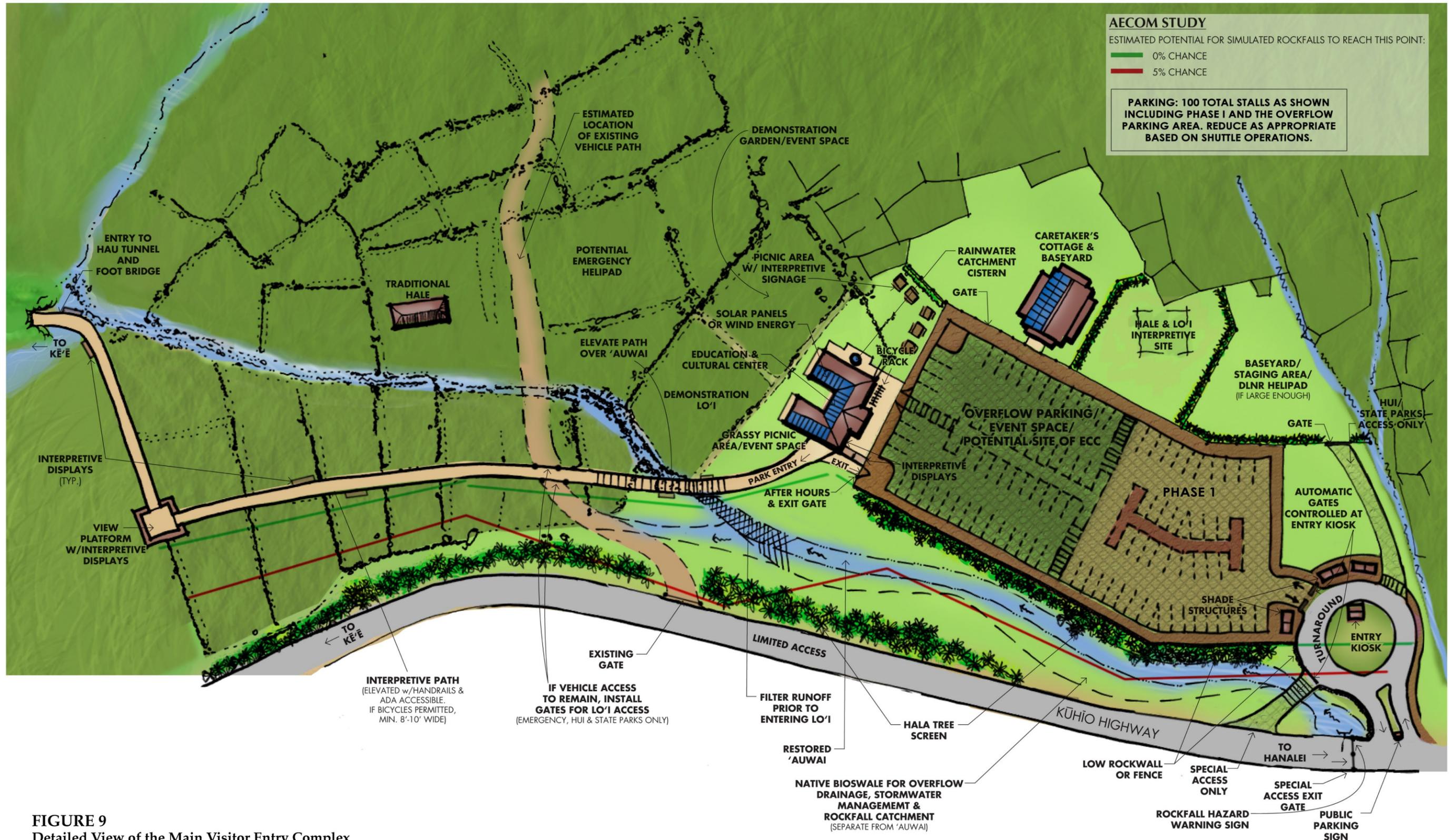


FIGURE 9
Detailed View of the Main Visitor Entry Complex
HĀ'ENA STATE PARK

This page intentionally left blank.

3.0 LAND USE CONFORMANCE

The processing of various permits and approvals are prerequisites to the implementation of the Hā'ena State Park Master Plan. Relevant federal, state and county regulations, land use plans, policies, and ordinances are described below.

3.1 FEDERAL

3.1.1 AMERICANS WITH DISABILITIES ACT (ADA) OF 1990, AS AMENDED

The Americans with Disabilities Act of 1990, as amended (ADA) is a civil rights law that prohibits discrimination on the basis of disability. The ADA requires that all buildings, facilities, and sites shall conform to applicable federal, State, and County accessibility guidelines and standards. Section 103-50, HRS requires that all State of Hawai'i or County government buildings, facilities, and sites to be designed and constructed to conform to the ADA Accessibility Guidelines, the federal Fair Housing Amendments Act, and other applicable design standards as adopted and amended by the Disability and Communication Access Board (DCAB). All plans and specifications prepared for the construction of State of Hawai'i or County government buildings, facilities, and sites are to be reviewed by the DCAB for conformance to the ADA guidelines and standards.

Title II of the ADA requires that state and local government does not discriminate against persons with disabilities in the provision of government services. It is the policy of DLNR to pursue all reasonable efforts to ensure that its facilities, programs, and services are accessible to persons with disabilities.

Discussion: State Parks intends, to the maximum extent feasible, to provide access to archaeological and cultural sites, historic properties, and wilderness areas while preserving each site's significant features. In such instances where outdoor facilities cannot be made accessible, efforts will be made to provide an "equivalent experience." Equivalent experience may be in the form of an alternate facility that provides a similar environment, view, or interpretive encounter. Under the direction of the department's ADA Coordinator, State Parks is implementing a plan to make most of the areas accessible to persons with disabilities.

Proposed facilities are master planned to be compliant with ADA requirements. The recently constructed comfort station near Kē'ē Beach is constructed to ADA standards and the proposed ECC is designed at this conceptual level to be ADA compliant. Parking areas and walkways have been laid out to accommodate the appropriate number and dimensional requirements of the ADA.

3.1.2 NATIONAL AND STATE REGISTERS OF HISTORIC PLACES

The National Historic Preservation Act of 1966 authorized the official list of U.S. historic places worthy of preservation known as the National Register of Historic Places. The State of Hawai'i also maintains a state register of historic places, authorized by Chapter 6E, HRS.

The SHPD of the DLNR is charged with implementing the provisions of Chapter 6E, HRS. The State Historic Preservation Officer is the Chair of the BLNR.

The park is within the “Hā‘ena Archaeological Complex” (Site # 50-30-02-1600) that was listed in the Hawai‘i and National Register of Historic Places in 1984. It also lies immediately adjacent to a portion of the “Kaua‘i Belt Road” (North Shore Section) (Site #30-02-9346) that was listed in the National Register of Historic Places in 2004.

The “Hā‘ena Archaeological Complex,” which encompasses Hā‘ena State Park, was deemed significant because it represents a large, nearly continuous, and mostly intact complex of archaeological features dating from the early prehistoric period to the recent historic period (Yent 1983). Grouped broadly by location and type, the complex includes: 1) subsurface cultural layers and features, including burials, found within sand dune and beach-derived deposits forming a band along the seaward edge of the coastal flat; 2) irrigated agricultural field systems and wetlands that dominate the alluvial flat between the sand dune and the talus slopes along the cliff base, and 3) the traditionally important sites located along the talus slope, including the cliff face itself, that are significant to native Hawaiians because of their association with various legends, customs, and beliefs.

The “Kaua‘i Belt Road” stretches 10 miles from Princeville to Kē‘ē Beach and is considered the only remnant of the Belt Highway system on Kaua‘i to retain a high degree of integrity (Duensing 2003). This section is characterized by its narrow lanes, winding road alignments, historic bridges and culverts, road cuts, and scenic settings. The stretch from Hā‘ena Beach County Park to Kē‘ē was the last to be completed, probably in 1928. The concrete culvert crossing Limahuli Stream at the entrance to the Hā‘ena State Park is one of 13 bridges and culverts designated as contributing to the significance of the Belt Road.

Discussion: Consultation with SHPD has been initiated and is ongoing. The location, layout, and design of the proposed park elements have been planned to highlight the importance of - while minimizing the impacts to - those archaeological and cultural sites that contribute to the significance of the National Register complex. Archaeological testing for prior projects provided information on the probable distribution and nature of intact subsurface archaeological deposits and burials (McEldowney and Yent 2007; Major and Carpenter 2001; Yent and Carpenter, field notes, 2009). Proposed development is being confined primarily to areas that have been disturbed by past construction and landscaping activities and appear to have no intact cultural deposits. An archaeological sensitivity map prepared by State Park archaeologists helped to guide development in this manner. To ensure that impacts to archaeological resources are avoided, archaeological compliance will be conducted prior to all ground-disturbing activities. Greater discussion regarding site archaeology, potential impacts and mitigation measures can be found in Section 5.1.

The project will not directly or indirectly affect the structural character or integrity of the Belt Highway segment within the project area. This segment has been significantly altered over the years to accommodate the high volume of traffic at the highway’s terminus. The

road bed and shoulders have been expanded for parking and ADA improvements. One of the defining characteristics of the Belt Highway, its scenic setting, has been retained and will be enhanced with the proposed Master Plan improvements.

3.1.3 ENDANGERED SPECIES ACT

The Endangered Species Act of 1973 provides a program for the conservation of threatened and endangered plants and animals and their habitats. The lead federal agencies for implementing the Act are the USFWS and the NOAA Fisheries Service.

Discussion: Hā‘ena’s biological resources, along with mitigation measures are discussed in greater detail later in this report, in Sections 4.5-4.10. The USFWS provided a Technical Assistance letter in response to the pre-consultation process (see Appendix B). The letter confirms that there is no Critical Habitat within the Park. The letter identifies species in the area that are protected under the Act and recommends that surveys of the Park’s flora and fauna be conducted to document the presence of listed species. As the Master Plan is a programmatic project, the Technical Assistance letter recommends contacting the USFWS should State Parks determine that any proposed actions will adversely impact federally listed species or critical habitats.

3.1.4 LAND AND WATER CONSERVATION FUND (LWCF)

The National Park Service (NPS), Department of the Interior implements the Land and Water Conservation Fund Act of 1965 (Public Law 88-578). The Land and Water Conservation Fund (LWCF) program provides matching grants for the acquisition and development of public lands to meet the needs of all Americans for outdoor recreation and open space.

In 1977, grant monies from the LWCF were used to acquire the 63.7 acres that comprise Hā‘ena State Park. As a condition of this funding, any development or use in the Park must follow the post-completion and stewardship requirements of this program. These requirements are specified in Section 8 of the LWCF State Assistance Program Manual (LWCF Manual, 2008).

Discussion: The proposed Master Plan and management strategies have been reviewed by the NPS to ensure compliance with LWCF requirements as set forth by U.S. Code of Federal Regulations, Title 36, Part 59, Section 6(f) as well as with the original intent of park acquisition, which included the state’s commitment to develop opportunities for “swimming, fishing, picnicking, camping, and other beach-oriented recreation opportunities” (LWCF Agreement, 1972). In correspondence dated June 6, 2014 (Appendix B), NPS commented that the draft Master Plan for the Park shows:

“some changes to the Park’s use [that] reflect contemporary sensitivities to cultural resources and the sensitive shoreline ecosystem...the recreation opportunities include a variety of ocean recreation, walking, picnicking, nature viewing, sight-seeing, and

interpretive exhibits with the potential for camping and bicycling. These provide assurance that the public beach park qualities that make this a valuable LWCF park are planned for the future.”

The NPS letter also speaks to the agricultural terraces:

“The Master Plan draft also shows that the park will encompass a significant community gardening area with the proposed restoration of the lo‘i kalo (wetlands). Although such an area is unusual within a state park and more common in local parks, such areas are not out of compliance with LWCF requirements...Maintaining such a practice with an interpretive/educational component is clearly consistent with several goals within the 2008 SCORP...it is advisable to include trails and interpretive opportunities to ensure all members of the public – including visitors from afar and anyone not engaged in the community garden activities—can still understand what is happening there, the cultural significance, and generally not feel excluded from this public place...any agricultural goods harvested within the community garden areas should be generally for park programs and personal use and not part of a formal commercial or for-profit farming organization.”

3.2 STATE OF HAWAI‘I

3.2.1 STATE ENVIRONMENTAL REVIEW LAW (CHAPTER 343, HRS AND SECTION 11-200, HAR)

The State Environmental Review Law (Chapter 343, HRS and 11-200, HAR) requires an environmental assessment for any action that proposes the use of State lands and funds, when an action is proposed within the Conservation District or when activities are proposed in a historic site. An Environmental Assessment is required to determine if an EIS is required. However, provided that an agency determines, through its judgment and experience, that an EIS is likely to be required, the agency may choose not to prepare an environmental assessment and instead shall prepare an EIS that begins with an EISPN.

Discussion: This EISPN was prepared in compliance with Chapter 343, HRS as the proposed Master Plan involves the use of State land and funds, is in the Conservation District, and is located within a historic site. It is expected that an EIS will be prepared.

3.2.2 STATE LAND USE LAW (CHAPTER 205, HRS)

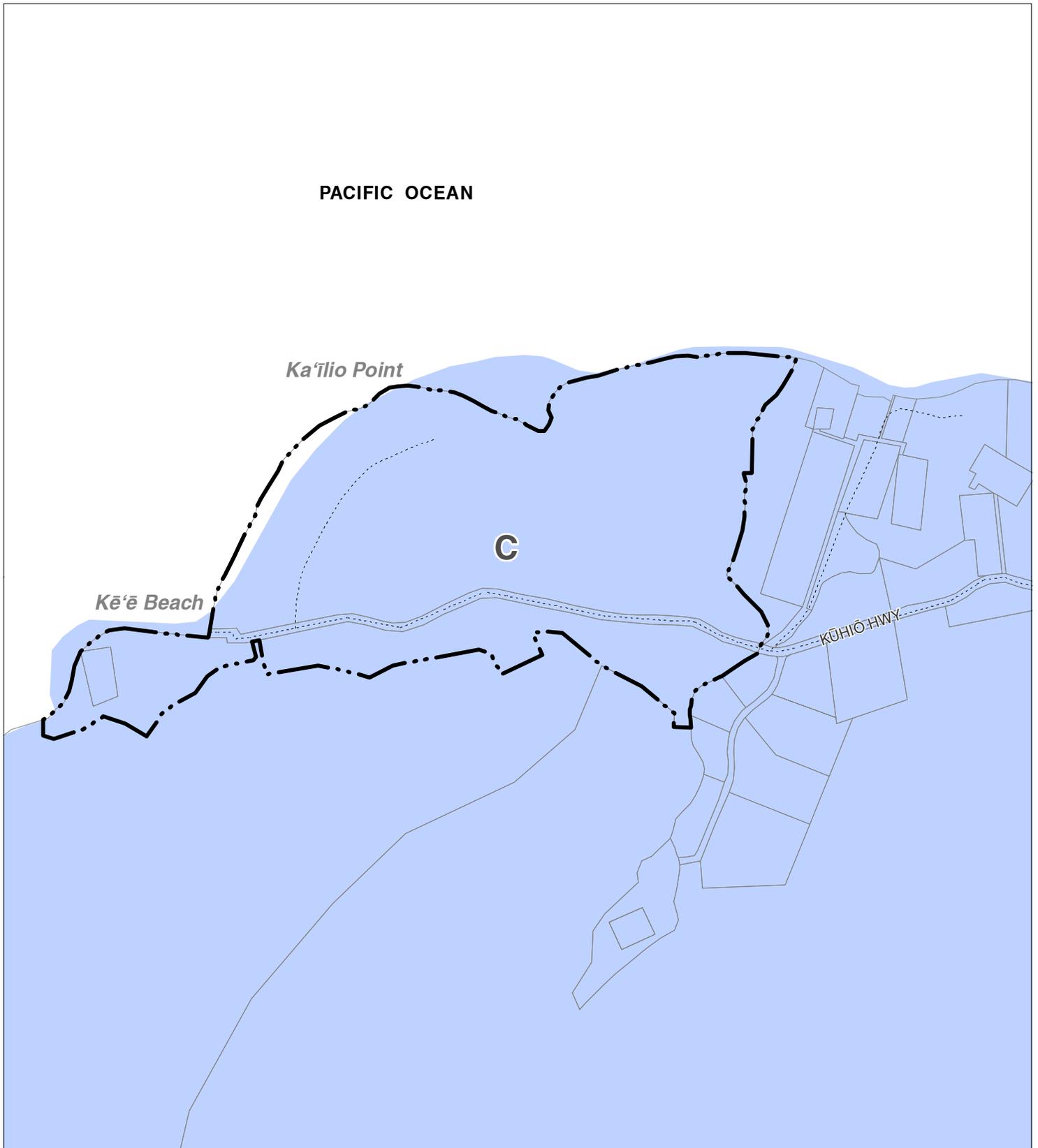
The State Land Use Law (Chapter 205, HRS), establishes the State Land Use Commission and authorizes this body to designate all lands in the State into one of four districts: Urban, Rural, Agricultural, or Conservation.

Discussion: The proposed site improvements are located within the State Conservation District (Figure 11, State Land Use). The DLNR, Office of Conservation and Coastal Lands (OCCL) is responsible for implementation of land use policies in the Conservation District. Pre-consultation comments from the OCCL (found in Appendix B) confirm that the Park is within the Resource and Protective subzone of the Conservation District (Figure 12,

Conservation District Subzones). The OCCL notes a previous Conservation District Use Application KA-1373 in 1983 for State Parks. A Conservation District Use Application may be required by the OCCL prior to construction of proposed Master Plan elements.

3.2.3 COASTAL ZONE MANAGEMENT (CHAPTER 205A, HAWAI‘I REVISED STATUTES)

In Hawai‘i, the Coastal Zone Management Act, is primarily implemented by the Counties through the Special Management Area (SMA). The SMA is discussed in greater detail in Section 3.3.4 of this document.



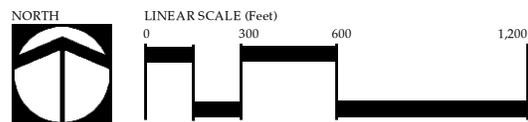
LEGEND

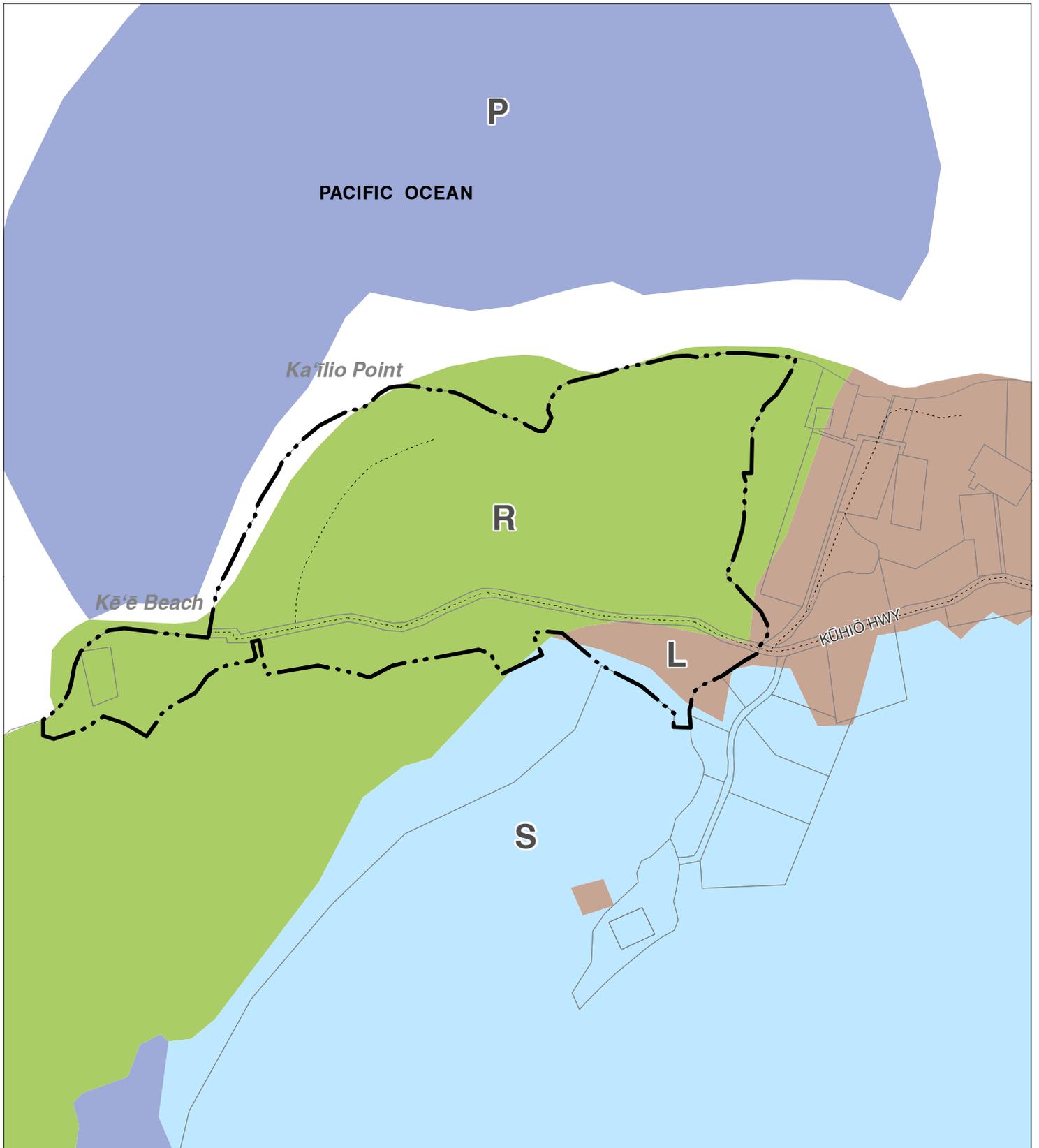
-  Hā'ena State Park Project Boundary
-  Road
-  A - Agricultural
-  C - Conservation
-  R - Rural
-  U - Urban

Source: State Land Use Commission (GIS, 2014)
 Disclaimer: This graphic has been prepared for general planning purposes only.

FIGURE 11
 State Land Use District
HĀ'ENA STATE PARK

Department of Land and Natural Resources Island of Kaua'i





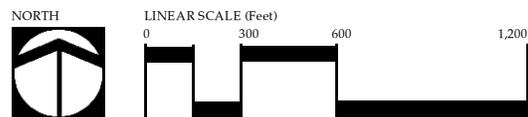
LEGEND

- Hā'ena State Park Project Boundary
- Road
- R - Resource Subzone
- L - Limited Subzone
- S - Special Subzone
- P - Protective Subzone

Source: Office of Planning and State Land Use Commission (2011)
 Disclaimer: This graphic has been prepared for general planning purposes only.

FIGURE 12
 Conservation District Subzones
HĀ'ENA STATE PARK

Department of Land and Natural Resources Island of Kaua'i



3.3 COUNTY OF KAUA‘I

3.3.1 THE KAUA‘I GENERAL PLAN

The General Plan (GP) of the County of Kaua‘i is a policy document that fulfills legal mandates of State law and the Charter of the County of Kaua‘i. It is intended to help guide long-range development for the enhancement and improvement of life on Kaua‘i, advance the County’s vision for Kaua‘i, and establish the strategies to help achieve that vision including recommended land uses. The GP was last updated in 2000.

The GP identifies “sharing of recreation resources with visitors” as an issue and opportunity:

Many visitors travel to the North Shore to enjoy its beaches and unique natural areas. The impact is especially great in the Hanalei-Hā‘ena region which has a large share of visitor attractions. Heavy visitor use can displace residents or significantly change the quality of the experience, especially at beaches and parks. Residents need to work with business people and parks agencies to identify: (1) parks and natural areas where visitors will be welcomed and accommodated, with levels of use based on parking or other easily managed limits; and (2) parks and natural areas where it is important to more strictly limit access in order to preserve the resources and/or the quality of the recreation experience (Sec. 6.1.3).

GP policies related to Kaua‘i’s parks and natural areas (both County and State) include:

Encourage the development of public-private partnerships involving the County and the Department of Land and Natural Resources in order to manage and improve Kaua‘i’s valuable parks and open spaces (4.2.8.3(a)).

Manage beach parks, resource parks, rivers, beaches and other natural areas according to the following policies in order of priority...(1) Conserve resources. (2) Provide for use by the general public...(3) Allow for group use (including commercial tours and equipment rentals) within conservation limits (4.2.8.3(c)).

To enhance the visitor’s experience of Kaua‘i and to provide meaningful jobs and income to Kaua‘i residents, the County shall develop or support development of the following programs by Federal, State or private agencies:...(1) Regional visitor centers...(2) First-person interpretation of natural areas, historic and archaeological sites, traditional agricultural and cultural practices, towns and communities...(3) Study and practice of Native Hawaiian and other ethnic cultural traditions and languages, including the development of cultural learning centers (4.2.8.3(d)).

Improve the facilities, maintenance and management of activities at State and County parks...(1) Commit the necessary resources to ensure adequate levels of park maintenance, repair and hygiene and to improve signage and interpretation of natural and cultural features...(2) In resource parks...such as...Hā‘ena...plan and improve specific areas to support larger numbers of visitors; manage other areas for moderate

or low use, based on conservation objectives. Prepare and update Master Plans for major parks...(4.2.8.3(e)).

The GP North Shore Land Use Map (Figure 13) designates the Park as “Park.” The GP North Shore Planning District Heritage Resource Map identifies the Park as a conservation area and notes that heiau sites are located within the Park (Figure 14).

Discussion: Master planning of parks, such as Hā‘ena State Park is clearly supported by the County’s GP. The GP recognizes the need for management measures to balance visitor demand and conservation needs. Further, the Plan identifies the need for adequate funding to implement management, interpretation, and maintenance of park facilities.

The proposed Master Plan seeks to address the issues and opportunities relating to the visitor experience on Kaua‘i’s North Shore. Community sentiment throughout the Master Planning process (Appendix A) has been that the Park’s cultural and ecological resources are overwhelmed by visitor volume and use. The purpose of the Master Plan is to help temper the volume of visitors and encourage interaction with the resources without being a detriment to them. As such, the Master Plan responds to the GP policy set forth in Section 4.2.8(c) by conserving resources, providing for use by the general public, and continuing to allow for group access.

3.3.2 NORTH SHORE DEVELOPMENT PLAN

The North Shore Development Plan designates Hā‘ena State Park and surrounding lands as “Open” (Figure 15, North Shore Development Plan Update). The Development Plan provides a framework for guidelines to direct the physical locations and relationships of major improvements, buildings and landscape within the North Shore Special Planning Area. Relevant North Shore Planning Area goals include:

Goal A: To preserve the unique natural beauty of the North Shore Planning Area.

Goal E: To preserve the wildlife and flora of the North Shore, recognizing man’s dependence upon this preservation for his own health and welfare.

Goal F: To insure the preservation of the historic-archaeological sites in the North Shore Planning Area

Goal H: To provide for recreational opportunities that are compatible with the unique qualities and natural features of the North Shore

More specific Development Plan recommendations that relate to natural resources and are applicable to the Master Plan are as follow:

Only basic supportive facilities should be provided at outdoor recreation areas selected for widespread public use in order to enhance the experience.

Multiple activity recreation areas must be managed to avoid hazardous conflicts between recreators and allow maximum use of resources.

Although public access is obtained to recreational resource areas, publicity should be minimized unless the appropriate agency can assure adequate management and security measures. In this manner, local residents would be allowed to continue traditional patterns of resource use.

Discussion: The Master Plan and supporting management actions address the recommendations of this County planning document. Specifically, those measures to minimize traffic congestion and interpret archaeological and ecological resources while providing opportunities for outdoor recreation contribute to applicable North Shore Planning Area goals.

3.3.3 COUNTY ZONING

The Park is not zoned by the County of Kaua‘i. Applicable land use regulations are those associated with the State Conservation District, as previously discussed in Section 3.2.2.

3.3.4 SPECIAL MANAGEMENT AREA

The SMA was established to protect coastal resources in areas extending inland of the shoreline. The site is within the SMA (see Figure 16, Special Management Area).

Discussion: Upon acceptance of a Final EIS, a Special Management Area Assessment Use Permit will be required for the implementation of the Master Plan.

3.3.5 COUNTY SHORELINE SETBACK

Ordinance 863, adopted December 2007, and amended in 2012 as Ordinance 935, sets forth a procedure for establishing building shoreline setbacks for the County of Kaua‘i. The determination of the shoreline setback is based on a lot’s average depth and historic rates of shoreline change. For lots with an average depth that is greater than 160 feet, the following table is used (adapted from County of Kaua‘i Ordinance 935, Table 2):

**TABLE 4
COUNTY SHORELINE SETBACK REQUIREMENTS**

For structures with a footprint that is:	Less than or equal to 5,000 square feet	Greater than 5,000 square feet
Then the setback distance is:	40 feet plus 70 times the annual coastal erosion rate	40 feet plus 100 times the annual coastal erosion rate

Discussion: A Shoreline Setback Determination application will be required by the County of Kaua‘i for implementation of physical building aspects of the plan.

3.3.6 COUNTY FLOOD PLAIN MANAGEMENT ORDINANCE

County of Kaua‘i Ordinance 831 pertains to development in the floodplain and coastal high hazard areas (tsunami zone). The majority of the Park elements are proposed to be outside mapped flood and tsunami hazard areas. The lifeguard stand is proposed to be moved to

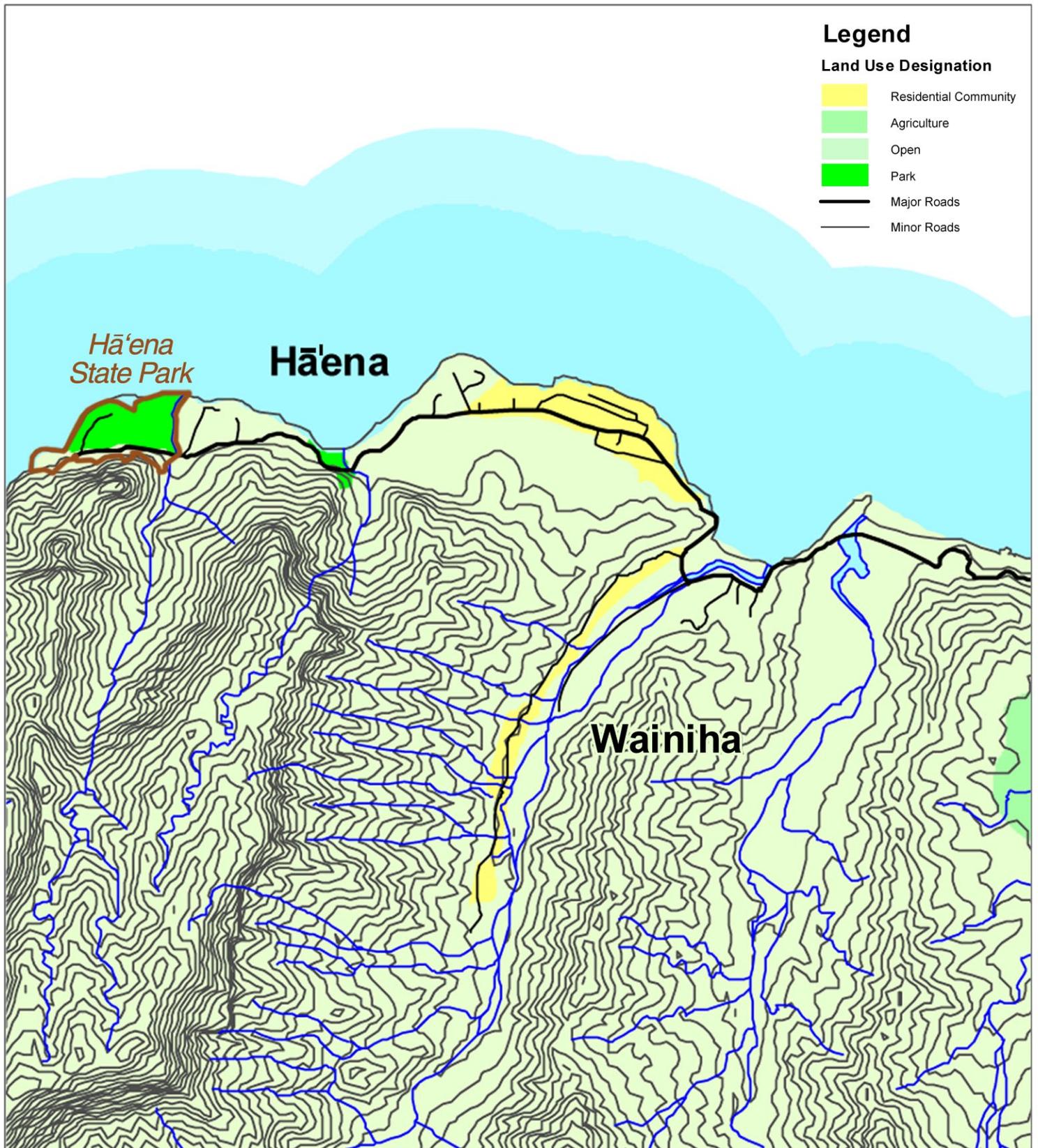
within the coastal high hazard area. Thus, this action should be coordinated with the County's Flood Plain Coordinator to ensure that it is done in compliance with Ordinance 831, which prohibits manmade alteration of sand dunes. The Master Plan suggests that the lifeguard stand be built upon the dune rather than excavated into the dune to avoid negative effects to the ecosystem.

3.4 APPROVALS AND PERMITS

The permits and/or approvals required to implement the proposed site improvements are listed in Table 5, Approvals and Permits.

TABLE 5
APPROVALS AND PERMITS

PERMIT/APPROVAL	AUTHORITY	STATUS
Compliance with Chapter 343 HRS	Office of Environmental Quality Control	In process
Compliance with Chapter 6E, HRS (Historic Preservation)	State Historic Preservation Division	In process
Conservation District Use Application	State DLNR, Office of Conservation and Coastal Lands	Required for implementation of development
Special Management Area Permit	County of Kaua'i Planning Commission	Required for implementation of development
Shoreline Setback Determination	County of Kaua'i Planning Department/State of Hawai'i Department of Accounting and General Services, State Survey Office	Required for implementation of development
Stream Channel Alteration Permit; Stream Diversion Works Permit; and/or Petition to Amend Interim Instream Flow Standards	DLNR, Commission on Water Resource Management	May be required for micro-hydro water diversion; and/or riparian restoration (depending on extent of in-stream activities)



Legend

- Land Use Designation**
- Residential Community
 - Agriculture
 - Open
 - Park
 - Major Roads
 - Minor Roads

LEGEND

- Hā'ena State Park Project Boundary

FIGURE 13

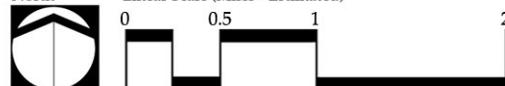
General Plan - Land Use Map

HĀ'ENA STATE PARK

Department of Land and Natural Resources
North

Island of Kaua'i

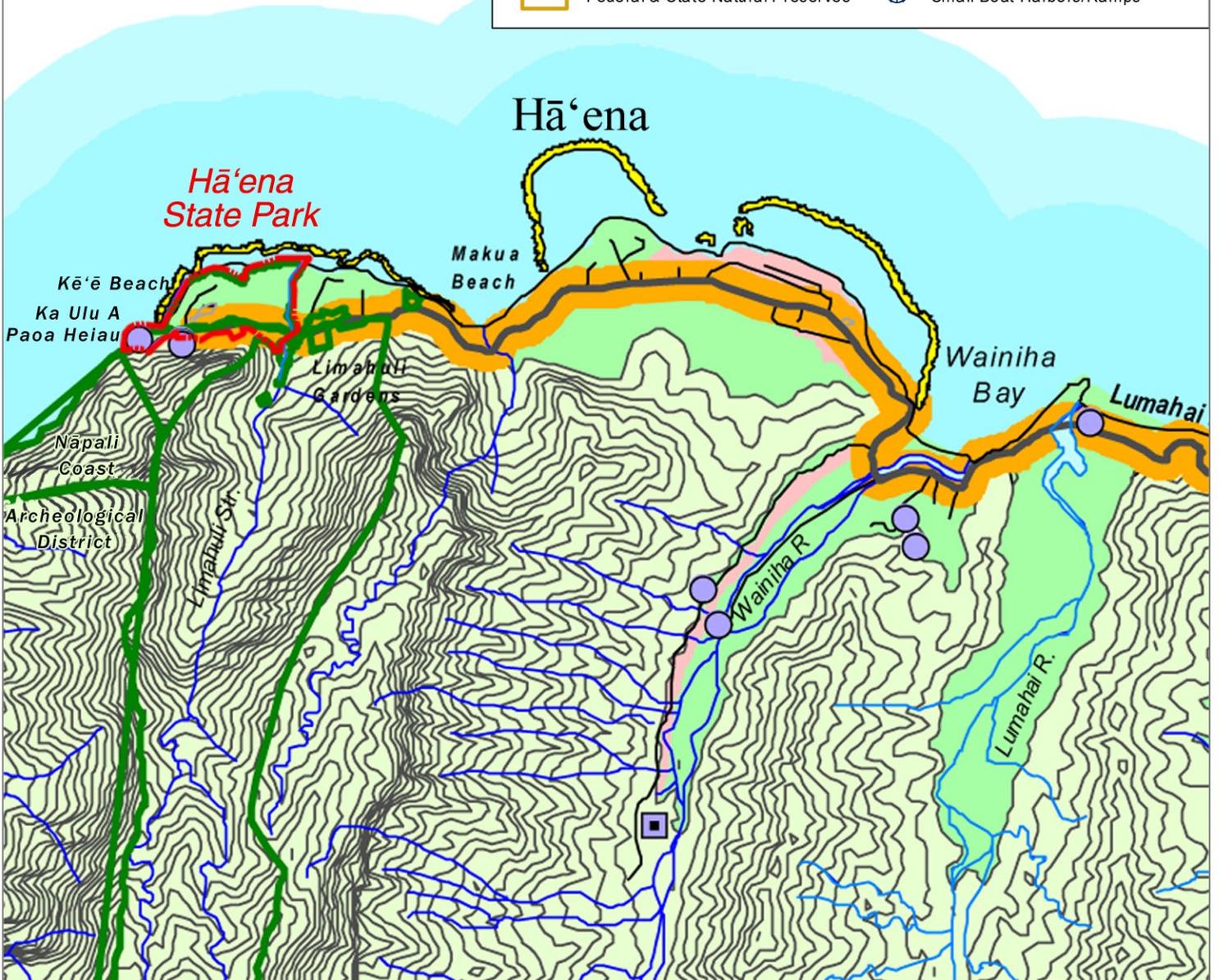
Linear Scale (Miles - Estimated)



Source: North Shore Planning District - Land Use Map
Disclaimer: This graphic has been prepared for general planning purposes only.

Legend

- | | | | |
|---|---|---|--|
|  | Important Land Form |  | Registered Archaeological Sites (excluding burials & lava tubes) |
|  | Open Space, Parks, Agriculture, Conservation |  | Heiau Site |
|  | Residential, Urban Center, Resort, Transportation, Military |  | Registered Historic Buildings & Structures |
|  | Streams, Reservoirs, Ponds |  | Other Important Historic Buildings & Structures |
|  | Scenic Roadway Corridors |  | Major Taro Growing Areas |
|  | Coral Reefs |  | Other Natural, Historic, Cultural, Scenic Features |
|  | Marshes |  | Special Streams |
|  | Resource Parks & Sites |  | Streams |
|  | Federal & State Natural Preserves |  | Small Boat Harbors/Ramps |



LEGEND

-  Hā'ena State Park Project Boundary

FIGURE 14

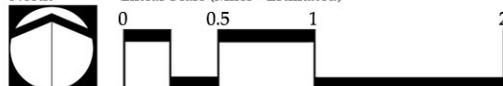
General Plan - Heritage Resources Map

HĀ'ENA STATE PARK

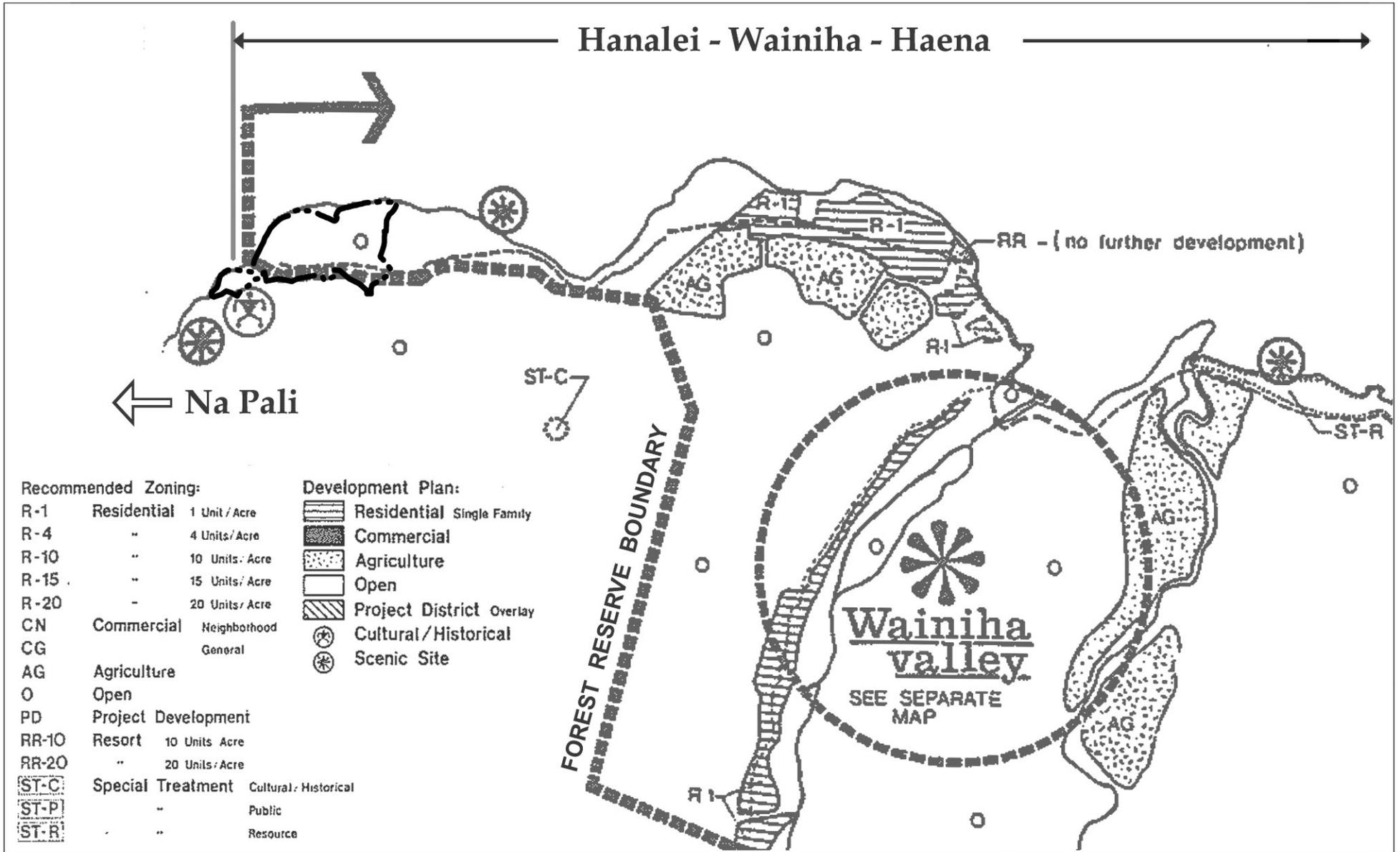
Department of Land and Natural Resources
North

Island of Kaua'i

Linear Scale (Miles - Estimated)



Source: North Shore Planning District - Heritage Resource
Disclaimer: This graphic has been prepared for general planning purposes only.
Incorrect or outdated Hawaiian spellings on source maps have not been corrected.



LEGEND

[Dashed Line] Hā'ena State Park Project Boundary

FIGURE 14

North Shore Development Plan Update

HĀ'ENA STATE PARK

Department of Land and Natural Resources

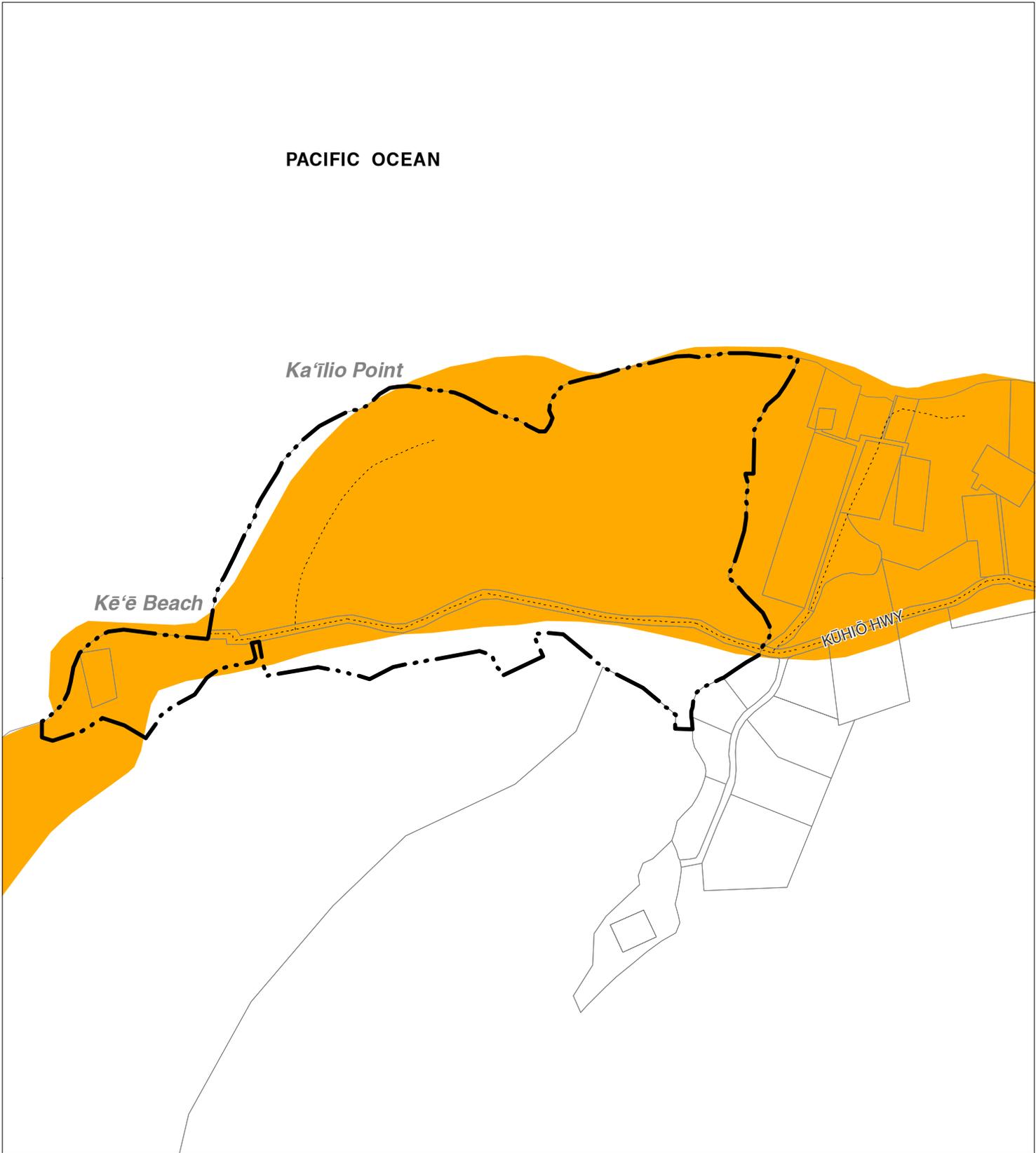
Island of Kaua'i

NORTH

LINEAR SCALE (Feet)



Source: Wilson Okamoto & Associates (1980)
 Disclaimer: This graphic has been prepared for general planning purposes only.
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

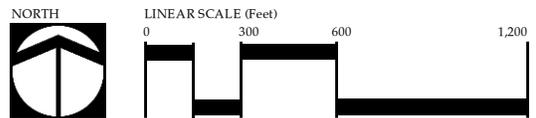


LEGEND

-  Hā'ena State Park Project Boundary
-  Road
-  Within the Special Management Area

FIGURE 16
 Special Management Area
HĀ'ENA STATE PARK

Department of Land and Natural Resources Island of Kaua'i



Source: County Planning Department (GIS, 2013)
 Disclaimer: This graphic has been prepared for general planning purposes only.

This page intentionally left blank.

4.0 DESCRIPTION OF THE AFFECTED NATURAL ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

This section describes the existing conditions of the physical or natural environment, potential impacts of the proposed Hā'ena State Park Master Plan on the environment, and the mitigation measures to minimize those impacts.

4.1 CLIMATE

Existing Conditions

In general, northeasterly trade winds, interrupted by the occasional large-scale storm, are present year round at Hā'ena. Nearby Wai'ale'ale receives an annual rainfall of approximately 450 inches per year. Due to the orographic effect (the process of moisture-laden northeasterly tradewinds lifting along windward slopes), Hā'ena receives an estimated 50-70 inches of rainfall annually (Blay and Siemers 2004). At Hā'ena State Park, it is higher at roughly 97 ± 2.5 inches on average per year (Giambelluca et al 2011).

Although no climatic data is officially collected for Hā'ena, the Western Regional Climate Center (a three-partner program with NOAA's National Climatic Data Center, the Regional Climate Centers and State Climate Offices) collects historic weather data at Wainiha, which can provide some generalities about climatic conditions along this stretch of Kaua'i's coastline. At Wainiha, the average annual temperature ranges between a high of 79.5 degrees to a low of 63.3 degrees Fahrenheit. While December through February are generally the coolest months, June through September are the warmest. Mean annual relative humidity ranges between 61 to 80 percent (NCDC 2009).

Surface winds are generally around 13 to 24 miles per hour from the northeast. There are some seasonal changes in prevailing wind direction in winter with southerly Kona winds. Strong winds occur at times in connection with storm systems moving through the area. Wind velocities and directions are influenced by the mountainous terrain to the south and west. Daily variations include diurnal effects of winds from the southwest quadrant during the night and morning hours, shifting to the northeast during the day.

Potential Impacts and Mitigation Measures

The proposed Master Plan is not expected to have an impact on climatic conditions and no mitigation measures are anticipated.

4.2 GEOLOGY AND TOPOGRAPHY

Existing Conditions

Approximately five million years in age, the Island of Kaua‘i is among the oldest islands of the Hawaiian archipelago. Originally thought to have been built from a single shield volcano, the island may in fact have been built primarily by the initial Nāpali formation of the Waimea (also Wai‘ale‘ale) shield volcano 4.35-5.1 million years ago with a possible second shield volcano building upon the eastern portion of the island after a catastrophic collapse of the eastern side of the original volcano. This second volcano, the Līhu‘e shield volcano, was active about a million years later and is believed to have been located in the area of the Līhu‘e Basin. The flows along the coast in the area of Hā‘ena are of the original Nāpali Member and have been dated between 4.27-4.36 million years old (Blay and Siemers 2004).

The Nāpali scarp’s dramatic 1,000-2,000 foot cliffs that stretch for over fourteen miles along the northwestern coastline are generally believed to represent a major structural failure of the original volcanic dome. However, there is a more recent theory that this formation may have been created mainly by wave erosion (Blay and Siemers 2004). According to Blay and Siemers (2004), this remains a geologic controversy but they believe it is probably a combination of both theories.

Kaua‘i’s post-erosional volcanic activity has largely been limited to the eastern portion of the island, leaving sedimentary processes as the major geological influence affecting the Hā‘ena State Park and Nāpali Coast.

Hā‘ena State Park sits at the western end of the Hā‘ena Plain, a coastal plain comprised of a basalt substrate covered by alluvial deposits along its mauka reaches and sandy beaches makai. Biogenic reefs, comprised mainly of coral and coralline algae, have grown like a “fringe” around the island. These reefs have provided skeletal matter for fragmentation, transport and deposition at the shoreline to produce sandy beaches (Blay and Siemers 2004).

During the Pleistocene epoch (0.126 to 2.558 million years ago), the Earth experienced large fluctuations in global sea level. Drops in sea level lowered the erosional baseline for streams, carving valleys and cliffs to steep grades. The lower sea level allowed for the deposition of calcareous and alluvial deposits, including calcareous dunes now lithified. These dunes run along the Park’s makai boundary and are a prominent feature along the existing beach.

Another geologic feature of note within the Park boundary is the variety of sea caves carved into the side of the mountain through natural processes. These caves were carved as a result of a rise in sea level during the Pleistocene, when existing lava tubes were enlarged by wave action. Currently, the valley flats are a result of alluvial fill from stream erosion and a decrease in sea level of five feet from its highest level.

The majority of Hā‘ena State Park lies on coastal plain formed by colluvial and alluvial deposition. The bulk of the Park area is at a ground elevation of between 10 and 30 feet above sea level. However, mauka of Kūhiō Highway, the land rises steeply into the Nāpali cliffs. A dune system parallels the shoreline while the area of the Park bound by the dunes and Kūhiō Highway is generally flat with hydrology that was altered by a pre-western contact ‘auwai. Figure 17 is a topographic map of Hā‘ena State Park.

As the land rises mauka of Kūhiō Highway, weathering has exposed rock formations and talus boulders pile up along the cliffs. Within the boundary of Hā‘ena State Park the cliffs rise to nearly 500 feet in elevation. Beyond the Park boundaries into the Nāpali Coast State Wilderness Park, the shoreline cliffs are over 1,000 feet in height.

Potential Impacts and Mitigation Measures

The proposed Master Plan will have no effect on Kaua‘i’s geology. Nor will it involve alteration to important geological features, such as the wet or dry caves within Hā‘ena State Park. To avoid impacts to the coastal dunes, the relocated lifeguard tower is proposed to be built up rather than excavated into the dunes. Further, the public will be encouraged to access the beach via trails, rather than crossing over the dunes.

4.3 SOILS

4.3.1 NATURAL RESOURCE CONSERVATION SERVICE

The U.S. Department of Agriculture’s Natural Resource Conservation Service (NRCS) *Soil Survey for the Island of Kaua‘i* identifies six different soil types for the Park, as shown in Figure 18, NRCS Soils. Descriptions of the soils from the *Soil Survey* are included below.

Mokuleia fine sandy loam (Mr) occurs on the eastern and northern coastal plains of Kaua‘i, and is nearly level. Below the surface, the soil has a profile similar to that of Mokuleia clay loam, which is characterized by dark-brown and light-gray, single-grain sand and loamy sand. Permeability is moderately rapid in the surface layer and rapid in the subsoil. Runoff is very slow, and the erosion hazard is slight. The available water capacity is about one inch per foot in the surface layer and 0.7 inch per foot in the subsoil.

Beaches (BS) occur as sandy, gravelly, or cobbly areas on all the islands in the survey area. They are washed and rewashed by ocean waves. The beaches at the Park consist mainly of light-colored sands derived from coral and seashells. Beaches have no value for farming. Where accessible and free of cobblestones and stones, they are highly suitable for recreational uses and resort development.

Marsh (MZ) consists of wet, periodically flooded areas covered dominantly with grasses and bulrushes or other herbaceous plants. It occurs as small, low-lying areas along the

coastal plains. Water stands on the surface, but marsh vegetation thrives. The water is fresh or brackish, depending on proximity to the ocean.

Hanalei silty clay, 0 to 2 percent slopes (HnA) is on stream bottoms and flood plains. In a representative profile, the surface layer, about ten inches thick, is dark gray and very dark gray silty clay that has dark brown and reddish mottles. The subsurface layer is very dark gray and dark gray silty clay about three inches thick. The subsoil, about 13 inches thick, is mottled, dark gray and dark grayish brown silty clay loam that has angular blocky structure. The substratum is stratified alluvium. The soil is strongly acid to very strongly acid in the surface layer and neutral in the subsoil. Permeability is moderate. Runoff is very slow, and the erosion hazard is no more than slight. The available moisture capacity is about 2.1 inches per foot of soil. Roots penetrate to the water table. Flooding is a hazard. This soil is used for taro, pasture, and sugarcane.

Hanalei silty clay, 0 to 6 percent slopes (HrB) has a profile like that of HnA (above) except that it has fewer mottles and the water table is at a depth of more than three feet. This soil is used for sugarcane, taro, pasture, and vegetables.

Rock outcrop (rRO) consists of areas where exposed bedrock covers more than 90 percent of the surface. It occurs on all five islands. The rock outcrops are mainly basalt and andesite. This land type is gently sloping to precipitous. This land type is not suited to farming. It is used for water supply, wildlife habitat, and recreation.

4.3.2 LAND STUDY BUREAU DETAILED LAND CLASSIFICATION

The *Detailed Land Classification, Island of Kaua‘i* by the University of Hawai‘i Land Study Bureau (LSB) document classifies non-urban land by a five-class productivity rating system, using the letters A, B, C, D and E, where “A” represents the highest class of productivity and “E” the lowest. The entire Hā‘ena State Park is classified as “E”, or “Very Poor” according to this land rating system (Figure 19, Land Study Bureau Classifications).

4.3.3 AGRICULTURAL LANDS OF IMPORTANCE TO THE STATE OF HAWAI‘I

The State of Hawai‘i Department of Agriculture’s Agricultural Lands of Importance to the State of Hawai‘i (ALISH) system rates agricultural land as “Prime,” “Unique” or “Other.” The remaining land is not classified.

“Prime” agricultural land is best suited for production of food, feed, forage and fiber crops. The land has the soil quality, growing season and moisture supply necessary to economically sustain high yields of crops when treated and managed including water management, according to modern farming methods.

“Unique” agricultural land can be used for specific high-value food crops. The land has a special combination of soil quality, growing season, temperature, humidity, sunlight, air drainage, elevations, aspect, moisture supply, or other conditions that favor the production of

a specific crop of high quality and/or high yield when the land is treated and managed according to modern farm methods.

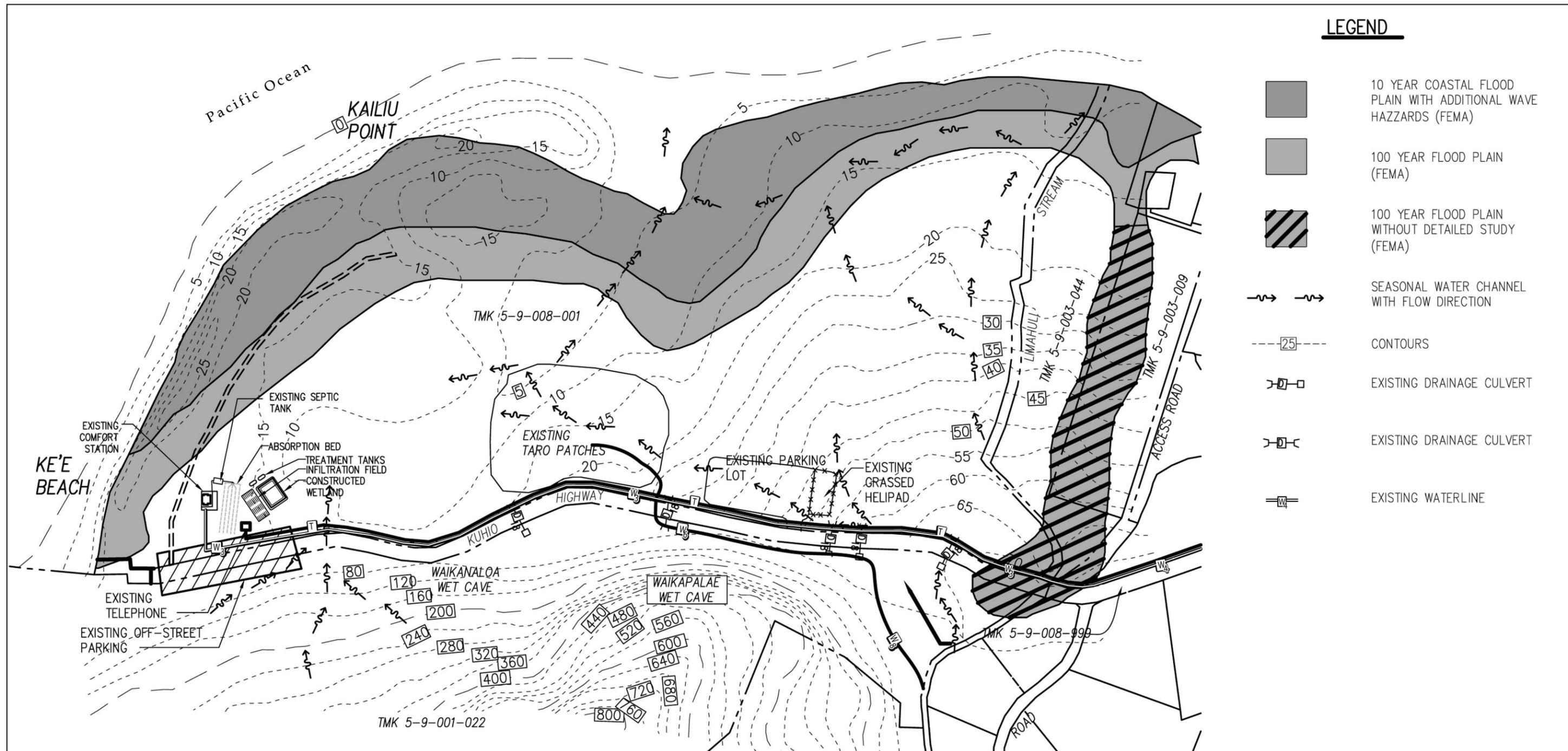
“Other” agricultural land is vital to production of food, feed, fiber and forage crops, yet they exhibit properties that are not ideal, such as seasonal wetness, erosion, limited rooting zone, slope, flooding, or drought. The land can be farmed satisfactorily through greater fertilization and other soil amendment, drainage improvement, erosion control practices, and flood protection and can produce fair to good crop yields when properly managed.

See Figure 20, Agricultural Lands of Importance, which shows that the dune system, and soils associated with wetlands are “Unclassified” while the portions of the Park interior are identified as “Prime” and the majority of the Park land area is classified as “Other.”

Potential Impacts and Mitigation Measures

Impacts to soils, such as soil erosion can occur during construction and during the life of a development. Sediment from soil erosion can negatively impact freshwater habitat in streams and can smother coral reefs. Minimal site disturbance is proposed, primarily due to the high possibility of encountering subsurface archaeology. However, this also minimizes the risk of soil sedimentation, both during construction and long term. During construction, the primary mitigation measure under consideration is the employment of appropriate best management practices for soil and erosion control. Long term soil and erosion control measures have also been designed into the Master Plan. For instance, a bioswale is proposed to receive stormwater runoff from the parking area adjacent to the ECC. Bioswales allow sediment to settle out of stormwater before it enters site drainages and streams.

This page intentionally left blank.



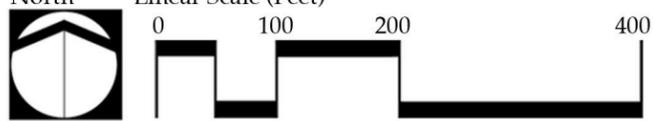
LEGEND

-  10 YEAR COASTAL FLOOD PLAIN WITH ADDITIONAL WAVE HAZZARDS (FEMA)
-  100 YEAR FLOOD PLAIN (FEMA)
-  100 YEAR FLOOD PLAIN WITHOUT DETAILED STUDY (FEMA)
-  SEASONAL WATER CHANNEL WITH FLOW DIRECTION
-  CONTOURS
-  EXISTING DRAINAGE CULVERT
-  EXISTING DRAINAGE CULVERT
-  EXISTING WATERLINE

FIGURE 17
Topography and Drainage Map
HĀ'ENA STATE PARK

Department of Land and Natural Resources
 North Island of Kaua'i

Linear Scale (Feet)



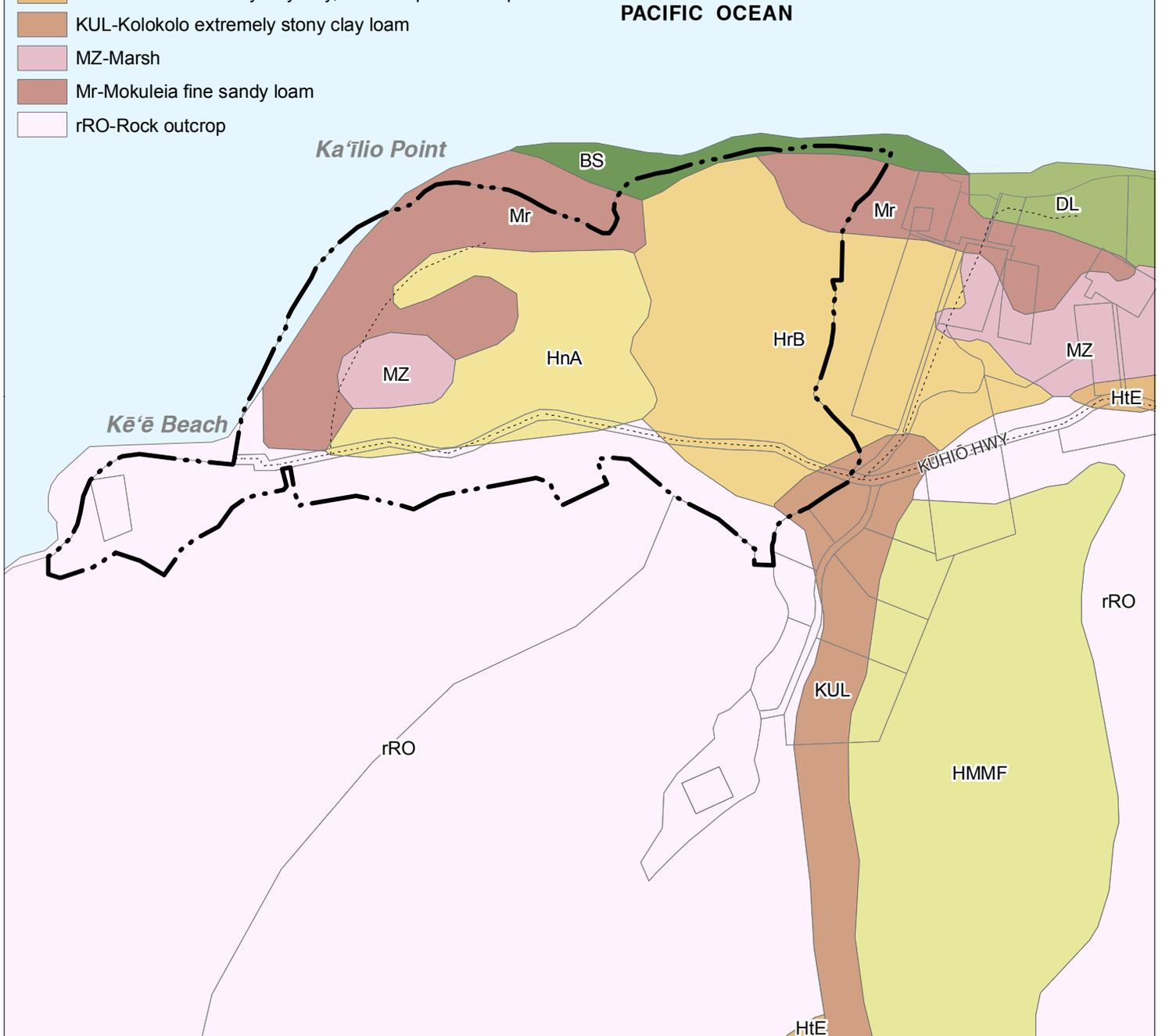
PBR HAWAII & ASSOCIATES, INC.

Source: Kennedy Jenks Engineers (January, 2001) Figure 3
 Disclaimer: This Graphic has been prepared for general Planning purposes only and should not be used for boundary Interpretations or other spatial analysis.

This page intentionally left blank.

Legend

- BS-Beaches
- DL-Dune land
- HMMF-Hihimanu silty clay loam, 40 to 70 percent slopes
- HnA-Hanalei silty clay, 0 to 2 percent slopes
- HrB-Hanalei silty clay, deep water table, 0 to 6 percent slopes
- HtE-Hanamaulu stony silty clay, 10 to 35 percent slopes
- KUL-Kolokolo extremely stony clay loam
- MZ-Marsh
- Mr-Mokuleia fine sandy loam
- rRO-Rock outcrop



LEGEND

- Hā'ena State Park Project Boundary
- Road

FIGURE 18
NRCS Soils

HĀ'ENA STATE PARK

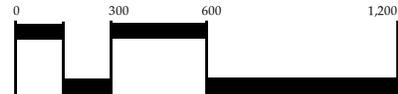
Department of Land and Natural Resources

Island of Kaua'i

NORTH



LINEAR SCALE (Feet)

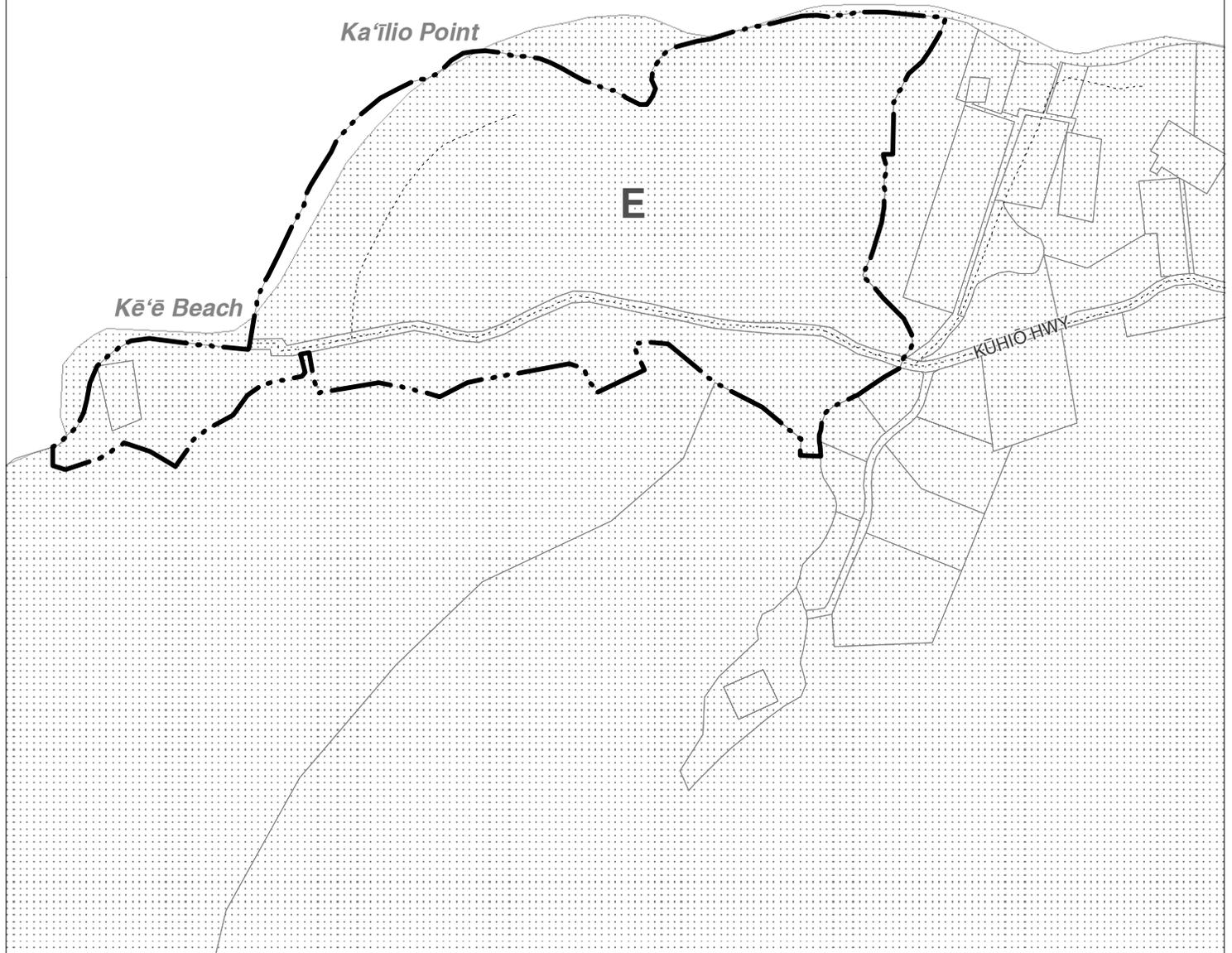


Source: County Planning Department (GIS, 2008)
Disclaimer: This graphic has been prepared for general planning purposes only.

AG Land Productivity Ratings

-  A - Excellent
-  B - Good
-  C - Fair
-  D - Poor
-  E - Very Poor
-  Not Classified

PACIFIC OCEAN



LEGEND

-  Hā'ena State Park Project Boundary
-  Road

FIGURE 19

Land Study Bureau Classifications

HĀ'ENA STATE PARK

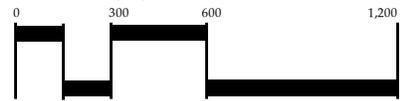
Department of Land and Natural Resources

Island of Kaua'i

NORTH

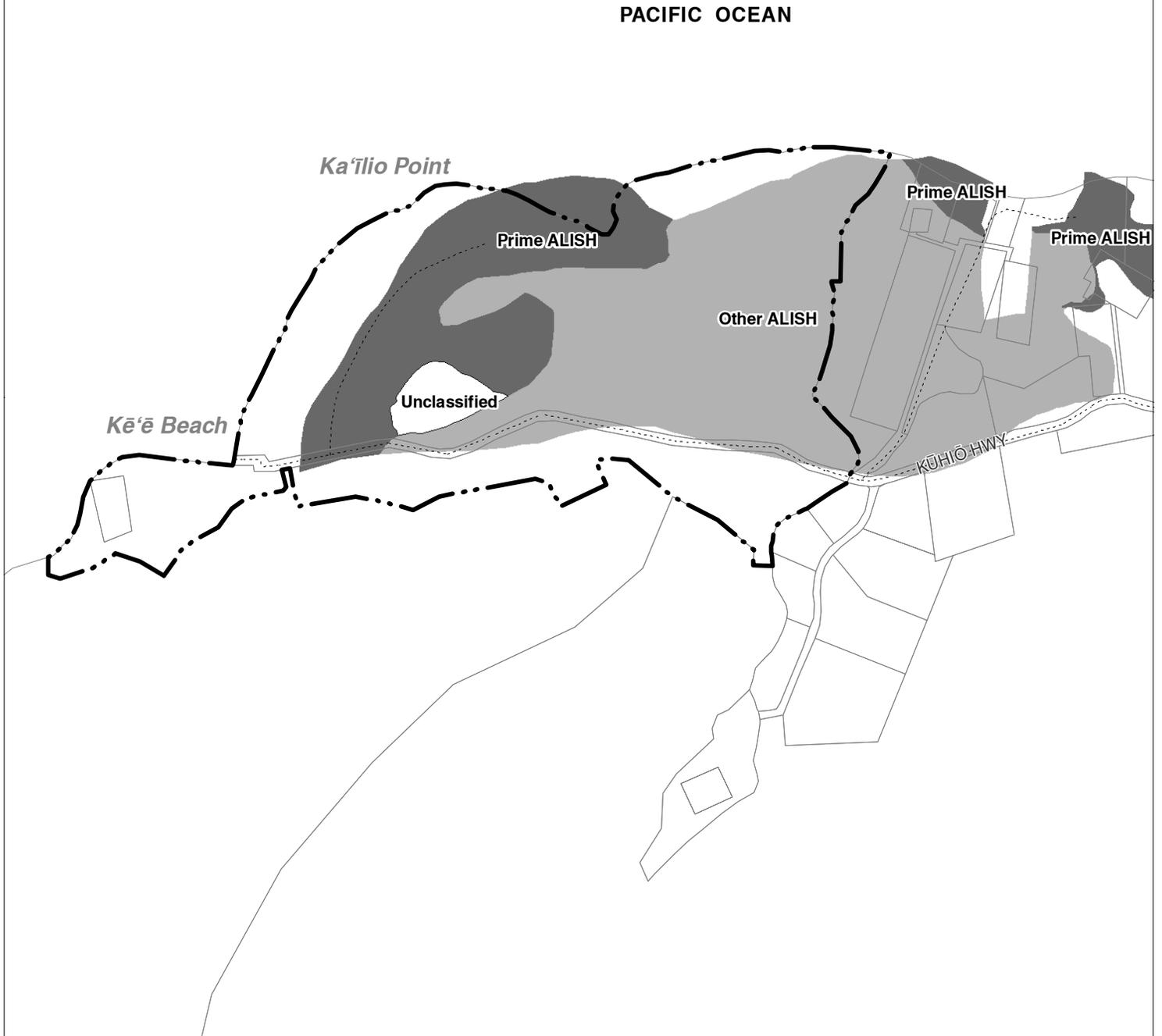


LINEAR SCALE (Feet)



ALISH Classification

-  Prime ALISH
-  Unique ALISH
-  Other ALISH
-  Unclassified



LEGEND

-  Hā'ena State Park Project Boundary
-  Road

FIGURE 20

Agricultural Lands of Importance

HĀ'ENA STATE PARK

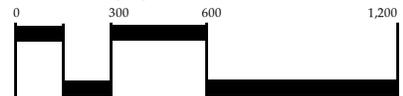
Department of Land and Natural Resources

Island of Kaua'i

NORTH



LINEAR SCALE (Feet)



Source: State Department of Agriculture
 Disclaimer: This graphic has been prepared for general planning purposes only.

4.4 GROUND AND SURFACE WATER

4.4.1 GROUND WATER

Existing Conditions

The dominant water resources on each of the Hawaiian Islands are volcanic rock aquifers. There are four general types of groundwater, dike, perched, unconfined basal and confined basal. Especially on Kaua‘i, perennial streams fed by groundwater springs are common. The groundwater resource beneath Hā‘ena State Park is basal water floating on salt water (UH Department of Geography 1983). However, due to the presence of a discontinuous, unmapped confining layer, the nature and extent of the basal ground water lens is not well understood (Wilson Okamoto 2008). Further mauka, beneath the Nāpali mountains, the water is confined by dikes and not floating on salt water (UH Department of Geography 1983). According to the DLNR Commission on Water Resource Management’s (CWRM) Water Resource Protection Plan, Hā‘ena State Park is located within the Wainiha System (Hanalei Sector), which has an estimated sustainable yield of 24 million gallons per day (gpd) (Wilson Okamoto 2008).

Potential Impacts and Mitigation Measures

On-site wastewater disposal can have the potential to impact groundwater resources if not treated. The Master Plan recommends that, as a potential mitigative measure to ensure groundwater *quality*, all wastewater be treated to a minimum “R-2” water quality with aeration and non-chlorine treatment such as UV disinfection to improve effluent quality. Also, under consideration is the use of non-chemical disinfectants and cleaning products for maintenance, particularly in composting toilets, to minimize impacts to wastewater treatment processes and effluent quality. No withdrawals of groundwater are proposed, thus, no mitigation measures to off-set groundwater *quantity* are anticipated.

4.4.2 SURFACE WATER

Existing Conditions

Surface water resources in Hā‘ena State Park include Limahuli Stream, water in the two wet caves, and Loko Kē‘ē located makai of Kūhiō Highway. There is also an extensive ‘auwai system that irrigated the lo‘i up until recent times when it was actively cultivated. It still exists in parts and there is a strong desire among community members to restore it wherever possible in conjunction with the restoration of the lo‘i. The *Hawai‘i Stream Assessment* (1990) lists Limahuli Stream as a perennial stream that flows to the sea year-round and identifies it as an “outstanding aquatic resource” due to the presence of native ‘O‘opu. The source of freshwater within Hā‘ena State Park begins at the top of the valley at 3,300 feet above sea level and reaches the valley floor after plummeting down an 800-foot waterfall. Only the lower 1,500 feet of the stream courses through Hā‘ena State Park.

The *Atlas of Hawaiian Watersheds and their Aquatic Resources* (Parnham, James E., Higashi, Glenn R., et al., 2008) acknowledges the protection Limahuli Stream enjoys due to its Conservation designation and location primarily within Limahuli Preserve, managed by the National Tropical Botanical Garden. The Atlas also documents that previous studies have identified the presence of native species and confirmed few introduced genera.

In October 2001, Mike Kido with the University of Hawai‘i’s Hawai‘i Stream Research Center produced an overview of the existing conditions, flora, and fauna in Limahuli Stream. Kido reported that between 1994 and 1999, average stream flow was approximately 6.3 million gpd. In drought periods, average surface flow is approximately 2.6 gpd. According to U.S. Geologic Survey’s Annual Statistics for Hawai‘i, for the period of 1999-2005 the average surface flow was 7.72 gpd.

Limahuli Stream water is diverted for irrigation and residential purposes by multiple landowners. According to the CWRM, there were seven separate diversions from Limahuli Stream, six of which are still active. Of the six active diversions, three supply Limahuli Garden and Preserve and three serve private residences. A portion of the water diverted for Limahuli Garden is conveyed to the lo‘i at Hā‘ena State Park by PVC pipe. Two of the diversions serve domestic uses and the rest are for agricultural, landscaping, or other irrigation purposes. The total diversion amount for five of the diversions is 0.8822 cubic feet per second (cfs), or just over 570,000 gpd. The amount diverted for one of the private residences is unknown. Table 6 provides a summary of the registered diversions from Limahuli Stream.

TABLE 6
REGISTERED DIVERSIONS FROM LIMAHULI STREAM

Diversion Diameter	Operator	Quantity Diverted (cfs)	Water Use
3” pipe	National Tropical Botanical Gardens	0.00203	Irrigation
1.5” pipe	National Tropical Botanical Gardens	0.44557	Irrigation
6” pipe	National Tropical Botanical Gardens	0.3342	Agriculture, Landscaping, Irrigation
Pipe (diameter unknown)	Private Residence	0.0892	Domestic, Irrigation
2” pipe	Private Residence	0.0112	Agriculture, Landscaping, Irrigation
5” pipe	Private Residence	Unknown	Domestic
TOTAL		0.8822	
Source: CWRM (2011)			

Potential Impacts and Mitigation Measures

The Master Plan does not propose any additional water diversions or change to the volume of water currently diverted from Limahuli Stream for irrigation.

The Master Plan suggests investigating the potential of Limahuli Stream waters as a source of energy through microhydro energy production. Should any new or increased diversion of water from Limahuli Stream be desired, permits may be required from the CWRM, as described in the pre-consultation response letter dated August 25, 2008 (Appendix B). CWRM permits that may be required include: Stream Channel Alteration Permit; Stream Diversion Works permit and/or a Petition to Amend In Stream Flow Standards.

It is anticipated that the volume of water diverted from the stream for microhydro use would be sufficient to operate a microhydro facility without discernably impacting stream flows. It is also anticipated that any water diverted from the stream for microhydro use will be returned to the stream after passing through the hydroelectric system, avoiding any effect on the volume of water in the stream. A microhydro system requires a consistently running source of water (as little as two gallons per minute) and a relatively small elevation change (as little as two to three feet of head) to turn a turbine to create power. However, more of each will increase output. Microhydro systems are more efficient the closer they are to the energy source. Neighboring Limahuli Gardens uses a micro hydro system to power their entire visitor center which runs on a 24V system and includes lights, a computer and cash register (Winter, personal communication 2011).

Mitigation measures under consideration to ensure that the Park elements do not contribute to the degradation of surface water resources include bioswales around the parking lot to filter stormwater before it is conveyed to drainages and use of rain barrels to collect roof runoff.

Further investigation will be necessary prior to detailed design of the parking lot to see if the ‘auwai can be restored to serve the lo‘i without extreme requirements or cost. If it is found that it can be restored, the grading and landscaping of this area should be done so that stormwater runoff from the parking lot is diverted away from the ‘auwai and directed to flow across the grassed areas of the parking lot or bioswales and adjacent landscaped areas, which could be designed as rain gardens.

Pedestrian paths throughout the parking lot and drop-off/pick up areas should be surfaced with permeable pavers or pavements or natural soil hardeners to increase rainwater infiltration while providing a stable, ADA-accessible surface. The proposed surface for the near-term visitor parking lot and the Kē‘ē special access parking area is permeable pavement or structural grass over the entire parking lot or at least half of the parking lot so it can be used for multiple purposes. This will stabilize the area while allowing rainwater to infiltrate the soils to prevent ponding and soil erosion.

During construction of park elements, best management practices to control sediment or polluting runoff from flowing into waterways will be employed. Certain construction activities within the Park may trigger the need for a National Pollutant Discharge Elimination System permit.

4.5 WETLANDS

Existing Conditions

Throughout the Park there are areas designated as wetlands by the USFWS National Wetlands Inventory (NWI), which uses best available data. They are primarily created through aerial photography interpretations and, while they cannot provide a definite wetland boundary for construction or regulatory purposes, they are useful for guidance when evaluating an area's suitability for development or uses.

The primary designation, PFO3C, covers most of the interior areas behind the dunes and makai of the highway. PFO3C is a palustrine (inland, non-tidal) wetland that is forested with broad-leaved evergreen vegetation and is seasonally flooded. The PEM1C wetland type is mapped over Loko Kē'ē and east of the parking area. These areas are palustrine (inland), persistently emergent (characterized by hydrophytic plants) and seasonally flooded.

Along and off the coast are several classifications of marine wetlands. M1RFL is the predominant offshore classification indicating a subtidal (permanently submerged below tidal waters) marine wetland with coral reefs. Along the narrow splash zone of the coast are two different intertidal marine wetlands – M2USN (unconsolidated shores that are regularly flooded at least once daily such as beaches and flats) and M2RSN (rocky shorelines that are regularly flooded by tidal waters). Within the two broader beach areas are M2USP wetlands which are intertidal, unconsolidated shorelines that are irregularly flooded (less than daily). Limahuli Stream is classified as an upper perennial (high gradient with fast water velocity) riverine system with a rocky bottom that is permanently flooded (R3RBH).

In October 2008, a wetland delineation study was prepared by AECOS, Inc. for the renovated comfort station's individual wastewater system (constructed wetland) project. AECOS interpreted the western edge of the PFO3C wetland to be a former pond wall (thought to be the edge of Loko Kē'ē). However, in their June 15, 2009 letter¹, the U.S. Army Corps of Engineers (USACOE) determined that the wetland did not extend as far as the wall and recommended that any work performed fifteen feet east of the wall require a new wetland determination study. The new study would also require a new determination by the USACOE. The AECOS wetland delineation study and USACOE determination letter are documented in the Final Environmental Assessment for the Hā'ena State Park Individual Wastewater System Improvements.

¹ USACOE File Number POH-2009-00067.

Presently, ongoing management of the wetlands is limited to the stocking of the surface water with mosquito guppies as a vector control measure (Juran, personal communication).

Figure 21 compiles the approximate NWI wetland boundaries from the State GIS files, the AECOS wetland survey map from their report and the recommendation from the USACOE.

In the biological report prepared by Geometrician Associates, two of the eleven zones were identified as wetland-related: “Marsh/Pond and Marsh/Cultivated Zones” and “Hau swamp and Hau Forest Zones.”

Potential Impacts and Mitigation Measures

No development is proposed within known wetlands. However, because NWI maps are non-regulatory and do not represent a precise delineation of wetlands, State Parks will need to carefully evaluate the layout of proposed improvements to ensure that wetlands are avoided. If it appears that water, hydric soils or wetland plants are present in the vicinity of proposed construction or grading activity, a wetlands delineation study will be conducted to locate the boundary of the resource and verification from the USACOE will be sought.

Some members of the MPAC expressed a desire to restore the loko and wetland areas (Loko Kē‘ē and Loko Naia) for endangered native birds and possible agricultural uses. Geometrician Associates believe it might be possible to restore the small wetlands on the property for the purpose of creating a native bird habitat. However, they do not recommend modifying these areas specifically to attract endangered birds for practical and legal reasons. However, if this is pursued, there are several management requirements to be considered, some of which are outlined below.

- Consult and coordinate with state and federal agencies to determine best course of action for improvements and ongoing management of the Park for endangered animal species.
- State Parks must enter into a “Safe Harbor Agreement” prior to undertaking the habitat improvement. This is a voluntary arrangement between the USFWS and a cooperating non-federal landowner under the authority of Section 10(a)(1) of the Endangered Species Act of 1973, 16 U.S.C. 1536(b)(4), 1539(a)(1). Under the Safe Harbor Agreement and an associated enhancement of survival permit, the non-federal property owner implements actions that will result in a net conservation benefit for species listed under the Act without the risk of further restrictions pursuant to section 9 of the Act, which prohibits take of listed species. The property owner also receives assurances related to modifications of the SHA or termination of the permit. Such agreements allow a landowner to promote threatened and endangered species on their property without liability for incidental takes that may occur.
- The wetlands should be protected through fringing vegetation that encourages viewing but discourages direct entry and possibly fencing shielded by the landscaping to help minimize access by predators. This would reduce the potential for endangered

birds to be harassed, injured or killed directly or indirectly by people or their pets due to the wetlands' proximity to the main entrance.

Restoration of the loko is expected to be beneficial to the environment, thus, no mitigation measures are anticipated at this time.

No diversion or use of the surface waters present in the Park's wetlands is proposed.

4.6 MARINE ENVIRONMENT

Existing Conditions

In 2008, SWCA Environmental Consultants investigated the existing marine conditions at Hā'ena State Park. The subsequent report (SWCA 2010) analyzed the adjacent nearshore waters around Kē'ē Beach and is attached as Appendix E. As part of the initial Master Planning efforts, a beach and ocean recreation study for Hā'ena State Park was prepared for DLNR by John Clark in 1992. In addition to analyzing potential recreational opportunities and constraints, the study also provides a description of the nearshore marine environment including the reefs that fringe the Hā'ena coastline (Figure 22). The SWCA report included a review of Clark's 1992 report and provided updates to Clark's findings where necessary.

Hā'ena State Park is located in the Ka'ilio shoreline sub-section of Hā'ena. Three outlets bisect the beach within the Park boundaries—Limahuli Stream, a small intermittent tributary stream, and several freshwater seeps.

Ocean conditions in the Park are typical of northern exposed coasts in Hawai'i which can experience dangerously high surf conditions primarily during winter months. Between October and May, swells can be in excess of ten feet at Hā'ena, but during summer months when trade wind swells typically dominate, the surf is generally reduced (Clark 1992). Recent observations show that many of the tree roots along the shoreline have become exposed due to erosion from wave action (SWCA 2010).

According to SWCA, northeast trade winds are present between 90-95 percent of the year and almost always generate some surf activity on the outer reef margins. Predominant longshore currents run east to west outside the reef. Add high surf conditions to these currents and a powerful rip current can be generated that runs out of the narrow channel at the west end of Kē'ē Lagoon to the open ocean, creating a hazard for swimmers and divers (SWCA 2010). Previous studies found tidal currents ranging from 0.1 to 1.0 knots, and Clark (1992) suggested that such current velocities were not usually a concern for nearshore ocean recreation activities. However, lifeguards at Kē'ē Beach strongly objected to SWCA biologists' plan to conduct snorkel surveys of the outer reef in November 2008 even during a day with unusually calm conditions (SWCA 2010).

Between Kē'ē Beach and Limahuli Stream, the beach is the widest and extends up to 150 feet mauka. The edge of the beach is lined with false kamani and ironwood trees. The area

between Hā'ena Point and Kē'ē Beach is backed by low sand dunes roughly four to eight feet high. Growth of these sand dunes is limited due to the presence of introduced tree stands. Clark noted a continued recession of the existing shoreline based on historical photo analysis of the region since the 1920s.

Since Clark's inventory, the University of Hawai'i, School of Oceanography and Earth Science and Technology (SOEST) has further studied beach erosion. Depending upon the location along the shoreline at Hā'ena State Park, SOEST has found different transects along the beaches to be eroding at a rate of between less than six inches per year to as much as one foot per year. See Figure 25.

The major swimming area in Hā'ena State Park is Kē'ē Lagoon which is a large sand pocket protected by the surrounding platforms of fringing reef. SWCA found that much of Clark's description of the reef in 1992 still remains accurate in 2008. "Sand and reef pavement comprise the dominant marine geomorphologic structures between Kē'ē Beach and Maninihola Bay to the east. From Maninihola Beach west to Hā'ena Point the reef consists of aggregate reef, scattered coral and rock, and rubble with small patches of reef pavement. The reef pavement is covered with "macro-algae, coralline algae, and corals; however, the sandy lagoon floors and channels are uncolonized" (SWCA 2010). Live coral cover in Kē'ē Beach ranges between 4 and 47 percent in some areas due to the large amount of visitor traffic. There are a variety of inshore reef species in addition to macroinvertebrates, algae, and live coral species (SWCA 2010).

The State DOH has designated the offshore marine waters of Hā'ena with a Class AA rating which recognizes the area's significant ecological and recreational value (Figure 24). The Class AA waters are bounded by areas less than 18 meters (60 feet) in depth. Uses to be protected in this class of waters include oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment.

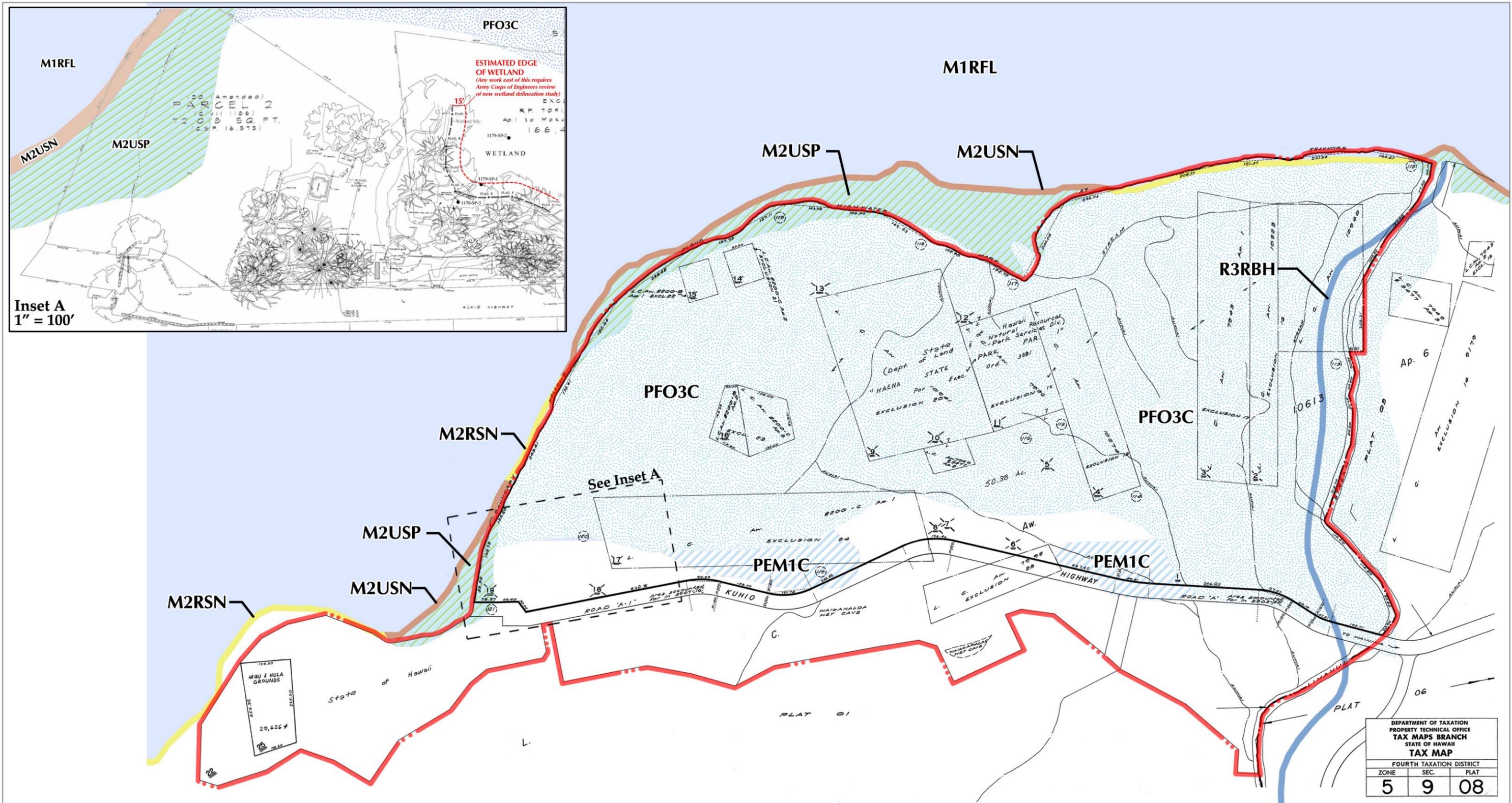
Based on initial samples collected in 2005-2006, the DOH (2008) found that state standards for Class AA waters for enterococci and coliform were attained at Kē'ē Lagoon. State standards for Class AA waters were also attained at Hā'ena State Park for temperature, salinity, dissolved oxygen, pH, and turbidity (SWCA 2010).

Potential Impacts and Mitigation Measures

In general, the Master Plan will have no additional negative impact on the natural marine processes, such as wind and currents. However, because the Master Plan proposes a limit on the number of visitors to the Park per day, the improvements and management strategies will have a net positive impact on some aspects of the Park's marine environment, including the water quality and health of the coral reef.

A variety of potential management measures are under consideration to maintain Class AA coastal water standards and prevent shoreline erosion. To address the marine water quality, the Master Plan recommends control of stormwater runoff and sewage seepage or spillage into the ocean, prevention of soil erosion, and encouraging ocean-friendly visitor behavior. Shoreline erosion can be slowed or halted by allowing natural tidal, current and wind processes to shape Hā'ena's shoreline. Measures under consideration to accomplish this goal include studying Hā'ena's specific natural dune building processes, restoring or removing vegetation, compliance with the County of Kaua'i's shoreline setback standards, and prohibition of shoreline protection structures.

This page intentionally left blank.



LEGEND

- - - - - Project Boundary
- - - - - Estimated Edge of Wetland (USACOE)
- Wetland Boundary (AECOS, Inc.)

NATIONAL WETLAND INVENTORY

- Estuarine and Marine Wetland (M2USP)
- Estuarine and Marine Wetland (M2USN)
- Estuarine and Marine Wetland (M2RSN)
- Freshwater Emergent Wetland (PEM1C)
- Estuarine and Marine Deepwater (M1RFL)
- Freshwater Forested/Shrub Wetland (PFO3C)
- Riverine (R3RBH)

FIGURE 21
Wetlands
HA'ENA STATE PARK
Department of Land and Natural Resources
Island of Kauai



Source: AECOS, Inc. (October 31, 2008)
Dept. of Army, Corps of Engineers letter (File Number POH-2009-00067, June 15, 2009)
U.S Department of the Interior, Fish and Wildlife Service (GIS)
Disclaimer: This graphic has been prepared for general planning purposes only.
Incorrect of outdated Hawaiian spellings on source map have not been corrected.

This page intentionally left blank.



LEGEND

--- Hā'ena State Park Project Boundary

FIGURE 22
Reef Environment and Surf Breaks
HĀ'ENA STATE PARK

Department of Land and Natural Resources
 North
 Linear Scale (Feet)

0 300 600 1,200

Island of Kaua'i

Source: SWCA Environmental Consultants (2009)
 Disclaimer: This graphic has been prepared for general planning purposes only.

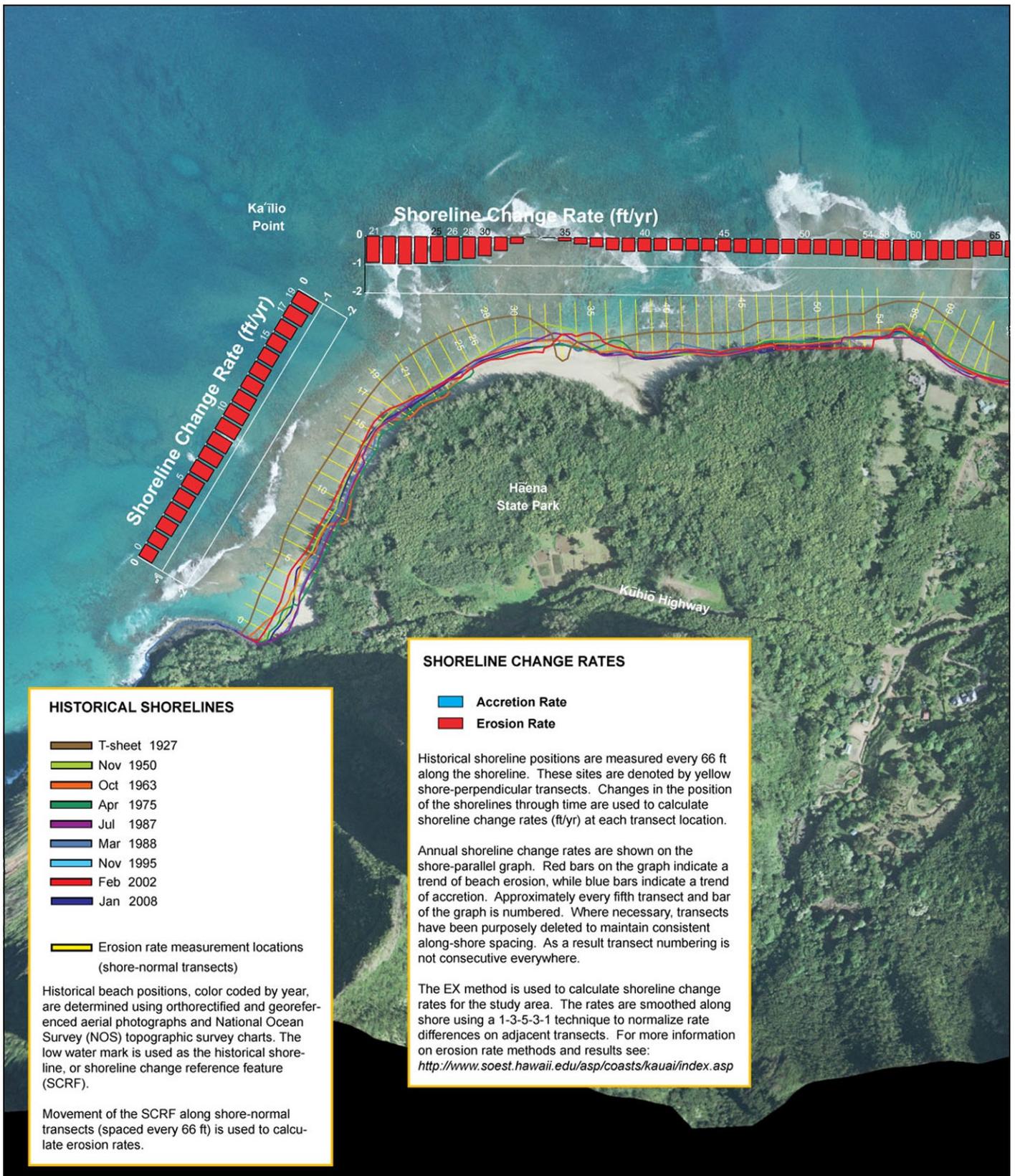
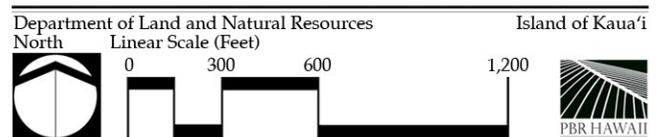
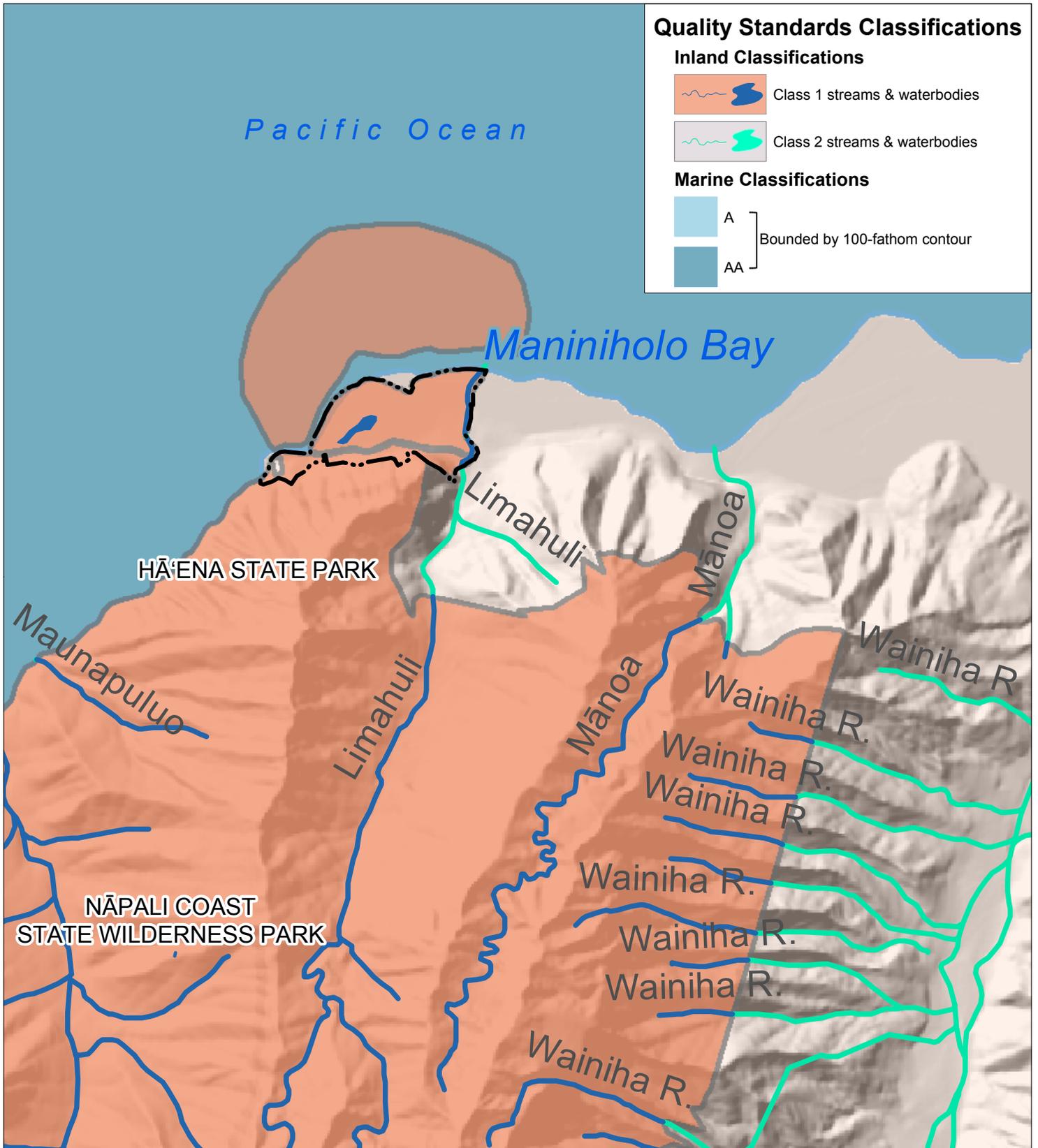


FIGURE 23
SOEST Shoreline Erosion Rates
HĀ'ENA STATE PARK



Source: University of Hawaii School of Ocean and Earth Science and Technology (2008)
 Disclaimer: This graphic has been prepared for general planning purposes only.
 Diacriticals have been added to Hawaiian place names.

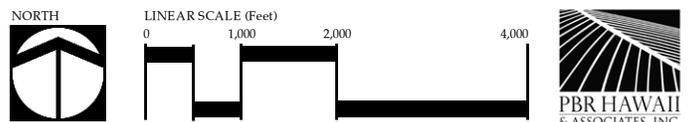


LEGEND

--- Hā'ena State Park Project Boundary

FIGURE 24
DOH Water Quality Standards Map
HĀ'ENA STATE PARK

Department of Land and Natural Resources Island of Kaua'i



Source: Hawaii Department of Health (June 2014)
Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.

4.7 MARINE BIOLOGICAL RESOURCES

Existing Conditions

The nearshore waters of Hā‘ena are known for their abundance of marine life. The plant and animal life of Hā‘ena’s waters provided sustenance for the ahupua‘a and have become an attraction for sport fishers and snorkelers. Historically, Hā‘ena is particularly known for abundant limu kohu (*Aparagopsis taxiformis*) and a large population of octopus (*Octopus vulgaris* and *Octopus ornatus*).

In 1999, Carl Stepath and Save our Seas compiled a variety of studies and found that fish populations in Kē‘ē were not as abundant as in other areas. During the survey, approximately 40 species of fish were identified by divers. However, in neighboring Hanalei Bay, approximately 160 species of fish were identified. The majority of fish observed in the Hā‘ena study areas were in their juvenile stage which indicates Kē‘ē is an important nursery area for native fish species.

Endangered Hawaiian monk seals (*Monachus schauinslandi*) or ‘īlio-holo-i-ka-uaua, “the dog who runs in the sea,” are frequently observed at Hā‘ena State Park. The honu, or green sea turtle (*Chelonia mydas*), is listed as threatened under the Endangered Species Act and are known to graze upon algae in shallow nearshore reef waters around the north shore of Kaua‘i, including the waters of Hā‘ena State Park. Although no evidence of turtle nests were reported in SWCA’s survey, the sandy beaches within Hā‘ena State Park are suitable for sea turtle nesting, and the possibility of a future turtle nesting there cannot be dismissed (SWCA 2010). See Appendix E.

Potential Impacts and Mitigation Measures

Marine biological resources in the Park are expected to be positively impacted by the proposed Master Plan. State Parks is proposing to limit the number of people in the Park to 900 people per day. The proposed visitor limit of 900 people per day is approximately *half* of the current number of visitors per day during the summer. This number is an initial visitor limit which State Parks may adjust over time depending on future improvements, improved/increased maintenance, and/or other studies such as impact studies, particularly if harmful impacts to the natural, cultural and archaeological resources arise.

Additionally, as described in Section 2.5.3, it is recommended that all visitors attend an educational session that would provide a brief overview of the Park’s extensive but sensitive natural and cultural resources and instruct visitors of the appropriate activities and behaviors allowed at the Park. Such a significant reduction in visitor use and better education on the Park’s resources will have a net positive impact for the Park’s flora.

Marine species, including coral and the fishes and invertebrates that live in coral reef environments are sensitive to land-based polluted runoff (Wilkinson and Brodie 2011). Thus, the Master Plan includes potential measures to minimize polluted runoff. One minimization measure under consideration is to reduce the number of motor vehicles driving the length of

Kūhiō Highway and idling and turning around at Kē‘ē Beach. Currently, there is no limit to the number of vehicles entering the Park. Vehicle counts conducted by Austin Tsutumi and Associates in 2008 found that on a holiday weekend in October, an average of 780 vehicles enter the Park daily. The Master Plan recommends that the total number of vehicles be reduced, and that of the vehicles entering the park, only special access vehicles such as those needing ADA access and lifeguards will be permitted to proceed to Kē‘ē via the limited access corridor. Land-based pollution will be further minimized through the installation of bioswales around the parking areas to capture sediment and pollutants that might run off this surface. Cisterns (rain barrels) will also be employed to catch rain water that sheds off the roof of the ECC. This water is planned for irrigation re-use, creating an opportunity for remediation of any pollution on-site.

Pollution of marine resources is proposed to be further minimized by secondary treatment of effluent at comfort stations. The Master Plan recommends that all wastewater be treated to a minimum “R-2” water quality with aeration and non-chlorine treatment such as UV disinfection to improve effluent quality. Also, under consideration is the use of non-chemical disinfectants and cleaning products for maintenance, particularly in composting toilets, to minimize impacts to wastewater treatment processes and effluent quality.

Human disturbance in the water can also cause harm to marine resources, including coral, fishes, and honu. One of the management strategies in the Master Plan is to protect and sustain the long-term viability of Hā‘ena State Park’s nearshore resources. The Master Plan includes recommendations for interpretive devices such as signage and programs administered at the ECC to assist visitors in understanding the fragility of nearshore marine resources. It is also recommended that State Parks:

- Refers to the management guidelines and protocols for the Community-Based Subsistence Fishery Area anticipated to be established for Hā‘ena by Hawai‘i state law;
- Establishes a program of long-term scientific monitoring of fish and invertebrate populations trends within park marine waters; and
- Allows sufficient flexibility and insures long-term monitoring to employ the principal of adaptive management and allow changes to be made to permitting processes and management actions, as deemed appropriate, based upon the results of long-term monitoring and catch statistics.

4.8 TERRESTRIAL FLORA

Existing Conditions

In May 1988, Kenneth M. Nagata conducted a botanical study for Hā‘ena State Park on behalf of DLNR (Nagata 1991). In addition to identifying the various types of vegetation found within the confines of the park, Nagata also provides additional recommendations to preserve existing fauna. In January 2009, Drs. Terry and Hart (Geometrician Associates, LLC) conducted an updated biological survey of Hā‘ena State Park. The survey included a

physical survey of flora and fauna; a review of previous surveys of the area (including Nagata's work); report of the results describing plant communities, and habitats; and, discussion of potential effects from increased recreation on wildland resources. Appendix D contains the survey report.

Terry and Hart found that biological resources within the Park have been drastically affected by the introduction and proliferation of non-native, invasive plants and trees. They identified eleven vegetation zones compared with Nagata's six (Figure 25). Over time, areas that were grasslands have become more wetland-like. Terry and Hart dug several soil pits during their winter survey (January 2009) and noted the presence of mucky, sulfidic soils indicating frequent saturation and reducing conditions, meaning that the inundated condition is not unusual. They recommended further investigation to delineate the boundaries of the wetlands per the definitions of Section 404 of the Clean Water Act. The area also included approximately an acre of standing water and they noted native Koloa Maoli or Hawaiian ducks (*Anas wyvilliana*) utilizing the ponds daily.

Additionally, areas that Nagata found to be dominated by ironwood trees (*Casuarina equisetifolia*) near the dunes have been encroached upon by Java plum (*Syzygium cumini*) and false kamani (*Terminalia catappa*) forests.

A total of 117 flowering plants and nine ferns or fern allies were observed by Terry and Hart at the Park in 2009. Most of the plant species found were alien. However, fifteen were indigenous and six were Hawai'i endemics. Several of the alien species recorded are also considered invasive. In whole, native species comprise approximately 17 percent of the total number of species, but account for negligible land cover. No listed or proposed threatened or endangered plant species were found on site during Terry and Hart's survey.

However, comments from the USFWS dated August 29, 2008 (Appendix B) indicate that one endangered plant species (*Peucedanum sandwicense*) is reported from the area, but there is no designated critical habitat in the planning area. In 2010, Critical Habitat ecosystems were updated for the Island of Kaua'i. A review of Geographic Information Systems data after this update found that no new critical habitats have been designated for Hā'ena State Park.

The native plants Terry and Hart did find were scattered within the Park in small numbers. The exceptions were along the strand associated with the dune complex, on rugged pali cliffs, and in the wetland areas where hau (*Hibiscus tiliaceus*) dominates although the hau is a relatively recent newcomer and was not nearly as widespread in 1991 as it is today. Of the 15 native species, only Koali, or morning glory (*Ipomoea indica*), and the Ni'ani'au fern (*Nephrolepis exaltata hawaiiensis*) are widely common today, with hala (*Pandanus tectorius*) and hau scattered but locally abundant. Pōhuehue (*Ipomoea pes-caprae*) is considered abundant in the strand zone. Except in the pali area, all of the endemic species are uncommon in the Park.

Two endemics found in 1988 were also found in 2009. They are Ko‘oko‘olau (*Bidens forbesii*), a common lowland species on the north shore, and ‘Āhinahina (*Artemisia kauaiensis*), which is found throughout the sea cliffs of Kaua‘i and are restricted to Kaua‘i.

Kumu Roselle Bailey noted in her article published in *Humu Mo‘olelo: Journal of the Hula Arts*, that the native ‘Ālula (*Brighamia citrina*) and ‘Ēkaha (*Elaphoglossum*) once grew at Ke Ahu a Laka but disappeared after a news story of the Keonelo petroglyphs made the site popular to the general public (Bailey 2008). Terry and Hart make no mention of them in their 2009 survey.

Species of cultural importance, such as Ki or Ti (*Cordyline fruticosa*), ‘Ōhi‘a ‘ai or mountain apple (*Syzygium malaccensis*), Kō or sugar cane (*Saccharum officinarum*), Mai‘a or banana (*Musa paradisiaca*), Noni (*Morinda citrifolia*), Niu or coconut (*Cocos nucifera*), ‘Ulu or breadfruit (*Artocarpus altilis*), ‘Ape (*Alocasia macrorrhizos*), kalo or taro (*Colocasia esculenta*) and kukui or candlenut (*Aleurites moluccana*) are found in small numbers throughout the park, with some larger specimen of kukui and breadfruit indicating old plantings.

According to an unpublished report prepared for DAR by Mike Kido, riparian cover along the streams contours are predominantly alien species and provide shade for approximately 70.4 percent of the stream. Native tree species account for less than one percent of all riparian areas below Limahuli Falls. Approximately 328 metric tons of plant litter is deposited within riparian areas annually, which Kido estimates translates into 48,204 metric tons of plant litter being processed within the stream environment and exported as organic nutrients in times of flooding (Kido 2001 unpublished).

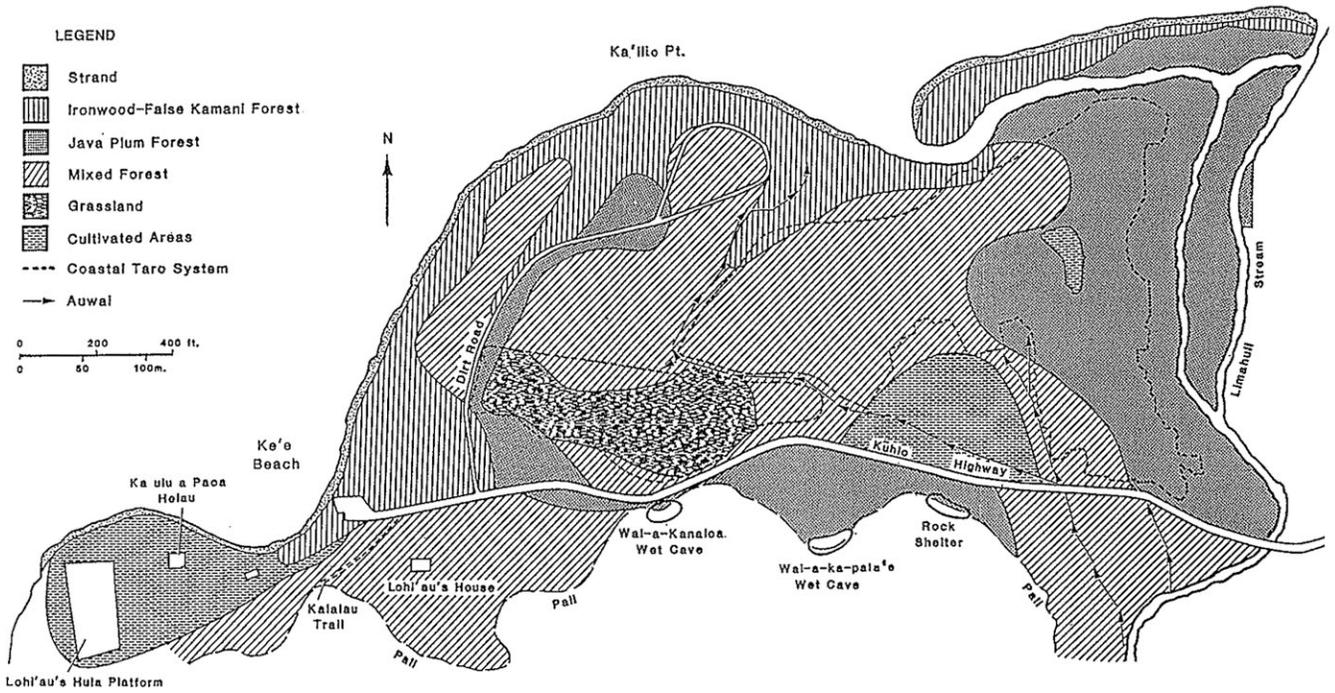
Potential Impacts and Mitigation Measures

With exception of the riparian area associated with Limahuli Stream and the native species in the various strands, the existing threat to the otherwise low value vegetation elsewhere in the Park is limited. However, as the biological survey notes, if visitor use grows, there will be greater pressure on botanical resources. As a mitigation measure State Parks, in the Master Plan, proposes a daily limit on visitors of 900 that is approximately *half* of the current number of visitors per day during the summer. Additionally, as described in Section 2.5.3, it is recommended that all visitors attend an educational session that would provide a brief overview of the Park’s extensive but sensitive natural and cultural resources and instruct visitors of the appropriate activities and behaviors allowed at the Park. Such a significant reduction in visitor use and better education on the Park’s resources will have a net positive impact for the Park’s flora.

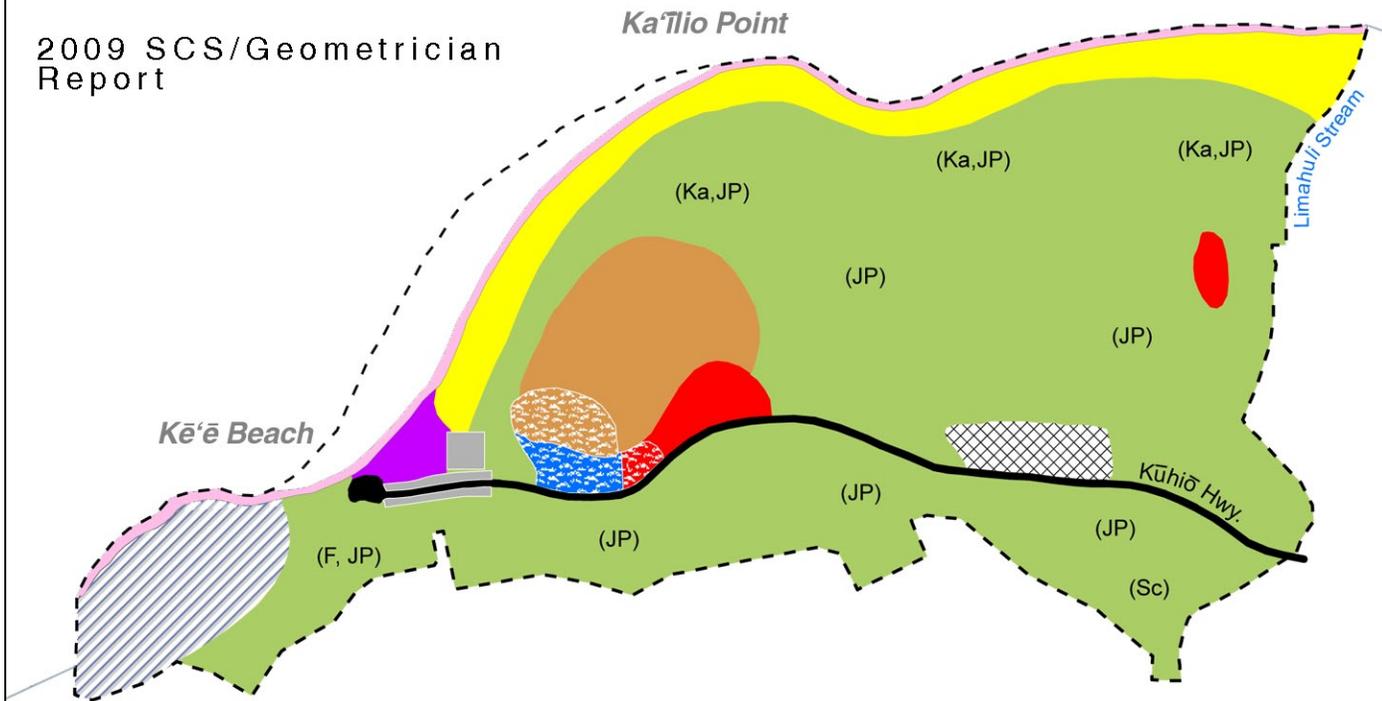
The Master Plan also anticipates eventual restoration activities to strengthen native plant communities within the Park. Areas of the Park where restoration is being considered include, in priority order, the coastal strand, the ironwood and false kamani forest, the Limahuli riparian zone, and talus slopes. Restoration of the native flora would increase

native plant conservation and opportunities to educate the public. This may also indirectly support native birds including endangered and threatened species without a formal effort to create an endangered species habitat. These restoration activities are considered to be beneficial to the Park's botanical resources and thus, no mitigation measures are anticipated.

1991 Nagata Report



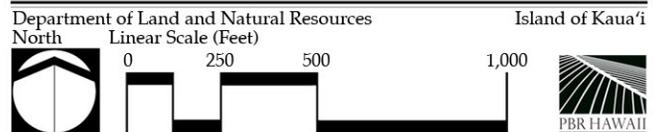
2009 SCS/Geometrician Report



LEGEND

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> --- Hā'ena Park Boundary ■ Parking/Restrooms ■ Pacific Ocean | Vegetation Types <ul style="list-style-type: none"> ■ Strand ■ False Kamanī Forest ■ Ironwood ■ Unsurveyed ■ Disturbed | <ul style="list-style-type: none"> ■ Cultivated ■ Marsh/Cultivated ■ Hau Forest ■ Hau Swamp ■ Marsh/Pond ■ Mixed Forest (Dominant, Co-dominant)
(Species Codes): JP = Java Plum
Sc = Schefflera
Ka = False Kamanī
F = Ficus |
|--|--|---|

FIGURE 25
Vegetation Zones - 1991 and 2009
HĀ'ENA STATE PARK



Source: Nagata (1991); Scientific Consultant Services, Inc./Geometrician Associates (2009)
 Disclaimer: This graphic has been prepared for general planning purposes only.
 Incorrect or outdated Hawaiian spellings on source maps have not been corrected.

4.10 TERRESTRIAL AND FRESHWATER FAUNA

Existing Conditions

The January 2009 biological survey (Appendix D) conducted for the Master Plan also included a survey of animals within the Park. Thirteen species of birds were observed by Terry and Hart during their survey including the endangered Koloa Maoli, or native Hawaiian Duck (*Anas wyvilliana*), two indigenous shorebirds (Kōlea, Pacific Golden Plover, *Pluvialis fulva* and ‘Ūlī, *Heteroscelus incanus*) and Koa‘e Kea, the White-tailed Tropicbird (*Phaethon lepturus dorotheae*), an indigenous seabird. All other observed birds were non-native introductions.

Additional species of seabirds, waterbirds, shorebirds and forest birds that are federally listed as endangered or threatened may use the Park. The wetlands may also provide feeding and nesting areas to the indigenous ‘Auku‘u or Black-crowned Night-heron (*Nycticorax nycticorax hoactli*). Other federally endangered waterbirds that would likely use the wetlands are the Ae‘o or Black-necked Stilt (*Himantopus mexicanus knudseni*), ‘Alae ke‘oke‘o or Hawaiian Coot (*Fulica alae*), ‘Alae‘ula or Hawaiian Moorhen (*Gallinula chloropus sandvicensis*), and Nēnē or Hawaiian goose (*Branta sandvicensis*).

It is also expected that the federally endangered ‘Ua‘u or Hawaiian Petrel (*Pterodroma phaeopygia sandwichensis*), federally threatened ‘A‘o or Newell’s Shearwater (*Puffinus auricularis newelli*) and the ‘Ake‘ake or Band-rumped Storm-petrel (*Oceanodroma castro*), listed by the State of Hawai‘i as endangered, would fly over Hā‘ena State Park to their nests in the mountains. These birds, especially the young, can be affected by exterior lighting and become disoriented.

Although not sighted during the survey, the endangered ‘Ōpe‘ape‘a, or Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), probably utilizes Hā‘ena State Park as it has been seen in the Hanalei and Princeville areas.

Terry and Hart detected feral cats (Pōpoki; *Felis catus*) during their survey, and also recognized that mice (‘Iole li‘ili‘i; *Mus* spp.) and rats (‘Iole; *Rattus* spp.) are likely also present. They also acknowledged the presence of wild pigs (Pua‘a; *Sus s. scrofa*) and goats (Kao; *Capra h. hircus*) that are known throughout this part of Kaua‘i.

Terry and Hart’s survey also identified various skinks, anole, gecko and bullfrog in the park, and acknowledge that there are likely more species of reptiles and amphibians throughout the Park. All were alien species and common on Kaua‘i.

Terry and Hart also surveyed the freshwater species inhabiting Limahuli Stream. They note five species of endemic ‘O‘opu or Hawaiian gobies may inhabit this stream, including the ‘O‘opu alamo‘o (*Lentipes concolor*), ‘O‘opu nopili (*Sicyopterus stimpsoni*), ‘O‘opu naniha

(*Stenogobius hawaiiensis*), ‘O‘opu akupa (*Eleotris sandwicensis*) and ‘O‘opu nakea (*Awaous guamensis*).

Invasive species in Limahuli Stream include the Tahitian prawn (*Macrobrachium lar*) and poeciliids (swordtails, *Xiphophorous helleri* and guppies, *Poecilia reticulata*). According to Kido, the presence of poeciliids in particular poses a serious threat to the native ‘O‘opu. Poeciliids are known to carry water-borne pathogens which infect ‘O‘opu (Kido 2001 unpublished). Limahuli Garden and Preserve staff have observed that poeciliids are now well established in the lower stream reaches.

Potential Impacts and Mitigation Measures

As the biological survey notes, if visitor use grows, there will be greater pressure on botanical resources. In fact, State Parks, in the Master Plan, proposes a daily limit on visitors of 900 that is approximately *half* of the current number of visitors per day during the summer. Additionally, as described in Section 2.5.3, it is recommended that all visitors attend an educational session that would provide a brief overview of the Park’s extensive but sensitive natural and cultural resources and instruct visitors of the appropriate activities and behaviors allowed at the Park. Such a significant reduction in visitor use and better education on the Park’s resources will have a net positive impact for the Park’s fauna.

Seabirds are attracted to artificial lights and can be downed after circling the light source and tiring or colliding with the pole or other objects. Once grounded, they can be struck by motor vehicles or are easy prey for cats, dogs or other animals. To avoid any impact to seabirds, the Master Plan does not include any parking lot lighting. Any security lighting that is deemed necessary at the ECC will likely have downward shielding to avoid negative impacts to seabirds.

Endangered waterbirds are attracted to standing water, including the former loko and restored lo‘i. In order to minimize predation of these birds by feral animals, measures to reduce the feral cat and rat population are proposed in the Park. These measures include installation of animal-proof garbage receptacles and maintaining cooperation with the Humane Society, which at times had placed traps in the Park for removal of feral cats. Additionally, the Master Plan recommends that, before any wetland restoration activities proceed, that an analysis of the costs, benefits and liabilities associated with intentionally creating habitat for endangered waterbirds be conducted.

The ‘Ōpe‘ape‘a, endangered Hawaiian Hoary Bat, roosts in woody vegetation. If trees or woody shrubs (over 15-feet in height) are removed during the breeding, birthing and pupping season during the months of June 1 through September 15, there is the risk of young bats being harmed or killed. In order to minimize impacts to ‘Ōpe‘ape‘a, it is proposed that State Parks restrict any cutting of large shrubs or trees to periods outside the breeding season.

In order to preserve the native aquatic species present in Limahuli Stream, the Master Plan avoids making any alterations to the stream bed or banks. Except anticipated restoration of the riparian resources associated with the stream, no development or activities are proposed proximate to the stream. No changes to the existing stream crossing at the Park entry are proposed.

A potential threat to Limahuli Stream, and upstream resources is from further introduction of alien fishes and invertebrates. Limahuli Stream is one of the few places in the state that does not have apple snails and the snails are currently in the Park's lo'i. Control measures to prevent the spread of apple snails from the Park's lo'i to Limahuli Stream should be included in any design or implementation of the 'auwai and irrigation systems for the Agricultural Complex. Some suggested control measures include but are not limited to:

- Elevating and extending the outfall pipes from the Limahuli Stream diversions above the receiving 'auwai so the snails cannot crawl directly into the stream. The snails are known to not like cold, fast-moving water which is what flows from Limahuli Stream so the risk is minimized.
- Grading the 'auwai to flow makai and away from Limahuli Stream so water does not flow back to Limahuli Stream.

State Parks should also continue to cooperate with DAR to keep new alien fish out of the 'auwai and stream and in ridding the stream of periodic invasions of swordtails, guppies, and other alien fish (Terry and Hart 2009).

4.11 NATURAL HAZARDS

Existing Conditions

Typical natural hazards impacting the Hawaiian Islands include flooding, tsunami inundation, hurricanes, volcanic eruptions, and earthquakes. The following sections describe the natural hazards that may impact the Park and general area, as appropriate.

4.11.1 FLOOD HAZARD

According to the FIRM Panel 1500020030E (9/16/05) prepared by the Federal Emergency Management Agency (FEMA), National Flood Insurance Program (NFIP), there are several Special Flood Hazard Areas within Hā'ena State Park (see Figure 26). They are located along the coast and along Limahuli Stream and include Zones VE, AE and A. Zone VE is a coastal flood zone with velocity hazard for wave action subject to the one percent chance annual flood (100-year flood). Within the Park and nearshore waters, base flood elevations have been determined and range between 10 and 21 feet with the lower base flood elevations at the furthest eastern and furthest western edges of the Park. The highest base flood elevations are located offshore of Ka'ilio Point.

Moving inland of the Zone VE areas are the Zone AE areas. These are the Special Flood Hazard Areas subject to the one percent chance annual flood and where base flood elevations

have been determined. Base flood elevations start at 10 to 11 feet near Limahuli Stream and increase to 15 feet near Kēʻē and 18 feet near Kaʻilio Point.

The base flood elevations have not yet been determined along the mauka portions of Limahuli Stream and therefore these areas are located in Zone A. However, they are still within the Special Flood Hazard Areas subject to the 100-year flood. Also according to Kennedy/Jenks, there are mapping discrepancies between the location of Limahuli Stream on the FEMA maps, the Kauaʻi Online Hazard Assessment database, and the Hawaiʻi NFIP database. As a result, the exact location of the Zone A area is not clear and Kennedy/Jenks has contacted DLNR, which is currently working to resolve this issue with the U.S. Environmental Protection Agency (EPA) Region 9. Kennedy/Jenks recommends maintaining a buffer along the stream until this can be resolved.

4.11.2 WIND AND STORM HAZARDS

Since 1980, two hurricanes have had devastating effects on Kauaʻi—Hurricane ʻIwa, a Category 1 on the Saffir-Simpson scale, in 1982 and Hurricane ʻIniki, a Category 4, in 1992. Since Hurricane ʻIniki hit from the south, there was no significant storm surge or overwash in Hāʻena. However, ʻIniki’s sustained winds reached over 100 mph with gusts up to 150 mph as it passed over Kauaʻi, making landfall near Hanapēpē and sweeping northward to Hanalei (Businger 1998). ʻIwa’s sustained winds were 75 mph with maximum winds at 110 mph and did not make landfall. However, its diameter was so great that it enveloped Kauaʻi as it passed to the north. While it is difficult to predict such natural occurrences, it is reasonable to assume that future incidents are likely, given historical events and the FEMA Special Flood Hazard Areas along the coastline.

4.11.3 TSUNAMI HAZARD

Hāʻena has been struck by tsunami waves multiple times in recorded history. The tsunami of 1946 is remembered as particularly devastating, destroying homes, a church, and a school and taking lives. Another destructive tsunami struck in 1957, leaving only four of the 29 homes in Hāʻena standing, although it did not result in loss of life. The land makai of the highway within Hāʻena State Park is located within the tsunami evacuation zone. During the 1946 tsunami, wave heights reached 30 feet near Kēʻē and 24 feet off Kaʻilio Point. Wave heights reached 28 feet off Kaʻilio Point in the 1957 tsunami. Both of these tsunamis were generated by large earthquakes (magnitude 7.1 and 8.3, respectively) in the Aleutian Islands off Alaska. See Figure 27. The nearest State Civil Defense siren is located at Hāʻena County Park.

4.11.4 SHORELINE EROSION

The coastal geology group at SOEST has documented shoreline rates of change since 1927. As shown in Figure 23, shoreline erosion takes place along the entire park site at rates between 6 inches and nearly 1 foot per year.

4.11.5 ROCKFALL HAZARD

A Rockfall Hazard Assessment was performed by AECOM during the months of August and September, 2008 and updated in 2013 with a supplemental rockfall analysis and computer simulation in the area between the main parking lot and Wai a Kanaloa. The assessment, attached in its entirety as Appendix C, included a geological survey of the site and rockfall hazard identification which included a visual assessment and preparation of a geological report, locating rock outcroppings with GPS readings, and color photography. The Assessment also included an engineering planning study of the rockfall condition, development of preliminary rockfall protection design options, and cost estimates. A summary of their findings is presented graphically in Figure 28.

To evaluate rockfall risk, AECOM utilized the U.S. DOT Federal Highway Administration Rockfall Hazard Rating System methods and guidelines. This rating system evaluates a number of criteria including: slope height, ditch effectiveness, structural conditions, rock friction, erosion rates, volume of rockfall events, climate and presence of water on slope, rockfall history and slope topography. It uses a three-class rating system for hazardous conditions based on its potential to impact adjacent properties.

- **Class A** – high estimated potential for rockfall on adjacent properties with high historical rockfall activity. Chances for rockfall is moderate to high and when rockfalls occur, they will more than likely reach adjacent properties.
- **Class B** – moderate estimated potential for a rock to fall on adjacent properties with moderate historical rockfall activity. Class B rating indicates that although a rockfall is probable, the chances of it reaching adjacent properties are low to moderate. This could involve scenarios where risk is mitigated by the presence of catchment ditches or large flat areas that can contain rockfalls.
- **Class C** – low to no estimated potential for rockfall on adjacent properties with low historical rockfall activity.

AECOM also analyzed the chance of rockfall. This is primarily based on the stability of the rock face and condition of the supporting materials. There are four categories:

- **Category 1** – imminent potential for rockfall (could happen anytime)
- **Category 2** – short term potential for rockfall (within several to a dozen years)
- **Category 3** – medium term potential for rockfall (within dozens of years)
- **Category 4** – long term potential for rockfall (up to or more than a hundred years)

Please note that the time scale references are used symbolically and are not meant to represent an actual timeframe within which the rockfall events may occur.

AECOM used computer simulation to model rockfall events along five transects within the Park. They determined that the rockfall hazard conditions at Hā'ena State Park consists of both Class A and Class B rockfall ratings based on the potential for rockfalls to reach the highway at various positions as well as at Kē'ē Beach and the Kalalau Trailhead. See Figure 28. The area around Wai a Kanaloa is the most hazardous rockfall area (Class A) because: 1)

many rockfall features exist here; 2) the very high probability for rockfalls to reach the highway and Wai a Kanaloa; and 3) the almost constant presence of visitors. Rockfalls are less likely to reach the highway or beach at the other areas (Class B). AECOM also analyzed the chance of rockfall at specific locations within the Park which are also shown on Figure 28. They range from Category 1 through 3. AECOM performed supplemental analysis in the area between the main parking lot and Wai a Kanaloa to help guide the design of the proposed park Master Plan. Using computer modeling, they provided a baseline estimate of how far simulated rockfalls would reach. The 0% and 5% chance of simulated rockfall lines were determined based on computer modeling and then used to help locate all major facilities outside of the rockfall zones.

Potential Impacts and Mitigation Measures

While it is difficult to predict natural hazards, it is reasonable to assume that future incidents are likely, given historical events. However, the threat of such hazard is no greater for the proposed project site than any other location on Kaua‘i. Due to the remote location of the Park and the potential for hazardous conditions, an emergency evacuation plan and rescue plans should be developed. Coordination and regular drills (at minimum annually) with State Civil Defense, Kaua‘i fire and police departments should be performed to ensure readiness. All park staff and others involved with the ongoing maintenance of the Park such as volunteers, concessionaires/lessees and their staff, and specialists tending the Agricultural Complex and Hula Complex should be trained in the proper procedures for handling different emergency situations.

Currently, there are no State Civil Defense sirens in the Park and no tsunami evacuation signs on Kūhiō Highway within the Park. The closest siren is located at Hā‘ena County Park roughly 3,500 feet to the east. Pre-consultation comments from State Civil Defense suggest that 25 square feet of land area be set aside for “possible future siren installation.” The land area required for a siren can be accommodated with the park, most likely in the main parking area, should State Civil Defense deem that it is an appropriate location for a warning siren.

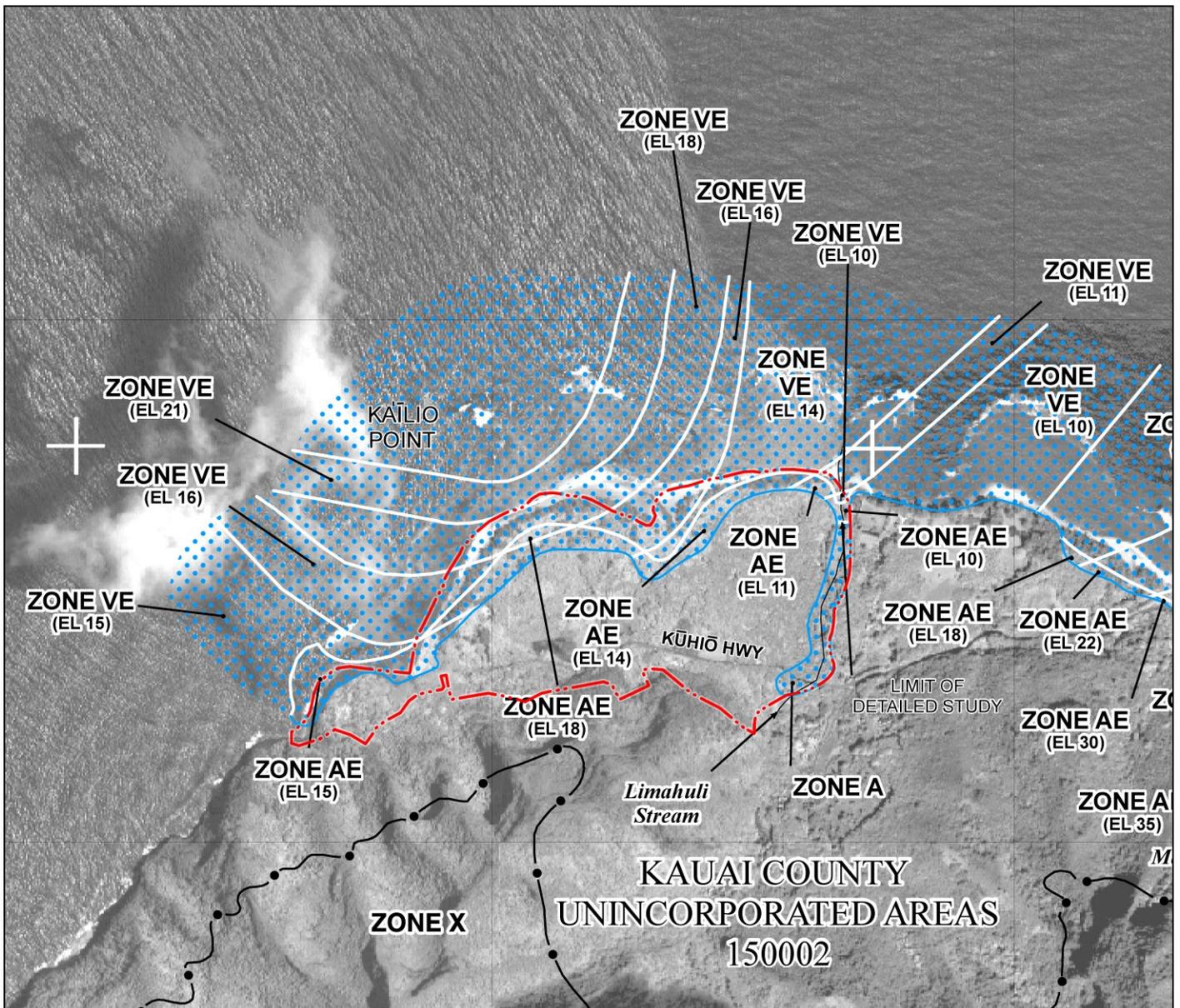
To facilitate evacuations in the event they are necessary, the helicopter landing pad is proposed to be retained with the Master Plan improvements. Emergency evacuation routes should also be planned and indicated on visitor brochures and materials. They can also be described and shown on maps during the visitor orientation sessions. The loop paths through the lo‘i can be used as an emergency route between Kē‘ē and the Welcome Pavilion/ECC. An emergency phone is expected to be retained. Additionally, the presence of an on-site caretaker is expected to improve emergency warning communications and evacuation coordination within the Park when necessary. If a shuttle system is developed (as described in Section 5.7.1), an emergency evacuation plan will need to be developed specifically for the shuttle passengers.

Except for the lifeguard tower, all proposed structures are planned to be outside the 100-year flood zone, thus avoiding any impacts. Plans to move the lifeguard tower should be

coordinated with the County's Flood Plain Coordinator to ensure that the action is in compliance with Ordinance No. 831 (County Flood Plain Ordinance). Impacts to floodplain are further avoided by focusing development away from Limahuli Stream and its riparian zone.

Health and safety impacts of rockfall are proposed to be mitigated by siting all of the major facilities, including the Interpretive Path to Kē'ē, outside of the high rockfall hazard zones as described by AECOM in their Rockfall Hazard Assessment report (Appendix C). Specifically, the 0% and 5% chance of simulated rockfall lines were used to help locate all major facilities outside of the rockfall zones. These improvements should be considered part of the rockfall mitigation and prioritized in capital improvement project funding. In addition, warning signs should be installed at appropriate locations along the highway and safety instructions should be made during visitor orientation prior to park entry.

Trees mauka of Kūhiō Highway may serve to catch those rocks that do fall, thus, tree removal north of the highway is not proposed. The Master Plan elements also include features to restrict the public from standing immediately in front of the wet cave, Wai a Kanaloa, where the cliffs above are greater than vertical and identified as Class A hazards. Interpretive devices will be located a respectful distance from these features with native and Polynesian-introduced plants for landscaping planted to discourage people from entering the caves or congregating directly under cliff faces should they choose to traverse the highway despite the rockfall warnings. In addition, the highway between the turnaround and Kē'ē will be closed to general vehicle traffic and used only for special vehicle access due to the potential rockfall hazard. The only vehicles that will be permitted beyond the gate will be special access vehicles such as the lifeguards, hula practitioners, family caretakers of the cemeteries and ADA vehicles (if the stall is available).



LEGEND

- SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
- The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

- FLOODWAY AREAS IN ZONE AE
- The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
- OTHERWISE PROTECTED AREAS (OPAs)
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary

- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the National Geodetic Vertical Datum of 1929
- Cross section line
- Traverse line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 1000-meter Universal Transverse Mercator grid values, zone 4N
- 5000-foot grid ticks: Hawaii State Plane coordinate system, zone 4 (FIPSZONE 5104), Transverse Mercator projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile
- 76° 07' 45", 32° 22' 30"
- 600000 FT
- DX5510 x
- M1.5

LEGEND

- Hā'ena State Park Project Boundary

FIGURE 26

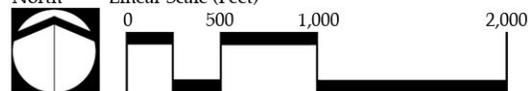
Flood Insurance Rate Map

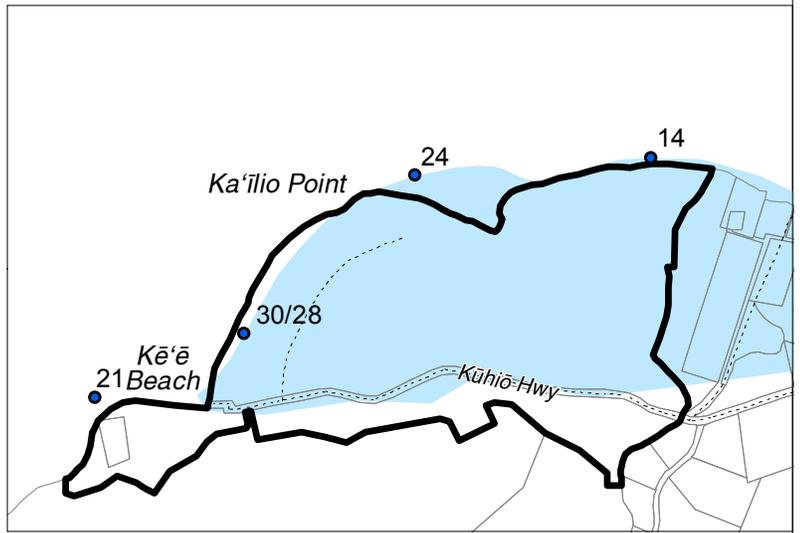
HĀ'ENA STATE PARK

Department of Land and Natural Resources
North Linear Scale (Feet)

Island of Kaua'i

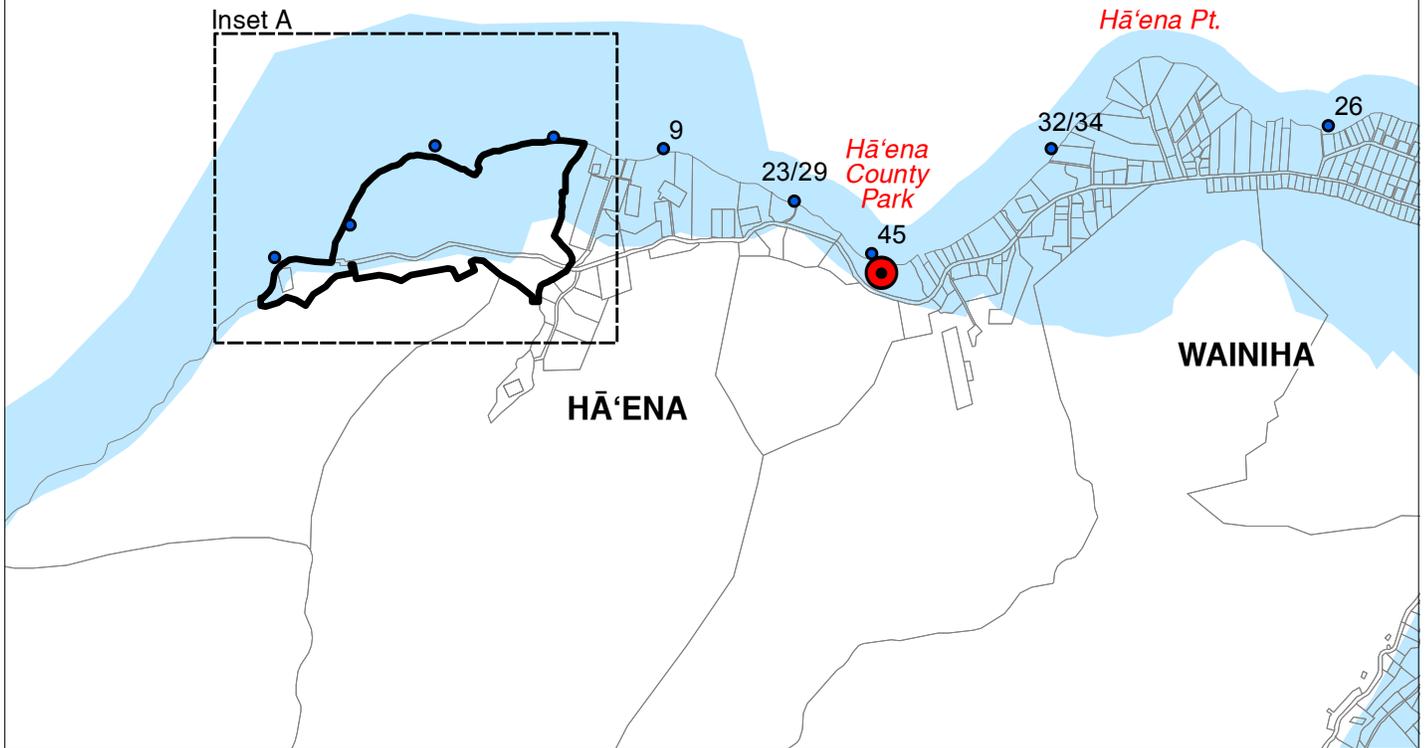
Source: Federal Emergency Management Agency, Map No. 1500020030E (effective 9/16/2005)
Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for any boundary interpretations or other spatial analyses.





Inset A : 1" = 1,000'

PACIFIC OCEAN



LEGEND

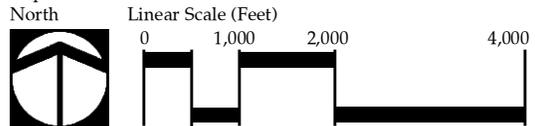
-  Hā'ena State Park Project Boundary
-  Road
-  Tsunami Evacuation Zone
-  Existing Civil Defense Siren
-  Tsunami Wave Heights (Height in Feet, 1946/1957)

FIGURE 27
Tsunami Evacuation Zone

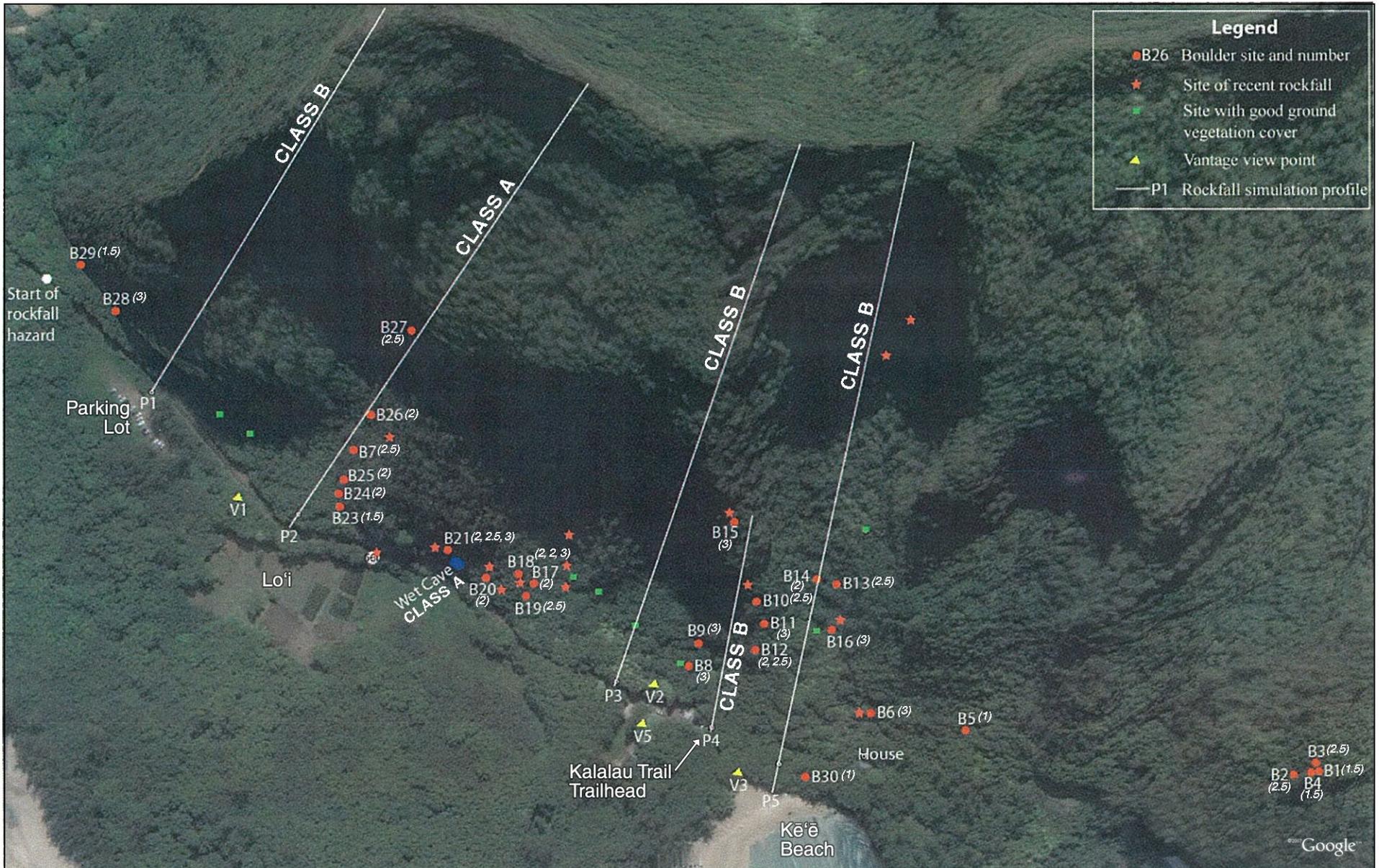
HĀ'ENA STATE PARK

Department of Land and Natural Resources

Island of Kaua'i



Source: Kaua'i Civil Defense Agency (2013); State GIS (1999, from Loomis 1976)
Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.



LEGEND

Rockfall Hazard

- Class A - High Estimated Potential
- Class B - Moderate Estimated Potential

Chance of Rockfall

- Category
- (1) - Imminent
- (2) - Short-term Potential
- (3) - Medium-term Potential
- (4) - Long-term Potential

FIGURE 28

Rockfall Hazards

HĀ'ENA STATE PARK

Department of Land and Natural Resources
North

Island of Kaua'i



NOT TO SCALE



Source: EarthTech (2008): Figure 1-1

Disclaimer: This graphic has been prepared for general planning purposes only and should not be used for any boundary interpretations or other spatial analyses.

This page intentionally left blank.

5.0 ASSESSMENT OF EXISTING HUMAN ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

This section describes the existing conditions of the human environment, potential impacts of the proposed Master Plan and mitigation measures proposed to minimize any impacts.

5.1 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Existing Conditions

The park is entirely within the “Hā‘ena Archaeological Complex,” listed in the Hawai‘i and National Register of Historic Places in 1984 (State site #30-02-1600). It also lies immediately adjacent to a portion of the “Kaua‘i Belt Road” (North Shore Section) (Site #30-02-9346) that was listed in the National Register of Historic Places in 2004. Systematic archaeological surveys beginning in the 1970’s have been conducted throughout most of the Park. When combined, this information characterizes the distribution pattern of archaeological and historic property types through the Park. The “Hā‘ena Archaeological Complex” was deemed significant because it represents a large, nearly continuous, and mostly intact complex of archaeological features dating from the early prehistoric period to the recent historic period (Yent 1983). Grouped broadly by location and type, the complex includes: 1) subsurface cultural layers and features, including burials, found within sand dune and beach-derived deposits forming a band along the seaward edge of the coastal flat; 2) irrigated agricultural field systems and wetlands that dominate the alluvial flat between the sand dune and the talus slopes along the cliff base, and 3) the traditionally important sites located along the talus slope, including the cliff face itself, that are significant to native Hawaiians because of their association with various legends, customs, and beliefs. These sites include Ka Ulu A Paoa Heiau, Ke Ahu A Laka hula platform, Lohi‘au’s house site, Wai a Kanaloa and Waiakapala‘e caves. In addition to burials, the subsurface cultural layers include fire hearths, refuse pits and post holes. The field systems include agricultural walls and ‘auwai. Historic-era cemeteries are also located within the Park. The cemeteries continue to be visited and cared for by local families. Remnants of a poi mill have also been identified within the Park.

The significance of the traditionally important sites such as Lohi‘au’s house site, Ka Ulu A Paoa Heiau and Ke Ahu A Laka hula platform is well documented in publications by historians and cultural practitioners and summarized in greater detail in the Cultural Impact Assessment (Appendix F).

The “Kaua‘i Belt Road” stretches 10 miles from Princeville to Kē‘ē Beach and is considered the only remnant of the Belt Highway system on Kaua‘i to retain a high degree of integrity (Duensing 2003). This section is characterized by its narrow lanes, winding road alignments, historic bridges and culverts, road cuts, and scenic settings. The stretch from Hā‘ena Beach

County Park to Kē‘ē was the last to be completed, probably in 1928. The concrete culvert crossing Limahuli Stream at the entrance to the Hā‘ena State Park is one of 13 bridges and culverts designated as contributing to the significance of the Belt Road.

The former Allerton Estate is located at the far western side of the Park site and is accessed by a narrow path off Kē‘ē. The primary residence burned to the ground and what remains are the building’s foundation and the remnants of a formal garden. Both the foundation and garden area are obscured by overgrown vegetation. Perched above the home site, the Allerton caretaker cottage remains, although in a state of disrepair.

Another historic structure is the Montgomery House, in which Henrietta “Etta” Phillips (a Hā‘ena kupuna and member of the MPAC) was born and raised.

Potential Impacts and Mitigation Measures

Human use and development has the potential to disturb and damage archaeological and historic resources. One of the objectives of the Master Plan is to provide opportunities for quality outdoor recreation, with sensitivity to significant natural and cultural resources. Anticipated mitigation measures described below are proposed to achieve this objective.

While continuing its commitment to offer outdoor recreational activities at Hā‘ena State Park, the state will employ both programmatic as well as physical mitigation measures to avoid and minimize impacts to archaeological and historic resources.

The primary programmatic action to mitigate impacts to archaeological resources will be to establish a Cultural Advisory Group to help guide management of all aspects of the Park. Specifically, the Master Plan recommends that the Cultural Advisory Group be consulted on management actions and construction projects as well as interpretive signage and programs. The enhanced oversight is expected to result in improved interpretation of the Park’s archaeological resources, and as a result, a visiting public that is more aware and sensitive to the importance and fragility of the site’s archaeology. Secondly, State Parks is proposing to limit the number of people in the Park to 900 people per day. This number is an initial visitor limit which State Parks may adjust over time depending on future improvements, improved/increased maintenance, and/or other studies such as impact studies, particularly if harmful impacts to the natural, cultural and archaeological resources arise.

The primary physical mitigation measure of the Master Plan is to avoid archaeologically sensitive areas by proposing new elements in previously disturbed areas. An archaeological sensitivity map (Figure 29) prepared by State Parks archaeology staff helped to guide proposed activity toward the disturbed areas and away from the most archaeologically sensitive areas of the Park. Impacts to archaeological resources will further be minimized through archaeological compliance prior to all earth disturbing activities, regardless of location.

All efforts were taken to minimize impacts to previously undisturbed areas. Alternative plans, including the 1991 draft park plan suggested developed picnicking areas in the sand dunes. The Master Plan has located picnic areas away from the ecologically and archaeologically sensitive dunes to near the ECC, where the ground has been previously disturbed. The subterranean area of the parking lot is conceptualized to serve as an absorption bed for the wastewater facilities serving the ECC and Caretaker's Cottage to minimize the footprints associated with these buildings.

The limited access corridor component of the Master Plan will also serve as a mitigation tool. By limiting the volume of vehicle traffic on the historic roadway segment between the main highway and Kē'ē, the macadam surface of the Kaua'i Belt Road will be better preserved than if it continues to experience current volumes of traffic.

Additionally, the Interpretive Path through the lo'i is expected to serve as a key component to the interpretive program at the Park. Access to the Park will be via the Interpretive Path, which will eventually begin at the ECC, where the visiting public has an opportunity to learn about the archaeological, historic, cultural and ecological significance of the Park's resources. Interpretive displays and wayside exhibits will be installed along this path, including directional signage and educational information for the varied sights along this trail. The portion of the path which traverses the lo'i will be elevated with handrails and a viewing platform will be provided where the path turns.

At Kē'ē, the lifeguard stand is proposed to be relocated, in order to improve the ability for lifeguards to see key areas of the lagoon and Kē'ē Channel. To avoid potential impact to subsurface resources, the foundation is proposed to be built up rather than excavated down into dune.

The Master Plan also anticipates that there will be continued restoration of the Park's archaeological resources, specifically, the hula complex and Agricultural Complex (including the 'auwai). Active management of these resources will mitigate against their loss to time and overgrowth of invasive vegetation. Restoration activities are expected to continue as a joint effort between State Parks archaeology staff and the Park's curator, Hui Maka'āinana o Makana.

The historic resources of the Park are also undergoing restoration, and the Master Plan recommends further restoration activities. State Parks repaired the roof and portions of the foundation on the Allerton Caretaker's House in 2013. Ongoing maintenance of the structure and grounds surrounding the cottage are being performed by the Hui under the current curatorship agreement. Additionally, the Master Plan recommends rehabilitation of the historic Montgomery House situated within the Agricultural Complex to support agricultural activities or other park uses/operations.

This page intentionally left blank.

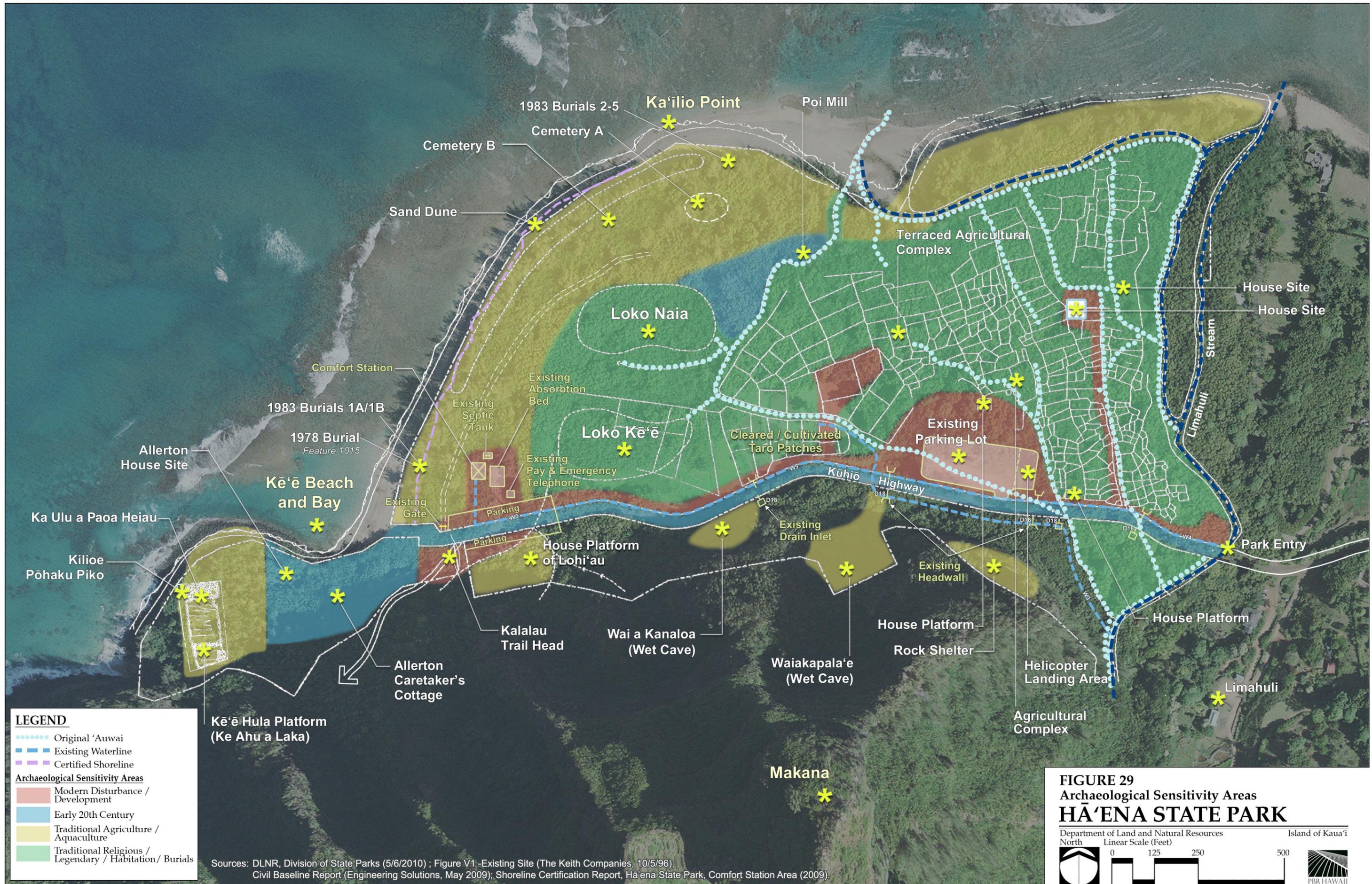
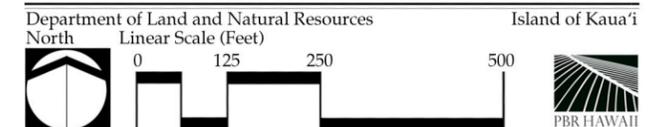


FIGURE 29
Archaeological Sensitivity Areas
HĀ'ENA STATE PARK



Sources: DLNR, Division of State Parks (5/6/2010) ; Figure V.1 -Existing Site (The Keith Companies, 10/5/96); Civil Baseline Report (Engineering Solutions, May 2009); Shoreline Certification Report, Hā'ena State Park, Comfort Station Area (2009).

This page intentionally left blank.

5.2 CULTURAL RESOURCES

Existing Conditions

Maria Ka'imipono Orr prepared a Cultural Impact Assessment (CIA) including a detailed overview of the historical and cultural background of Hā'ena and Kaua'i, traditional literature from mo'olelo (stories and legends), oli (chants), mele (songs), genealogies, and recent interviews and surveys of those most familiar with the area. The CIA underscores the importance of Hā'ena to Hawaiian culture, describes the ahupua'a life-system that existed into the 20th century, and highlights individuals' personal relationships with Hā'ena's resources through their stories and recollections. The CIA is attached as Appendix F.

Potential Impacts and Mitigation Measures

Human development, outdoor recreation and visitor activities have the potential to undermine the cultural significance of a place if not planned for or mitigated against. Potential negative impacts include inadvertently offending cultural sensibilities by walking, climbing, or picnicking on features that are considered significant to Hawaiian culture such as the Ke Ahu A Laka hula platform or Lohi'au's house platform. Development can also impact the cultural environment by limiting cultural practitioner's ability to access sites of cultural importance.

The CIA includes a single over-arching recommendation to mitigate the effects of human use on the Park's cultural environment: establish a Cultural Advisory Group to provide cultural expertise during the Master Plan/EIS process and through any later park developments. This recommendation is carried forward in the Master Plan, which also recommends that a Cultural Advisory Group be formed to advise State Parks and park management on all matters regarding the Park. Specifically, the Master Plan recommends that the Cultural Advisory Group be consulted on management actions, construction projects, and interpretive signage and programs. Secondly, State Parks is proposing to limit the number of people in the Park to 900 people per day. This number is an initial visitor limit which State Parks may adjust over time depending on future improvements, improved/increased maintenance, and/or other studies such as impact studies, particularly if harmful impacts to the natural, cultural and archaeological resources arise.

The primary physical mitigation measure is to avoid cultural resources when constructing new park improvements and, where warranted, augment cultural resources with development. Thus, new development in the Agricultural Complex is limited to facilities that support community gardening, such as a baseyard and equipment storage. Similarly, the remnant Allerton house foundation is recommended to serve as a hula staging area due to its proximity to Ke Ahu A Laka. Avoidance measures include removing the majority of vehicles from Kūhiō Highway beyond the main parking area, allowing for a slower, quieter and interpretive approach to the Park's features such as the wet caves, Kē'ē, Ka Ulu a Paoa, and Ke Ahu a Laka.

Beneficial impacts to the cultural environment are expected from enabling cultural practices in the Park through lo‘i restoration and kalo cultivation; hula; traditional subsistence fishing; and caretaking of the hula complex and cemeteries. As a means to preserve access to cultural resources, perpetuate tradition, and provide essential maintenance of resources, State Parks has entered into a partnership with the Hui to curate the agricultural and hula complexes. Additional partnerships will be encouraged to help manage other cultural resources within the Park. In particular, State Parks and the Hui will coordinate with the County Department of Parks and Recreation on the ongoing maintenance of and access to the heiau.

5.3 NOISE

Existing Conditions

The predominant sources of noise in the Park stem from automobile traffic accessing the Park and idling cars waiting for parking spaces. Other sources of noise are from natural sources, such as wind, rain and ocean waves.

Potential Impacts and Mitigation Measures

It is expected that the proposed reduction of the number of vehicles accessing, idling, and turning around in the limited parking area at Kē‘ē will have a positive impact as it will result in less automobile noise at the Park’s most popular recreation site (Kē‘ē beach and the Kalalau Trailhead) and important cultural sites (heiau and hula platform). No further mitigation is proposed.

During construction of any new structures, there will be temporary noise impacts associated with construction equipment. Similarly, restoration work may require the use of motorized equipment, but these impacts are expected to be temporary. As proposed mitigation for temporary construction noise, State Parks is anticipated to work with contractors to ensure adherence to DOH regulations and to ensure use of proper equipment and regular vehicle maintenance. Equipment mufflers or other noise attenuating equipment may also be employed as additional mitigation. All construction activities will be limited to daylight work hours.

5.4 AIR QUALITY

Existing Conditions

Regional and local climate, together with the amount and type of activity generally determine the air quality of a given location. At the project site, winds are predominantly trade winds.

Due to relatively undeveloped nature of the Park and surrounding properties, air quality is excellent. There are no point sources of airborne emission within proximity of the project site. Pollutants that exist may be attributable to automobile traffic accessing the Park and idling vehicles while waiting for parking spaces. Emissions from such sources are

intermittent and are quickly dispersed by prevailing winds. The State of Hawai'i is in attainment with all National Ambient Air Quality Standards.

Potential Impacts and Mitigation Measures

As with automobile noise, it is expected that the reduction in the number of vehicles accessing the limited parking area at Kē'ē will result in less automobile fumes and dust at the popular recreation sites and important cultural sites. Emissions from operation of construction equipment and other vehicles involved in construction activities may temporarily affect the ambient air quality in the immediate vicinity. However, these effects will be minimized through proper maintenance of construction equipment and vehicles. In addition, there may be a temporary adverse impact on air quality attributable to dust generated during project construction, particularly during earthmoving activity. Best management practices that meet DOH's standards are anticipated to be employed as needed to mitigate dust during construction.

5.5 SCENIC RESOURCES

Existing Conditions

Hā'ena State Park is well known for its scenic qualities and in particular, views of the rugged Nāpali coast. Kūhiō Highway's present alignment provides access to many of the Park's varied scenic resources, ending at Kē'ē, where the vista opens to the ocean and the beginning of the Nāpali coastline. At the Park entrance, a single-lane bridge crosses Limahuli Stream, where views up- and downstream offer a rare view of a natural and relatively intact, perennial stream. Under the shadow of Makana, the roadway passes the wet cave, Wai a Kanaloa, the Agricultural Complex, the seasonally-flooded wetlands of Loko Kē'ē and ultimately terminates at Kē'ē Beach. Wai a Kanaloa and the other wet caves in the area are both visually interesting to park visitors and home to mo'ō in Hawaiian legend. From within the Agricultural Complex, Makana's peak is visible and from this vantage point, the mountain's prominence in Hā'ena's stories can be appreciated. For most of the Park's visitors, the white sand beach and lagoon at Kē'ē are the primary destination. From here, one can observe important visual resources including the mountain peak of Makana which stands 1,280 feet above the Park and the sea cliffs of the Nāpali Coast. Kē'ē beach and lagoon are also valuable visual resources viewed from the air or points on Kalalau Trail. Views of Kē'ē and beyond from Ka Ulu A Paoa Heiau and the hula platform are also integral to these important cultural resources. Other areas rich with scenic resources are along the shoreline and Kalalau Trail. The park's scenic resources are documented in Figure 30 and Figure 31.

Visual access to the Park's scenic resources are currently diminished or outright impaired by the many cars parked illegally along the highway and the dense invasive tree canopy that covers much of the site's interior. Because Hā'ena is a major destination for visitors, hikers, and residents, parking is in high demand. Oftentimes people will park illegally directly in front of scenic resources blocking views wholesale or at best, altering the landscape with parked cars. The lifeguard stand at Kē'ē beach serves a vital function, however, its current

location is directly in the line of sight as one approaches the beach from Kūhiō Highway. Scenic resources are also obscured by a heavy forest canopy dominated by alien vegetation. See Figure 32, Constraints to Scenic Resources.

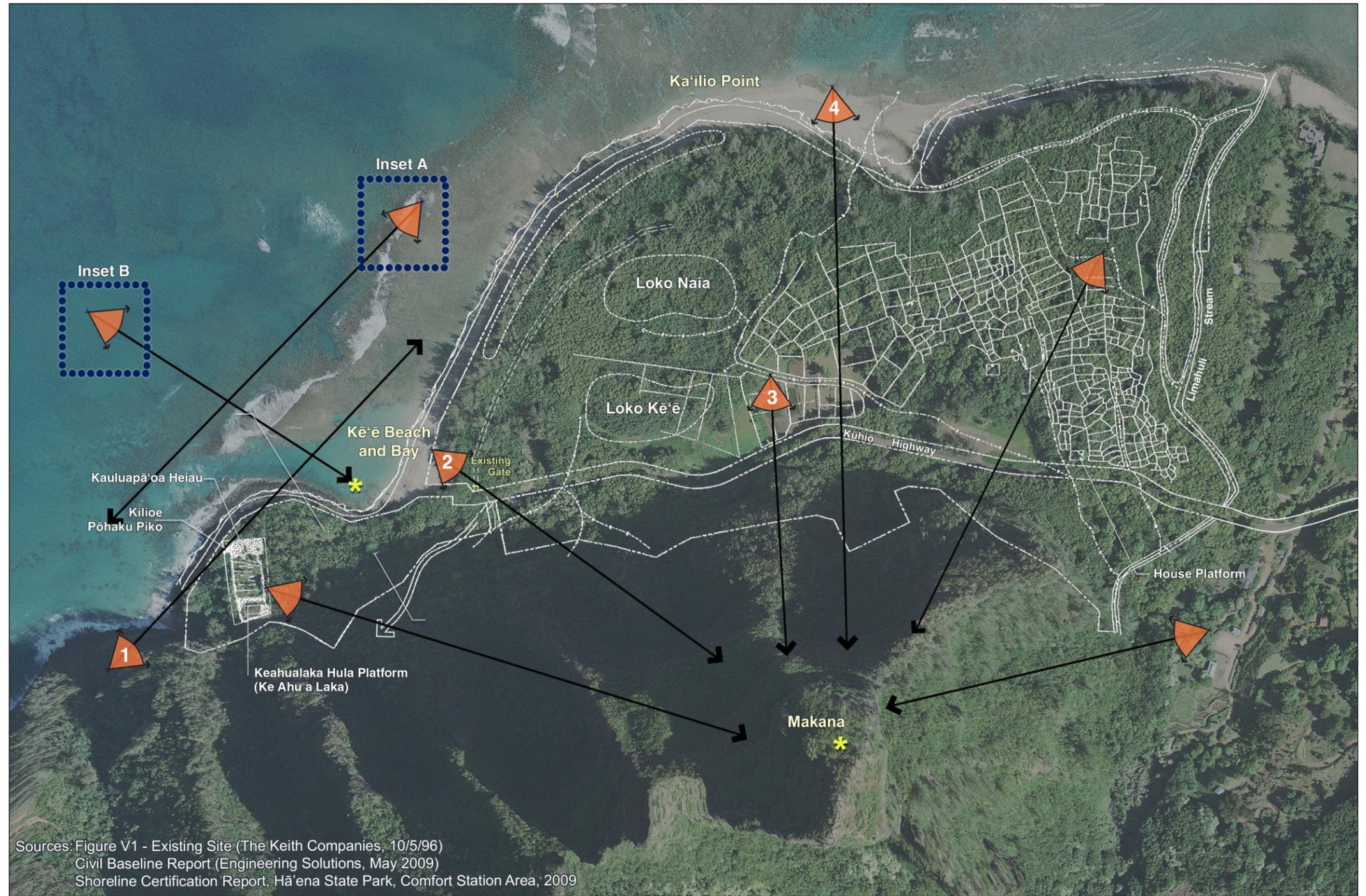
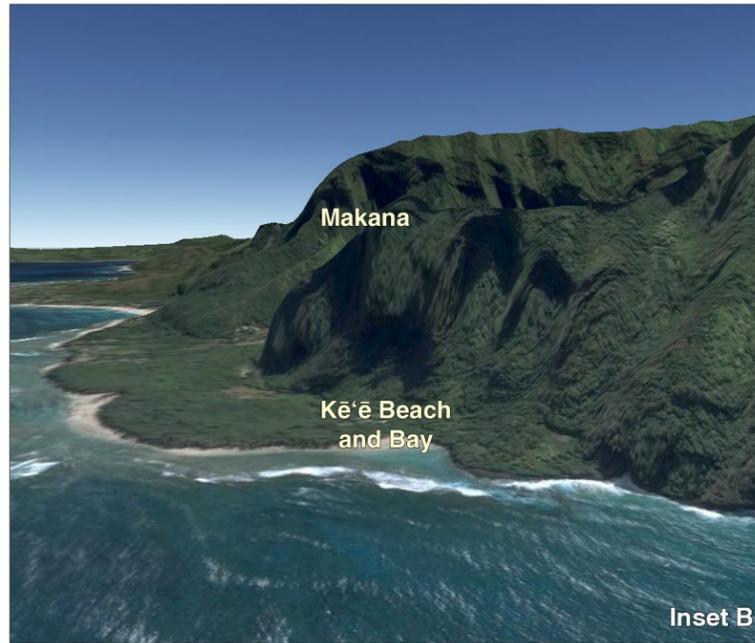
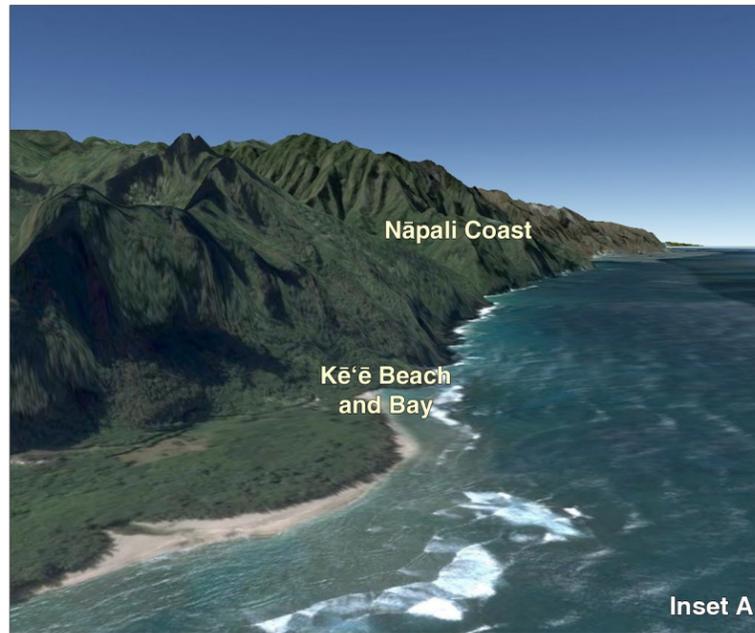
Potential Impacts and Mitigation Measures

Beneficial impacts to the scenic resources of the Park are anticipated due to various measures proposed in the Master Plan that improve visual access. View corridors and lookouts proposed in the Master Plan are illustrated in Figure 33. First, clearing strategic areas of the dense interior of the Park is recommended to be the focus of earlier phases of restoration and improvement. In addition, general vehicle access will be limited beyond the main parking area. Visitors will access the Park by foot or bicycle along the Interpretive Path, allowing views to the lo'i and wet cave without interruption by parked vehicles. Interpretive devices will be installed along the Interpretive Path at key historical and cultural sites. As mitigation against potential negative impacts to views, such displays are recommended to be carefully designed so as not to visually impact the integrity of the Park and its features. At Kē'ē, it is expected that elimination of the steady stream of vehicles waiting for parking and turn-around will serve as a beneficial impact and improve scenic views.

The lifeguard stand is proposed to be moved northeast of its current location. This will serve to remove an obstruction of the view of the beach from Kūhiō Highway while also allowing better visual access of the entire lagoon for the lifeguards for public safety purposes.

New development in the Park such as the ECC will be limited to areas of previous disturbance that do not obstruct any major or important viewplanes. Surrounded by forest, this location does not create an impact on any of the important views previously discussed and as shown in Figure 30, Major Views. Similarly, the Hālau Wa'a proposed with the Cultural Gathering Place is located away from viewplanes.

Last, any forest restoration that will remove the alien tree canopy dominated by false kamani trees will serve to benefit the Park's scenic resources.



LEGEND

- Historic and Scenic Resources
- View Planes Documented in Current Study

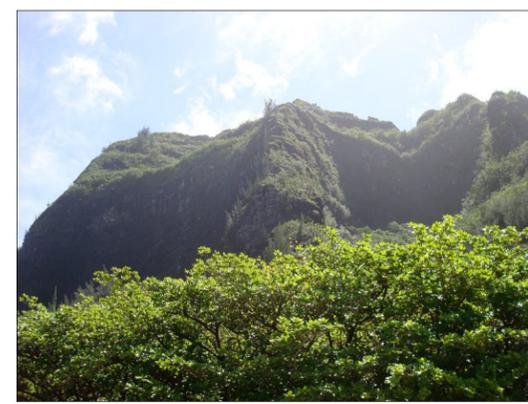
FIGURE 30
Major Views
HĀ'ENA STATE PARK

Department of Land and Natural Resources
 Island of Kaua'i
 North

Linear Scale (Feet)



View 1: View of Kē'ē from 1/2 mile point on Kalalau Trail



View 2: Makana from Kē'ē



View 3: Makana from the cleared lo'i



View 4: Makana from 'auwai outlet near Ka'ilio Point



View 1: Hula Platform looking northeast



View 2: Kē'ē from Allerton Caretakers Cottage



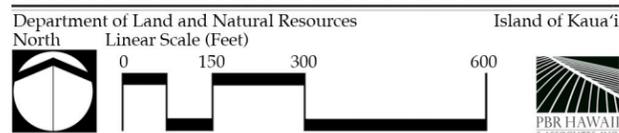
View 3: Kē'ē Beach

LEGEND

-  Points of Interest
-  View Planes Documented in Current Study

Note: View 7 photo credit to Kennedy Jenks.

FIGURE 31
Scenic Resources
HĀ'ENA STATE PARK



View 4: Looking toward Ka'ilio Point



View 5: Cleared lo'i looking west



View 6: Wai a Kanaloa (Wet Cave)



View 7: Limahuli Stream looking upstream from crossing



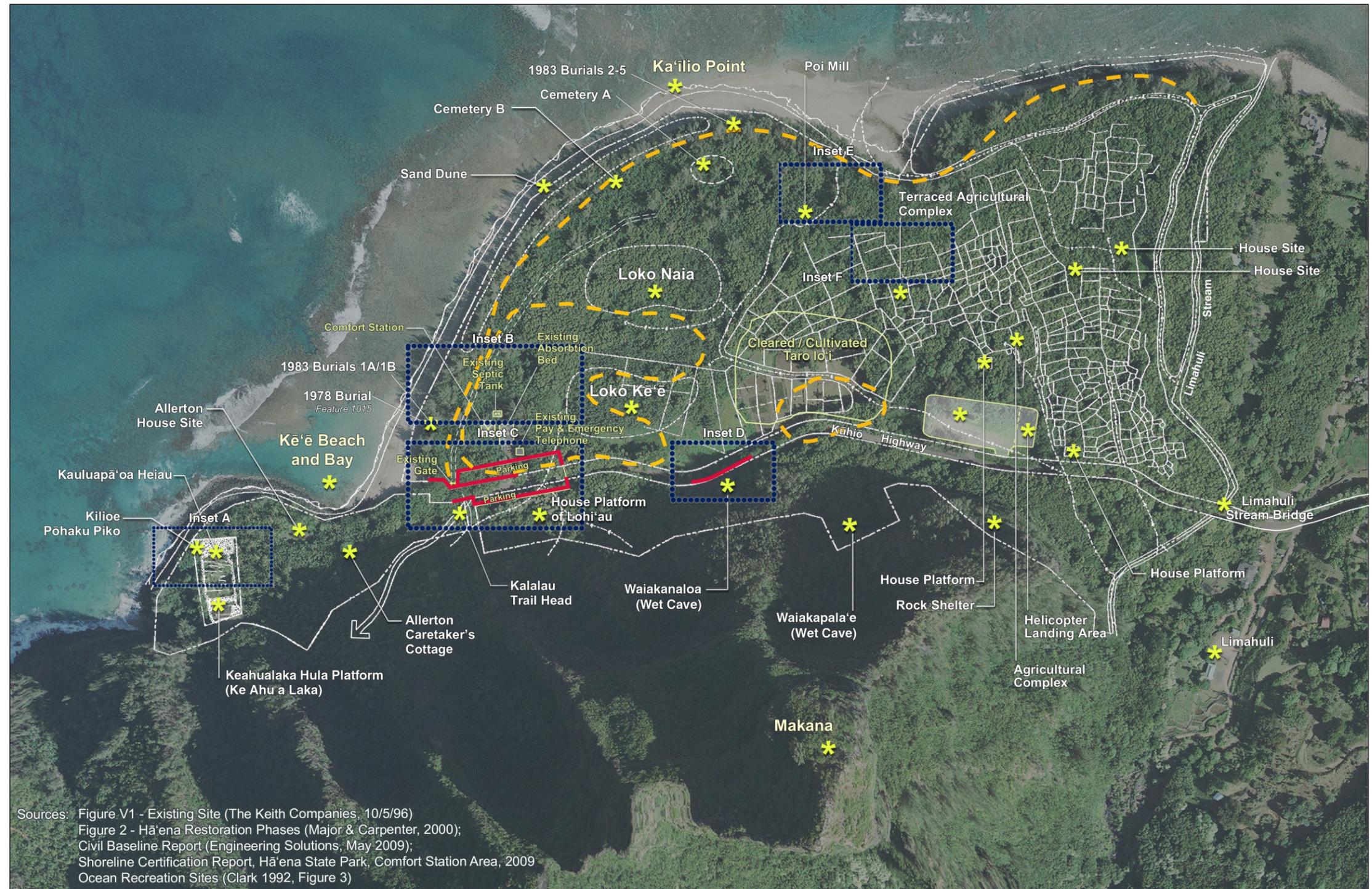
Inset A: Non-native vegetation at Kīlio Pōhaku Piko as seen from Keahualaka Hula Platform



Inset B: Trees blocking views of Kē'e



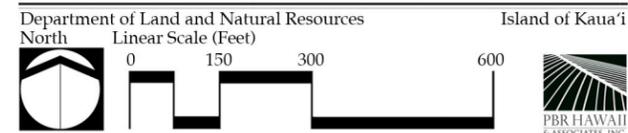
Inset C: Cars and Trees at Kē'e Beach



LEGEND

- Non-Native Vegetation that obscures visual resources
- Parking (legal & illegal) that obscures visual resources

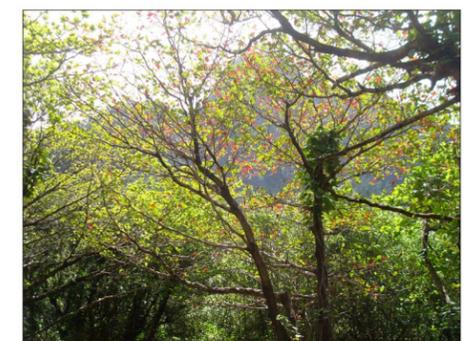
FIGURE 32
Constraints to Scenic Resources
HĀ'ENA STATE PARK



Inset D: Cars at Waiakanaloo



Inset E: Poi Mill site, hau trees



Inset F: View of Makana blocked by non-native vegetation

LEGEND

View Corridor to Ocean from Entry Complex

Other Scenic Views and Lookouts:

- 1 Lo'i
- 2 Lo'i and Ocean
- 3 Wetlands, Makana and Wai a Kanaloa
- 4 Lo'i
- 5 Lo'i
- 6 Hau Tunnel
- 7 Kē'e Lagoon
- 8 Makana and Ocean
- 9 Ocean
- 10 Lo'i and Entry Complex
- 11 Makana

Ocean Views

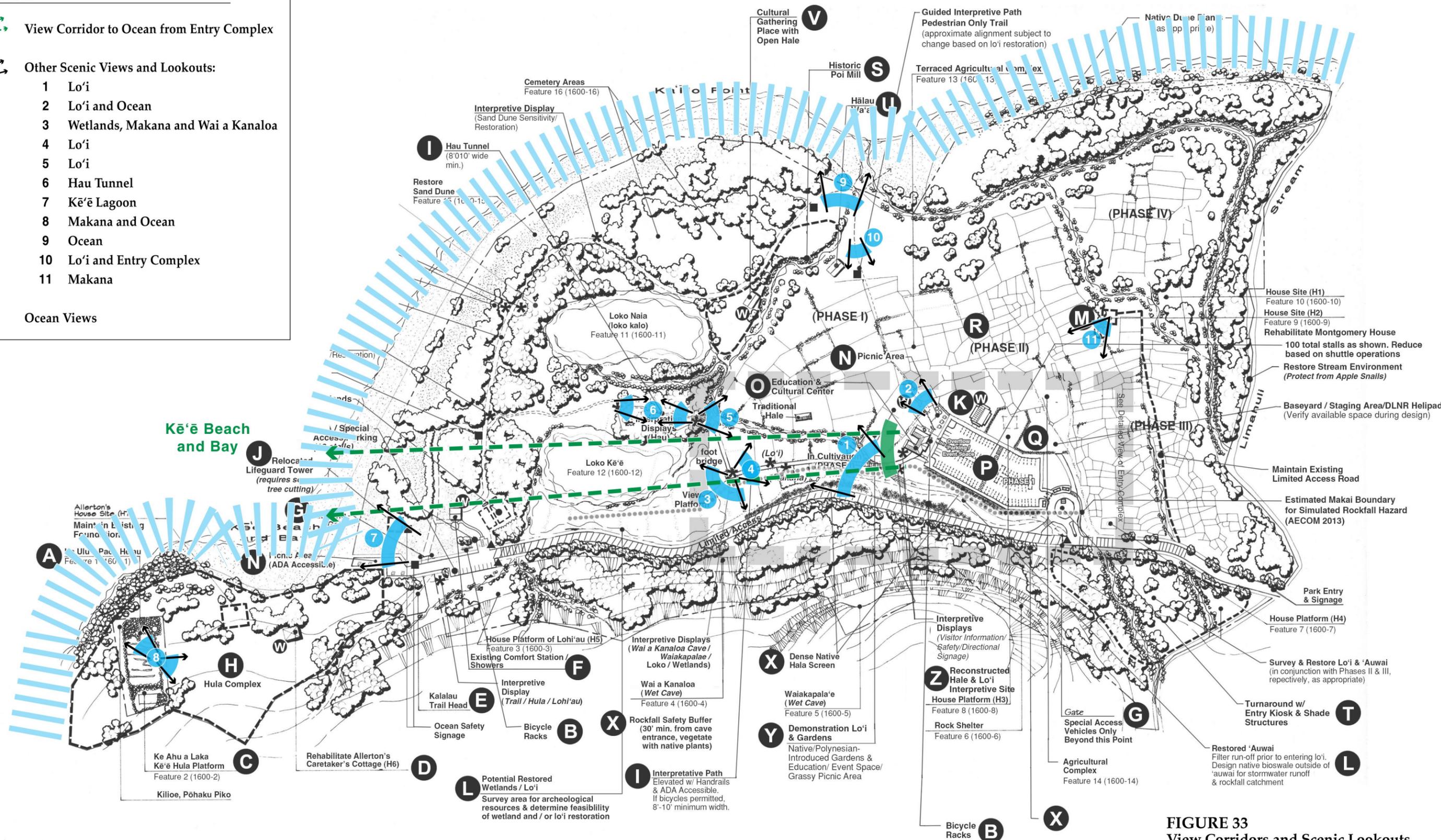


FIGURE 33
View Corridors and Scenic Lookouts
HĀ'ENA STATE PARK

Department of Land and Natural Resources
North Island of Kaua'i



Source: Based on 2001 Community Preferred Master Plan prepared by The Keith Companies
Disclaimer: This graphic has been prepared for general Planning purposes only and should not be used for boundary interpretations or other spatial analysis beyond the limitations of the data.



5.6 SOCIO-ECONOMIC CHARACTERISTICS

5.6.1 COMMUNITY CHARACTER

Existing Conditions

Hā'ena State Park is located at the terminus of Kūhiō Highway, in the ahupua'a of Hā'ena, District of Hanalei, Island of Kaua'i. The area is characterized by its undeveloped wildland environment, traditional agriculture, cultural and recreational amenities, including Limahuli Garden and Preserve, the Kalalau Trail, and Hā'ena County Park. According to the 2010 United States Census, the population of Kaua'i County was 67,091 persons, an increase over the 58,463 persons counted in the 2000 Census. The median age of Kaua'i residents in 2010 was 41.3 years of age. This reflects an aging of the population as the median age in 2000 was 38.

TABLE 7
2010 CENSUS DATA

	Hā'ena Census Designated Place (CDP)	Kaua'i	Hawai'i
Total population	431	67,091	1,360,301
Median age	42	41.3	38.6
% population under 18	21.6%	22.7%	22.3%
% population 60 years and over	18.3%	21.9%	20.4%
% of total population that identifies as one race			
White	66.8%	33%	24.7%
Black or African American	0%	.4%	1.6%
Am. Indian and Alaska Native	.2%	.4%	.3%
Asian	1.6%	31.3%	38.6%
Native Hawaiian and Other Pacific Islander	13.2%	9%	10%
Some other Race	1.4%	.9%	1.2%
Two or more races	16.7%	24.9%	23.6%
Average Household Size	2.6 persons	2.84 persons	2.89 persons
Total Housing Units	332	29,793	519,508
Occupied Housing Units	166	23,240	455,338
Vacant Housing Units	166	6,553	64,170
% vacant housing units that are Seasonal/Recreational/Occasional Use	84.9%	63.7%	46.9%

Potential Impacts and Mitigation Measures

It is not expected that the Master Plan will have any effect on the age, population counts, or racial distribution in the Hā‘ena CDP or Kaua‘i. No mitigation measures are planned.

5.6.2 ECONOMY

Existing Conditions

According to the 2012 State of Hawai‘i Data Book, the average annual number of wage and salaried employees was 605,300 statewide. The average annual wage and salaried employees on Kaua‘i was 28,100. The greatest wage and salaried employment was in the leisure and hospitality industry (8,600), followed by trade, transportation and utilities (5,500), government (4,600), professional and business services (2,800) and education (2,500). As of March 2013, the 2012 annual average statewide unemployment rate (not seasonally adjusted) was 5.8 percent. Kaua‘i’s average unemployment rate (not seasonally adjusted) reported in March 2013 for the year of 2012 was 7.4 percent.

As identified in the Kaua‘i GP, the visitor industry continues to be the driving force of the County’s economy. While the GP highlights the need to diversify the economy, it also recognizes that existing facilities require regular maintenance and upgrades.

Potential Impacts and Mitigation Measures

Despite the potential to limit the number of people entering the Park at any one time, the proposed Master Plan is not expected to impact the local economy in a negative manner. It is expected that managed entry will require individuals to plan their visit in advance and potentially take greater advantage of other North Shore attractions when the Park is at capacity. The recommendation for an increase in interpretive and caretaking activities in the Park may stimulate additional employment and the proposed new fees for visitors may generate enough new income for the Park to support this purpose. Construction of facilities will stimulate purchase of materials (generating excise tax revenues) and employment for labor (generating income tax revenues).

5.7 INFRASTRUCTURE

5.7.1 VEHICLE FACILITIES

Existing Conditions

Public vehicular access to Hā‘ena State Park is limited to Kūhiō Highway (State Highway 560), which runs the length of the Park and terminates at Kē‘ē Beach. The highway is owned and managed by the State DOT and consists of two twelve-foot lanes. Approaching Hā‘ena State Park, the highway has gravel and asphalt concrete pavement shoulders. The highway enters into the Park over Limahuli stream by a single lane, 10-foot wide by 12-foot long concrete bridge. Once in the park, the highway becomes two lanes again and measures

approximately 24 feet in width. The pavement structure is unknown. The highway terminates within the state park at Kēʻē Beach.

Paved shoulder lanes were installed along the highway within the Park in 1985 and in 2002 guardrails were added (Kennedy/Jenks 2011). The shoulders are often used for illegal parking, particularly in areas around Wai a Kanaloa and closer to Kēʻē.

In 2004, a ten-mile stretch of the highway between Princeville and Kēʻē Beach was listed on the National Register of Historic Places (Site Number 30-02-9396). It includes thirteen one-lane bridges within this span, a ford crossing at Mānoa Stream, and a stream crossing at Limahuli Stream. These narrow crossings give the highway its unique and scenic character. However, the narrowness along with weight limits of these bridges also essentially eliminates the passage of large tour buses and trucks through this portion of the North Shore. Passenger vehicles are limited to a 15-20-person maximum and theoretical vehicle weight limits for the bridges range between 20,000 and 40,000 pounds. However, these are not the tested strengths of these historic bridges and it could be far less in reality. A typical 15-passenger van has a gross weight limit (includes passengers and load) of 10,000 pounds (Austin Tsutsumi and Associates 2011).

The highway within the Park has no pedestrian or bicycle amenities, forcing pedestrians to compete with vehicles where steep slopes on both sides of the highway preclude foot and bicycle traffic.

Pervasive illegal parking occurs along both sides of Kūhiō Highway within the park, despite “no parking” posted signage. Cars parked on the already narrow shoulders further force pedestrians and bicycles into the highway.

Unpaved access roads exist within the park, including the coastal access road which runs behind the sand dunes and was recently gated, the access road to the Montgomery House, an access road to the cleared loʻi, and the driveway/access road to the former Allerton property.

A Traffic Impact Analysis Report (TIAR) was prepared by Austin, Tsutsumi and Associates, Inc. (ATA). It is attached as Appendix G. The TIAR includes vehicle counts, discussion of existing traffic operating conditions, projected traffic impacts for the proposed Master Plan and traffic/parking management options. According to historical information, the Park experiences its highest visitor counts in the month of August. Thus, to gain an understanding of the busiest traffic situation, traffic counts were taken on a long summer weekend that included Statehood Day (a Hawaiʻi state holiday). Approximately 1,550 vehicles per day were counted entering and exiting the Park (775 entering, 775 exiting). During the peak hour of traffic during the count (Thursday between 1:15 PM and 2:15 PM), 75 vehicles entered and 120 vehicles exited the Park. The TIAR also reported on the number of vehicles parked within the park, finding that parked vehicles accumulated at the highest rate mid-day. Peak parking accumulation was found to be on Thursday, during the noon hour.

A one-day vehicle traffic count was also conducted by University of Hawai‘i Mānoa students on July 16, 2012. The students counted 761 vehicles entering the Park during a 12.5-hour period of 6:00 AM to 6:30 PM. The students also counted 47 non-automobile entries (bicycle, walking, jogging) (Andrade, 2012).

Visitor use and traffic has increased significantly since the first visitor counts were done in 1993 (see Table 8).

The primary means of park access by visitors is by personal vehicle. The overwhelming sentiment from the public and project team is that the traffic congestion is a significant problem that needs to be addressed. It causes safety concerns for pedestrians, backs up traffic into the neighboring areas, discourages local residents from going to the park, and negatively impacts the overall experience at the Park.

TABLE 8
SUMMARY TABLE OF DAILY VISITOR COUNTS

Year	Month/ Season	Day of the Week	Visitors per Day	Source	Notes
1993	Off-peak		50 (average)	The Keith Companies 2001	
1993	August		353 (average)	The Keith Companies 2001	
1998	September	Friday	1,501	DLNR State Parks	
1999			1,700	DLNR via Stepath 2006	
2008	August	Holiday weekend	1,950 (est.)	ATA 2011	Estimated based on 2.5 persons per vehicle
2010	February	Wednesday	1,247 (est.)	DLNR State Parks	Counts only conducted from 9 a.m.-4 p.m. Estimated based on 2.5 persons per vehicle
2011	July	Monday	2,028 (761 cars)	UH Hawaiian Studies (Carlos Andrade)	Measured from 6:00 a.m. to 6:30 p.m. Includes 8 on bicycles, 14 hikers, 5 joggers, 20 pedestrians.

Potential Impacts and Mitigation Measures

The Master Plan includes a combination of physical improvements and programmatic options that when applied in combination will have a positive impact on the existing automobile traffic and parking conditions. The Master Plan is designed to eliminate the pervasive illegal

parking within the Park by limiting vehicular access to Kūhiō Highway beyond the main parking area. The main parking area is designed in the Master Plan to accommodate approximately 100 cars.

Limited Access Corridor. Vehicle access beyond the main parking area to Kē‘ē beach is proposed to be reduced from the currently unrestricted conditions to special access only (ADA, lifeguards and cultural practitioners). Restricting vehicular access from the main parking area to Kē‘ē Beach will effectively eliminate illegal parking along the highway’s shoulder. This is expected to have a beneficial impact for pedestrians and bicyclists who currently compete with moving vehicles in the highway. Reducing the number of illegally parked vehicles will also serve to improve access to visual resources, particularly at Wai a Kanaloa. Reducing the number of vehicles turning around and/or idling while waiting for parking at Kē‘ē is expected to be a beneficial impact by reducing vehicle/pedestrian conflicts; reducing dust, noise and exhaust fumes; and reducing the amount of pollutants running off vehicles and washing into the lagoon. In addition, the limited access corridor will protect the historic macadam surface of the Kaua‘i Belt Road by reducing the impact of the existing high volumes of traffic.

The proposed parking areas shown in the Master Plan do not materially change the number of legal parking spaces within the Park. It eliminates the opportunity for illegal parking along Kūhiō Highway within the Park boundaries. The beneficial impacts of removing the illegal parking include fewer cars parked within rockfall hazard areas, elimination of vehicles from scenic views such as Wai a Kanaloa wet cave and Kē‘ē Lagoon, and elimination of parking along the Highway’s shoulders which displaces pedestrians and bicyclists into the roadway. The potential negative impacts of removing the illegal parking include an increased demand for legal parking spaces within the park, potential displacement of parking to Kūhiō Highway outside the Park (also illegal), and driver frustration at the park entry and turn-around in the event parking is not available.

Mitigation measures proposed to address the potential negative impacts of removing the illegal parking include: enforcing a per day visitor limit, encouraging use of a shuttle to the park, and improved communication regarding park visitor limits, parking availability and access options. A visitor limit of 900 people per day will be imposed. The visitor limit is expected to have a positive impact on the traffic in the Park and in nearby communities. By instituting a daily visitor limit, park managers are better able to manage park operation and resource impacts. In addition, they are able to anticipate how busy the Park will be on any given day and post notices online or distribute updates to the visitor industry early in the day. This would encourage visitors to plan ahead and could help reduce drop-ins and general traffic along the highway through neighboring North Shore communities to the Park. Prior to instituting the visitor limits, a public information campaign must be made far in advance so people are able to plan their visit to the Park. To accommodate visitors above what the 100-stall parking area can support, a shuttle to deliver visitors to the Park will be encouraged.

A transportation sub-committee of the MPAC evaluated a number of programmatic and physical improvements to mitigate the potential impacts of restricted park access including:

- Park access and transportation modes
- Parking management
- Fees for park entry and/or parking
- Point of purchase or ticket pickup

During the meetings with the MPAC and community, various suggestions were made to encourage or even require that visitors arrive at the Park by different modes of transportation to help reduce traffic. Three concepts were explored with the MPAC: (a) Princeville-based park entry, (b) Combination on-site parking and Princeville entry facility, and (c) On-site parking only. The preferred scenario, which best mitigates the potential traffic and parking impacts of the Master Plan, is described as follows.

The preferred scenario is to implement the shuttle from the Princeville facility at the start of Phase I, minimizing the need for visitor parking in the parking lot in the Park. However, the Master Plan includes space to accommodate a parking lot for up to 100 vehicles. The design and materials of the parking lot would allow its size to be adjusted as the Master Plan is implemented. It could be reduced to accommodate as few as zero vehicles if the shuttle bus service is fully implemented and meets all needs, or expanded to accommodate up to 100 vehicles to address the possibility that the shuttle service might not be implemented on schedule or to accommodate special needs that could only be met by additional on-site parking (for example, the need for after-hours on-site parking, or additional parking for cultural practitioners, kupuna, subsistence fishermen or handicapped visitors). This scenario should significantly reduce traffic in the Park and surrounding neighborhoods. By providing visitors an alternative means to get to the Park, this scenario will also reduce the potential for “spillover” parking issues in the neighborhood that could be created from the limited main parking lot.

Parking demand can be influenced by a number of factors including the availability, attractiveness, and perceived convenience of alternate means of access to the park, socio-economic characteristics of visitors, the accessibility, efficiency, and perceived safety of the parking facility, the cost of parking, and time frame factors (i.e. week day vs. weekend; seasonal fluctuations; and, other unexpected events such as a downturn in the economy). If the main parking lot remains, parking management can be achieved by manipulating one or more of the above factors, either alone or in concert. Some of the management options could be applied together while others would not.

There are two potential entry points at which a fee could be administered — at the parking lot for parking and for park entrance for individuals (both remote, if established, and on-site).

Initially, State Parks plans to assess an entry fee per person, with Hawai‘i residents exempt, regardless of how visitors arrive at the Park. More pertinent to the impacts of the parking

improvements are parking fees charged separately from entry fees, which may help manage parking demand. In general, ample free parking encourages vehicular trips and long stays. Parking priced at a premium or hourly could encourage alternative modes of access and higher turn-over rates within the parking lot. Furthermore, if parking is further reduced on-site, premiums could be charged to park on-site.

When fees are introduced, there are other options to help encourage repeat visitation or support local attendance such as offering annual or lifetime passes and open houses/fee free days. Because federal Land and Water Conservation Fund (LWCF) monies were used to acquire the Park lands, any fees charged to non-residents cannot exceed twice that charged to residents. Where there is no charge for residents but a fee is charged to nonresidents, nonresident fees cannot exceed fees charged for residents at comparable State or local public facilities. In addition, the fees administered at Hā'ena State Park must be consistent with statewide standards.

Table 9 summarizes the fees currently charged at some of Hawai'i's most popular parks. Table 10 shows different options of how fees could be charged for both entry and parking.

If entry fees are charged at the park, park pass systems such as annual passes or lifetime passes could be implemented to make it more affordable for frequent visitors. The passes could include benefits such as free or discounted parking if parking fees are charged, priority parking spaces, priority park entry and/or parking reservations or potential exclusion from daily visitor limits. If pass holders are excluded from daily visitor limits, the MPAC suggested requiring passes be obtained prior to park arrival so visitors who did not plan their visit could not bypass the daily limit and purchase an annual pass upon arrival. The LWCF rules require that reservations, memberships, or annual permit systems available to residents must also be available to nonresidents and the period of availability must be the same for both residents and nonresidents.

There are several types of pass systems that could be implemented at the Park. Even with the restrictions required by State and LWCF rules, there is flexibility in the way the pass systems may be offered and a wide range of benefits they could offer. They could be implemented alone or in combination depending upon the desired impact on visitorship.

Many parks and museums that have entry fees offer open house or fee free days to encourage visitation and serve those who may not be able to pay. Depending how entry fees are established for Hā'ena State Park, similar programs could be implemented. With the daily visitor limits in place, advance reservations would be highly recommended for both parking and entry.

During the meetings with the MPAC, creative ideas about how to manage the flow of visitors to and from the Park were discussed. One involved the point of purchase for tickets, or where tickets to the Park could be obtained. One suggestion was to locate it offsite to minimize

unnecessary drop-in vehicle traffic to the Park. If visitors were required to obtain their tickets prior to arrival, this would encourage them to plan their trips to the Park ahead of time and would also give park managers an idea of how many people to expect at the Park on any given day. Tickets could be obtained online or through an authorized ticket vendor/distributor and ticket availability could be posted on the website in real time. Another option the MPAC suggested was to have visitors obtain entry tickets through a shuttle service which would also help reduce traffic to the Park. Also, if annual passes were available and pass holders were excluded from daily visitor limits, the MPAC felt it important to make them only available online or remotely, or to have the passes mailed to the recipient, so that visitors could not bypass the daily limit by purchasing one at the Park. All of these options require extensive public outreach and education. Table 11 provides a list of options from the traditional to those requiring more complicated management and their respective positives and negative impacts.

5.7.2 PARKING CONFIGURATION AND MATERIALS

Existing Conditions.

Within the park, there are two designated parking areas, one approximately 800 feet from the Park entrance and one at the terminus of the highway near Kē‘ē beach. The parking lot nearest the Park entrance is dirt and gravel and measures approximately 30,000 square feet in area, it is unsigned and unstriped. In the absence of striping, visitor parking patterns are informal and at times inefficient. During wet weather conditions the dirt/gravel surface becomes muddy and deeply grooved from vehicle maneuvering. As the parking surface dries, the grooved mud becomes hard packed ruts. The parking area near Kē‘ē beach is hard-packed dirt on each side of the highway. Two ADA accessible spaces are paved, striped and signed.

Potential Impacts and Mitigation Measures

The main parking area is proposed to be constructed of a material that can be striped or otherwise allow for an orderly parking pattern. Beneficial impacts are expected to include more orderly and efficient use of the parking area, an improved driving surface, and a reduction in sediment runoff. Negative impacts from changing the parking lot surface include the potential for polluted runoff and inability to infiltrate rain water on hard surface parking. Mitigation measures to address the potential negative effect of a hard surface parking area include use of materials and construction methods that support infiltration such as pervious pavers or grasscrete. Bioswales around the parking area are also proposed. Methods for stormwater systems will be determined at the time of construction plan design based on sustainability, cost, and availability of materials/technology.

5.7.3 PUBLIC TRANSIT

Existing Conditions

The County of Kaua‘i Transportation Agency provides public transit service between Hanalei and Kekaha via the Kaua‘i Bus. Service between Līhu‘e and Hanalei is provided six days a

week, Monday through Saturday, between 6:20 a.m. and 8:00 p.m. Route 400 runs from the Hanalei Courthouse to Kaua‘i Community College and Route 500 runs in the opposite direction. Fares are \$2.00 per trip for adults, \$1.00 per trip for seniors (60+ years) and youth (7 – 18 years). The County also offers monthly passes for \$35.00. All buses are wheelchair accessible. Folding baby strollers, musical instruments, and body boards are permitted onboard. However, surfboards, large backpacks and other bulky items that block the aisle or seat are not permitted onboard. Currently, there is no public transportation service to Hā‘ena. Private shuttles and taxis can be arranged for a fee.

Potential Impacts and Mitigation Measures

The Master Plan proposes to remove opportunities for illegal parking within the Park. This may result in a greater demand for public transit to the Park. Proposed mitigation measures include enforcing a per day visitor limit, encouraging use of a shuttle to the park, and improved communication regarding park visitor limits, parking availability and access options.

5.7.4 PEDESTRIAN AND BICYCLE FACILITIES

Existing Conditions

Although primary access to the Park is by car, people also walk, jog, and bicycle to the park; some of whom enjoy early morning or late afternoon treks to the beach when the Park is not as crowded. There are currently no designated pedestrian or bicycle facilities within the Park or en route to the Park. Pedestrians and bicyclists typically travel along the side of the highway or in the shoulder of the roadway (Kennedy/Jenks 2011). However, there are many areas where rock slopes, vegetation, guardrails, and illegal parking block the shoulder, forcing pedestrians and bicyclists to share the narrow vehicle travel lanes, creating a dangerous situation where they may be hit and vehicle traffic is forced to slow down.

Potential Impacts and Mitigation Measures

The Master Plan includes a combination of physical improvements and programmatic options that will have a positive impact on pedestrian and bicycle facilities.

The Master Plan proposal to limit vehicular access along Kūhiō Highway from the main parking area to Kē‘ē Lagoon is anticipated to have both beneficial and potentially negative impacts. The reduction of vehicles on Kūhiō Highway is expected to result in fewer vehicles traveling through, idling, and turning around in the rockfall hazard area, in front of scenic resources, and in conflict with pedestrians and bicyclists. In addition to improvements to scenic resources and safety, beneficial impacts are expected to include less vehicle noise, exhaust, and polluted runoff. The anticipated negative impact from limiting vehicular access along Kūhiō Highway is that visitors will not be able to drive right up to the Park’s resources.

Mitigation measures proposed to address the potential negative impact of limiting vehicular access along Kūhiō Highway include: maintaining a special access parking area at Kēʻē Beach for ADA and cultural uses, such as hula practitioner staging and cemetery caretaking.

Currently, the primary pedestrian flow through the Park is along Kūhiō Highway from the main parking area or from illegal parking spots on the highway shoulders to Kēʻē Beach. The Master Plan proposes construction of an Interpretive Path which is meant to be the primary pedestrian facility between the main parking area and Kēʻē Beach. It will traverse the loʻi along the first berm separating the first two rows of loʻi and then turn north to avoid the wetlands. It will cross an ʻauwai over a footbridge and connect to a path through the hau tunnel. This path will then connect to the trail behind the dunes and turn south, leading visitors past the lifeguard tower to Kēʻē. There are both beneficial and negative impacts anticipated with construction of an Interpretive Path at the location proposed. Beneficial impacts of moving the pedestrian flow from Kūhiō Highway to the interpretive corridor include removing visitors from the rockfall hazard area, and reducing the potential for pedestrian/vehicular conflicts along the highway, while allowing greater visual access to the agricultural complex, the wetlands and the peak of Makana. Potential negative impacts include the potential for disruption of community gardening activities in the loʻi, and disturbance of loʻi walls from construction of path footings. Proposed mitigation measures include restoration of the agricultural complex (Phases III and IV) and archaeological surveying prior to path construction.

TABLE 9
EXAMPLE ENTRY AND PARKING FEES FOR HAWAII PARKS, 2012

Park	Entry Fee (Adult/Child)	HI Resident Entry Fee	Parking Fee*	HI Resident Parking Fee*	Passes[†] Available	Notes
<i>HAWAII STATE PARKS</i>						
Nu‘uanu Pali State Wayside Park	None	None	\$3	Free		Commercial PUC vehicles: \$6 for 1-7 passenger vehicles, \$12 for 8-25 passenger vehicles, \$24 for 26 + passenger vehicles.
‘Iao Valley State Monument	None	None	\$5	Free		Commercial PUC vehicles: \$10 for 1-7 passenger vehicles, \$20 for 8-25 passenger vehicles, \$40 for 26 + passenger vehicles.
‘Akaka Falls State Park	\$1 per walk-in	Free	\$5	Free		Commercial PUC vehicles: \$10 for 1-7 passenger vehicles, \$20 for 8-25 passenger vehicles, and \$40 for 26 + passenger vehicles.
Diamond Head State Monument	\$1 per walk-in	\$1 per walk-in	\$5	\$5		Commercial vehicles: \$10 for cars/vans, \$20 for mini-buses, and \$40 for buses.
‘Iolani Palace State Monument	None	None	Metered	Metered	N/A	Fees charged for tours and basement gallery exhibits administered by The Friends of ‘Iolani Palace. Self-led audio tour is \$7 for adults, \$5 for children aged 5-12. Guided tour is \$20 for adults, \$6 for children aged 5-12, \$15 for Hawai‘i residents and military with proper ID. Entry for the Basement Gallery Exhibits is \$7 for adults, \$3 for children aged 5-12.
<i>NATIONAL PARKS</i>						
World War II Valor in the Pacific National Monument	None	None	None	None	N/A	No fees for entry to USS Arizona Memorial. However, entry tickets must be obtained prior to entry either online or in person on a first come, first served basis. Audio tours available for \$7.50. The Battleship Missouri Memorial, USS Bowfin Submarine Museum and Park, and Pacific Aviation Museum, are operated by non-profit entities that charge fees for admission. Online purchases regardless of fees are assessed a \$1.50 processing fee per ticket.
Haleakalā National Park	\$5 per person with no vehicle	\$5 per person with no vehicle	\$10	\$10	Yes	Vehicle entry fees (except for commercial groups) good for 3 days. Motorcycles are \$5 plus \$5 for each additional passenger. Youth 15 and under are free. Non-commercial groups charged: <ul style="list-style-type: none"> • \$10 for vehicle capacity of <14. • \$5 per person for vehicles with a capacity of 15 or greater. Commercial groups charged: <ul style="list-style-type: none"> • \$5 per person for non-road based organized groups that offer activities such as Astronomy and Hiking. • \$30 plus \$5 per person for road based vehicles with a 1-7 passenger capacity. • \$45 for road based vehicles with an 8-25 passenger capacity. • \$100 for coach buses with a passenger capacity of 26 people or more.
Pu‘uhonua ‘O Hōnaunau National Historical Park	\$3 per person	\$3 per person	\$5	\$5	Yes	Entry and parking fees are valid for 7 days. Up to 8 people per vehicle entrance fee.
Hawai‘i Volcanoes National Park	\$5 per pedestrian or bicyclist	\$5 per pedestrian or bicyclist	\$10	\$10	Yes	With a valid receipt, general admission entrance fees allow entrance for 7 days. Non-commercial groups in vehicles with a capacity of 15 or more charged \$5 per person. Persons 15 years or younger are free. Commercial operations charged on vehicle capacity and type of tour given (road-based or not).
Kīlauea Point National Wildlife Refuge	\$5/Free under 16 yrs.	\$5/Free under 16 yrs.	None	None	Yes	Passenger vehicles are limited to vans with a capacity of 15 or fewer people.
<i>CITY and COUNTY OF HONOLULU</i>						
Hanauma Bay Nature Preserve	\$7.50/Free 12 yrs. and under	Free	\$1	\$1		Parking fee is refundable if vehicle exits the parking lot within 15 minutes.
NOTES: *For private non-commercial vehicles. [†] Refers to any type of pass such as an annual pass, lifetime pass, volunteer pass, multi-park pass, etc.						

This page intentionally left blank.

**TABLE 10
OPTIONS FOR FEES**

Option	Pros	Cons	Implementation Considerations
Flat Rate (for Entire Day)	<ul style="list-style-type: none"> • Simple to administer. • No enforcement required. 	<ul style="list-style-type: none"> • Does not take into account different impacts of different users. 	<ul style="list-style-type: none"> • Payment can be made in advance. • Consider different rates for residents/non-residents as long as it meets State and LWCF rules.
Half-Day Rate	<ul style="list-style-type: none"> • Offers lower fee options for those spending less time at the Park. 	<ul style="list-style-type: none"> • Difficult to enforce. 	<ul style="list-style-type: none"> • Payment can be made in advance. • Requires enforcement.
Hourly Rate	<ul style="list-style-type: none"> • Offers lower fee options for those spending less time at the Park. • Could be graduated to encourage turnover, especially for parking. 	<ul style="list-style-type: none"> • Difficult to enforce. 	<ul style="list-style-type: none"> • Requires fee collection upon exit or enforcement. • Implement real-time parking space availability notification system to help mitigate unnecessary traffic to the Park.
Rates Based on User (e.g. hiker vs. park user)	<ul style="list-style-type: none"> • Charge fees appropriately based on use and user impacts. 	<ul style="list-style-type: none"> • Could be difficult to enforce within the Park. 	<ul style="list-style-type: none"> • Payment can be made in advance. • Requires more check-in points and enforcement.

TABLE 11
TYPES OF PASSES

Type	Description
Annual Pass	Annual passes could be issued at discounted rates for either park entry or parking, or for both. Annual passes would need to be renewed each year and could be valid from the month of purchase (or of distribution, if free), a person's birthday, or by calendar year. Fees would be pro-rated appropriately. Parking passes could either be issued to an individual or to a specific vehicle. Annual park passes could be issued to individuals or to families at different rates (if there is no charge for residents, there would also be no charge for resident families).
Volunteer Pass	Park passes could be issued to those who put in a certain minimum number of volunteer hours at the Park.
Kupuna Pass	Park passes could be issued at discounted rates to kupuna or seniors of a certain age.
Lifetime Pass	Park passes could be issued to certain individuals who meet specific criteria as long as it does not violate State or LWCF rules. An example might be to recognize those who have dedicated or volunteered a large amount of time to the Park or original Hā'ena family members who once resided on the land within the Park. These passes would be valid for the duration of a person's lifetime and would not require renewals.

5.7.5 WATER

Public facilities serving the Park are described in detail in Appendix H, Civil Baseline Report, which was prepared by Kennedy Jenks Consulting Engineers (formerly Engineering Solutions).

Existing Conditions

According to Kennedy/Jenks, the County of Kaua'i Department of Water (DOW) currently provides potable water to the Park via a four-inch PVC pipe that terminates at the entrance to the Park and has a one-inch meter. Water is gravity-fed from a 0.1 million gallon reservoir 1.1 miles away at a ground elevation of 126.5 feet above mean sea level. Within the park, a three-inch galvanized iron pipe runs along Kūhiō Highway in an east-west direction and serves the comfort station and associated shower at Kē'ē Beach. Most of the three-inch pipe is installed above ground and buried pipe depths are unknown. Recorded water usage from October 2003 to November 2006 averages 2,125 gpd. More efficient fixtures were added when the comfort station was upgraded in 2008. It is expected that the new fixtures will decrease water demand from 25 gallons per minute to 21 gallons per minute.

As a condition of the SMA permit for the existing comfort station, the Kaua'i County DOW required that a backflow prevention device be installed (County permit number(s) SMA(U)-2007-2 and SMA(U)-2010-3). A backflow prevention device was installed in 2009 with the comfort station construction.

Limahuli Stream water is diverted for irrigation and residential purposes by multiple landowners. According to the CWRM, there were seven separate diversions from Limahuli Stream, six of which are still active. Of the six active diversions, three supply Limahuli Garden and Preserve and three serve private residences. All consist of PVC pipes and none pump water from the stream. Two of the diversions serve domestic uses and the rest are for agricultural, landscaping, or other irrigation purposes. The total diversion amount for five of the diversions is 0.8822 cfs, or just over 570,000 gpd. The amount diverted for one of the private residences is unknown.

A portion of the water (average of 760,000 gpd) diverted for Limahuli Garden is conveyed to the lo'i at Hā'ena State Park by PVC pipe. The intake is located on the south side (mauka) of the highway and the water flows by gravity through an HDPE pipe to and into the lo'i. The line begins as an eight-inch HDPE line at an elevation of 95.9 feet amsl and transitions to a six-inch HDPE line at 57.5 feet amsl. It crosses the highway through one of the 18-inch drainage culverts (Kennedy/Jenks 2011).

There is no fire protection water system within the Park. If needed, seawater is airlifted to the site of any fire. The last fire hydrant/standpipe is located outside of the park, roughly 75 feet away, and is connected to the County's potable water system.

Potential Impacts and Mitigation Measures

The existing 3-inch water main within the Park is expected to be sufficient for the proposed Master Plan improvements. This is due to the anticipated reduction in number of daily visitors recommended by the Master Plan. Comments from the County DOW, found in Appendix B, indicate that water will be limited to the existing water meter until adequate water system facilities are available. To minimize demand and impacts on the County water system, the Master Plan suggests using treated wastewater and collected rainwater for irrigating the landscaping around facilities such as the ECC, picnic area, Caretaker's Cottage and Baseyard as well as for toilet flushing at the ECC and Caretaker's Cottage.

As additional traditional lo'i are cleared, there may be more demand for irrigation water. More efficient use of the site's historic 'auwai, may help capture and divert precipitation to desired locations. The Master Plan suggests redesigning the Kūhiō Highway culverts so that rainwater that passes beneath it flows more naturally and can be filtered and used in the 'auwai system.

Additional diversion from Limahuli Stream should be reduced as much as possible by collecting, storing, and using rainwater. However, should additional volumes be desired from Limahuli Stream, effects on the stream's function and the biological resources it supports will need to be taken into consideration and permits may be required from the CWRM. The CWRM provided a pre-consultation response letter to this effect on August 25, 2008 (Appendix B) noting that approvals required from the CWRM may include Stream Channel Alteration Permit; Stream Diversion Works and/or Petition to Amend In-stream Flow Standards.

An additional mitigation measure under consideration to minimize or avoid additional stream water diversion is diversification of agricultural crops to include the addition of dryland crops within the agricultural complex. One request of the MPAC was to allow for community gardening activities to include other culturally relevant crops to be planted in addition to kalo. It is generally thought that complex was known to be flexible, allowing dryland cultivation to be done by simply redirecting water through different paths. ‘Uala, or sweet potatoes, were known to be grown in sandy areas and mai‘a, bananas, kō, sugar cane, and ‘awa (*Piper methysticum*) were grown in the valleys. If this mitigation measure is employed, close coordination with State Parks archaeological staff will be critical to ensure that the lo‘i walls are not disturbed.

5.7.6 WASTEWATER

Existing Conditions

Park wastewater facilities are described in Appendix H, Civil Baseline Report and in greater detail in Appendix I, Wastewater Preliminary Engineering Report. Hā‘ena State Park’s first comfort station was built in 1979 at Kē‘ē Beach by DLNR and wastewater previously emptied into a six by eight-foot diameter cesspool. In 2001, a 2,500-gallon individual wastewater system including a 2,500 gallon septic tank and 2,700 s.f. leach field was built for the comfort station to comply with EPA’s large capacity cesspool closures.

In 2008, the original comfort station was demolished and replaced by a new one built in the same location. It maintains the same number of fixtures as the original – three water closets, one urinal, and two lavatories (sinks). These fixtures are estimated to generate 2,016 gpd (Kennedy/Jenks 2011). According to DOH standards for picnic parks, this equates to approximately 403 visitors per day based on an average 5 gpd per person (toilet wastes only). An outdoor shower with multiple shower heads and spigots is located to the south of the comfort station and runoff water is allowed to drain and infiltrate into the surrounding soils.

In the years 2007-2010, DLNR and members of the Hā‘ena community collaborated on the design of an alternate individual wastewater system to mitigate impacts to cultural and archaeological resources beneath the existing leach field. The result has been approval and construction (in 2011) of a subsurface flow-based wastewater treatment system. A “subsurface” system is one where the constructed wetland is contained within a liner, but the wastewater flows beneath the surface of a gravel medium within the liner so there is no exposed water under normal operating conditions. Native plants such as makaloa (*Cyperus laevigatus*) and ahu‘awa (*Cyperus javanicus*), two perennial sedges, are native species that were planted within the constructed wetland. Wastewater is first treated within a primary treatment tank. Then, the wastewater flows to the constructed wetland where it is further treated by having the plants take up nitrogen and more importantly, create an environment where organisms that thrive in the root systems can feed on bacteria in the wastewater, further improving water quality before discharging it into the leaching chambers. The new infiltration field is located to the east of the archaeological site but west of the delineated

natural wetlands of the two loko. The new comfort station and treatment facilities are sized to manage the same amount of wastewater, 2,016 gpd, or roughly 403 visitors per day, based on DOH standards (Kennedy/Jenks 2011). The existing septic tank and leach field will continue to serve as an emergency backup system in the event the constructed wetlands system is not operational.

Greywater from the outdoor shower at Kē‘ē is allowed to infiltrate into the surrounding ground.

In addition to the existing comfort station wastewater system, an abandoned cesspool was found at the Montgomery House. The existing Allerton House and Caretaker’s Cottage also probably have abandoned cesspools.

Potential Impacts and Mitigation Measures

The addition of the ECC and Hālau Wa‘a/Cultural Gathering Place will necessitate additional comfort stations. The ECC facilities will help reduce the use of the Kē‘ē comfort station where there are sensitive cultural sites. The Master Plan also suggests that a comfort station may be constructed near the hula complex and that restroom facilities may be added to the restored Montgomery house. Due to the site’s remoteness, the Master Plan does not propose connection to any public sanitary sewer systems and all wastewater is proposed to be treated and disposed of on site.

Based on strong community preference, the Master Plan proposes that any new wastewater systems include a treatment system that brings wastewater to an “R-2” water quality level. “R-2” is nomenclature describing levels of quality for recycled water, defined by the DOH. R-2 water is disinfected, secondary treated wastewater with effluent fecal coliform that does not exceed 23 per 100 ml using seven days of results and 200 per 100 ml in more than one sample in a 30-day period. It is deemed acceptable to utilize R-2 water for subsurface irrigation of non-edible plants. Additional treatment is required for broadcast irrigation.

Treatment of wastewater to an R-2 level is anticipated to be the primary mitigation measure for potential impacts associated with on-site wastewater disposal. A suite of mitigation measures under consideration to offset any impacts that could be caused by wastewater treatment and disposal include:

- Treatment for wastewater should be to a minimum R-2 water quality, with aeration and non-chlorine treatment such as UV disinfection to improve effluent quality. Consider using renewable energy sources to provide power.
- To minimize the footprint of wastewater facilities on ecological, cultural and archaeological resources, locate effluent absorption beds under parking lots and driveways.
- Add aeration to the existing constructed wetlands primary treatment tanks, powered by a PV system.
- For remote, low use facilities, such as the Cultural Gathering Place and the hula complex, utilize composting toilets or temporary/portable facilities as needed.

- Use non-chemical disinfectants and cleaning products for maintenance, particularly in composting toilets, to minimize impacts to wastewater treatment processes and effluent quality.
- Since the proposed wastewater facilities are currently not standard according to the DOH, include maintenance manuals and provide instruction to ensure proper upkeep of all wastewater systems at the Park.
- Reuse effluent for irrigation rather than disposal.

A description and analysis of wastewater alternatives is provided in Appendix I, the Wastewater Preliminary Engineering Report. The report provides a Wastewater Alternatives Matrix that will assist in specific system selection at the time of building design. Beyond recommending that secondary treatment be provided, the Master Plan does not prescribe the type of systems to be employed at the ECC, Hālau Wa‘a, hula complex or restored Montgomery house, allowing maximum flexibility for building designers to take advantage of emerging technologies in wastewater management. If defunct cesspools are located during the construction process, they will be abandoned in accordance with current regulations.

5.7.7 DRAINAGE

Existing Conditions

As discussed in Section 4.5, the coastal areas and the areas along Limahuli Stream are within the 100-year flood plain with base flood elevations determined in both the special flood hazard areas (Zone AE) and coastal flood areas with velocity hazard (Zone VE) (see Figure 26). Much of the Park is also classified as wetlands makai of the highway with the exception of the main parking lot area and the area around the existing comfort station. Limahuli Stream is the only perennial stream within the Park. However, there is an extensive ‘auwai system that once served the lo‘i and intermittent flows during heavy rainfall events coincide with many of these channels. The Civil Baseline Report (Appendix H) notes that during heavy rains, stormwater runoff is typically full of sediment, soil, plant and animal material and other debris which causes muddy plumes at the outfalls. This is part of the naturally occurring drainage pattern at the Park. The two main outfalls are Limahuli Stream and Pohofokeiki Channel. However, the Kē‘ē lifeguards and community members have also witnessed heavy runoff flowing from the end of the highway across the beach, eroding the sand and emptying into Kē‘ē Lagoon.

Drainage facilities on the site consist of five 18-inch reinforced concrete drain culverts that allow storm water to cross beneath Kūhiō Highway from south to north. Three have at-grade three by four-foot drain inlets and the other two have headwalls. Drainage calculations are provided in the Civil Baseline Report (Appendix H). It is estimated approximately 56.8 cfs and 37.9 cfs of runoff from approximately 14.2 acres above Kūhiō Highway flows downslope into the culverts during the ten-year and two-year storm, respectively.

The drain culverts satisfy the requirements set forth in the County of Kaua'i Department of Public Works Storm Drainage Standard. However, during a 50-year storm, an estimated 7,300 cfs of runoff flows directly to the ocean. This includes runoff from the west end of Makana that flows over Kūhiō Highway as well as the entire area of the Park below Kūhiō Highway. During heavy rain storm events, the entire park is inundated with rushing waters from this surge of rainwater. The existing drainage improvements do not have the capacity and were not designed to handle the larger storm events.

Potential Impacts and Mitigation Measures

The addition of impervious surfaces to a site can result in a decrease in water quality and an increase in surface water volume during rain events. Water quality can be impacted by rainwater sheet flowing across impervious surfaces, collecting pollutants, sediment and trash and delivering the pollutants to natural drainages and streams. These same impervious areas, can also impact the quantity of water and the speed in which it is delivered to natural drainages and streams because there is no opportunity for water to infiltrate in place.

The intensity of rain events and volume of stormwater flows from mountain sources are such that, to assist in selection of mitigation measures and to support development and construction decision-making, a detailed drainage study is planned.

In general, it is expected that basic stormwater mitigation measures can address the effects from development during the average storm events. For larger events, where the Park is inundated with rushing waters, mitigation measures are simply to minimize development and ensure that what is built and planted can withstand heavy precipitation and overland sheet flows. To this end, no new structures, parking or other impervious surfaces are proposed in the mapped 100-year floodplains. To mitigate against water quality impacts during typical rainfall events such as the one or ten-year storms, parking areas are proposed to be designed to incorporate best management practices to prevent the runoff of contaminants to streams and coastal waters. A potential bioswale associated with the parking area will serve to assist with both water quality (pollutants have time to settle out of stormwater and be remediated by plants) as well as water quantity (providing a place for water to go). The Master Plan also suggests installation of pervious materials for both the special access and main parking areas. This will allow water to infiltrate more easily on site, minimizing sheet flows of water during normal rain events and any accompanying pollutants, sediment or trash on to Kē'ē Beach. Methods for stormwater systems will be determined at the time of construction plan design based on a detailed drainage study, sustainability, cost, and availability of materials/technology.

As very little park activity occurs in or adjacent to the stream, sediment sources at the mouth of Limahuli Stream are assumed to be bank erosion due to the riparian conditions within the Park as well as the condition of the forest and riparian area upstream. No changes to the drainage of Limahuli Stream are anticipated with the proposed Master Plan, unless riparian restoration is undertaken, in which case, beneficial impacts are expected.

5.7.8 ELECTRICAL AND COMMUNICATION SYSTEMS

Existing Conditions

The KIUC provides electricity for Kaua‘i. The park is not served by electricity and KIUC service terminates at the Park entry. A 3/4-inch Hawaiian Telcom telephone line runs along Kūhiō Highway to the pay phone near the comfort station at Kē‘ē Beach and parallels the existing three-inch water line.

Potential Impacts and Mitigation Measures

Due to the Park’s limited access to infrastructure and the dispersed locations of some of the proposed facilities, sources of renewable energy are proposed whenever feasible.

A cursory review of the potential renewable energy resources that may be available at Hā‘ena State Park was conducted based on readily available information.

Solar hot water heaters and solar PV energy are well-established technologies that have been installed widely throughout the islands. According to data from the Hawai‘i Sugar Planters Association collected in 1985, an estimated 350 solar calories per square centimeter falls on the area per day. The higher the intensity, the better the resource is. The average for the island is 350 cal/cm²/day, with ranges from 0 to 500 cal/cm²/day. A solar hot water heater can be installed at the Caretaker’s Cottage, the ECC and any of the other facilities that may require hot water such as the Montgomery House and Allerton Cottage, once they are renovated. Solar PV panels could also be installed at all of these locations to provide a renewable source of power as well as double as a shade structure at the turnaround. Solar PV could also be installed at the comfort station at Kē‘ē to power any new equipment needed for an upgraded wastewater treatment system.

Micro wind and micro hydro are other sources of renewable energy that should be considered in addition to solar. There are smaller wind turbines that can be installed on rooftops at the Park or those that rotate on a vertical instead of horizontal axis to minimize any impact to birds. There are also evolving wind technologies, such as the Humdinger Windbelt developed by a Hawai‘i-based company, that does not have rotating airfoils but captures energy from aeroelastic flutter (<http://www.humdingerwind.com>). As technology evolves, State Parks and DLNR should continue to look into viable alternatives as improvements are phased in and developed.

A micro hydro system needs a consistently running source of water (as little as two gallons per minute) and a relatively small elevation change (as little as two to three feet of head) to turn a turbine to create power. However, more of each will increase output. Micro hydro systems are more efficient the closer they are to the energy source and therefore Limahuli Stream, the only perennial stream at the park, could be investigated to provide a source for micro hydro. Neighboring Limahuli Gardens uses a micro hydro system to power their entire visitor center which runs on a 24V system and includes lights, a computer, and cash register

(Winter, personal communication 2011). Care must be taken, however, to size and locate the micro hydro to minimize impacts to the stream ecosystem and to account for periods of low stream flow.

In order to maintain communications and provide for public safety during emergencies, the existing hardline pay phone at Kēʻē Beach is proposed to be maintained. For similar reasons, hardline telephone service is proposed to be provided at the Caretaker's Cottage and Welcome Pavilion/ECC. A second pay phone or at least a closed-circuit phone which connects to the Caretaker is also proposed to be provided on the outside of the Welcome Pavilion/ECC so that emergency calls can be made when the ECC is closed and hikers who need assistance can contact the Caretaker. The remote and mountainous location limits wireless communications but wireless services should also be considered for visitor convenience and may be required for certain parking management technologies.

5.7.9 SOLID WASTE DISPOSAL

Existing Conditions

Trash receptacles and recycle bins are stationed throughout the Kēʻē Beach area. State Parks staff provides trash removal on a daily basis.

Potential Impacts and Mitigation Measures

Although fewer users to the Park will likely result in less trash generated at the park, facilities will be dispersed and new trash receptacles will be necessary at the ECC, picnic area and Hālau Waʻa so that waste disposal is convenient to park users. All receptacles are proposed to have animal-proof lids to minimize foraging by feral cats, dogs, rats and chickens. No additional mitigation measures are anticipated.

5.8 PUBLIC SERVICES

5.8.1 POLICE AND FIRE PROTECTION

Existing Conditions

The Kauaʻi Police Department has three stations located approximately 25 miles apart. The station nearest the Park is co-located with a fire station just north of the Princeville Shopping Center. The main police station and administrative headquarters are located in Līhuʻe at the County facility off Kaʻana Street near Kapule Highway. The Kauaʻi County Fire Department has a temporary lifeguard stand at the end of the highway fronting Kēʻē Beach. A helicopter landing pad is also located in the Park in the event of emergencies.

Potential Impacts and Mitigation Measures

The Master Plan will reduce the number of park users who may require police, fire and emergency rescue resources. However, due to the remote location of the Park and the potential for hazardous conditions, an emergency evacuation plan and rescue plans should be developed, both of which have the potential to increase the need for police and fire resources.

The plan calls for the lifeguard stand to be moved north of its current location, but this will be a positive impact as it will allow better visibility of the entire Kēʻē Lagoon for lifeguards. The helicopter landing pad is proposed to remain at its current location.

Coordination and regular drills (at minimum annually) with State Civil Defense, Kauaʻi fire and police departments should be performed to ensure readiness. All park staff and others involved with the ongoing maintenance of the Park such as volunteers, concessionaires/lessees and their staff, and specialists tending the Agricultural Complex and Hula Complex should be trained in the proper procedures for handling different emergency situations.

5.8.2 EDUCATION

Existing Conditions

Public school education is under the direct supervision of the Hawaiʻi State Department of Education. Kauaʻi's public schools are divided into three school complexes, Kapaʻa, Kauaʻi, and Waimea. There are a total of ten (10) elementary schools, three (3) intermediate schools, four (4) high schools, and four (4) charter schools. A total of 9,505 students were enrolled in Kauaʻi's public school system in the 2013-2014 school year. Higher education in Kauaʻi is provided through Kauaʻi Community College, which is part of the University of Hawaiʻi system. This two (2) year university offers Associate degrees in Applied Science, Science, and Arts with a variety of concentrations as well as a number of certificates.

Currently, Hāʻena State Park offers minimal, self-directed educational opportunities through the use of informational signage.

Potential Impacts and Mitigation Measures

Beneficial impacts are expected from the Master Plan with respect to education. The interpretive component of the Master Plan anticipates significantly increased opportunities for on-site learning. The physical and management improvements proposed are anticipated to support learning in the Park through improved interpretive signage, guided tours, or hands-on learning that occurs with community work days and volunteer events.

5.8.3 HEALTH CARE SERVICES

Existing Conditions

There are three major hospitals on Kauaʻi. They are: the Kauaʻi Veterans Memorial Hospital in Waimea, the Samuel Mahelona Hospital in Kapaʻa, and the Wilcox Memorial Hospital in Līhuʻe.

Potential Impacts and Mitigation Measures

The Master Plan developments and management measures are not anticipated to create any greater demand on regional health care services. It is anticipated that proposed plan elements

such as visitor education, improved signage, and location of facilities away from the rockfall hazard area will result in beneficial impacts to public health.

5.8.4 RECREATIONAL FACILITIES

Existing Conditions

Hā'ena State Park is one of seven state parks on Kaua'i. There are also two state recreational piers on the island. County facilities in the Princeville-Hā'ena corridor include Hā'ena County Park, 'Anini Beach Park, Hanalei Black Pot, and Hanalei Pavilion. The only nearby federal facility is the Hanalei National Wildlife Refuge, which includes a lookout at Hanalei and developed visitor facilities at Kilauea.

Hā'ena State Park is heavily utilized year round by as many as 10,000 visitors during high-season months. The park is used for a variety of ocean-oriented recreational activities including, swimming, snorkeling, sunbathing, beachcombing and fishing. Land-based recreation within the Park is primarily hiking on the Kalalau trail. The popularity of the Park manifests itself in traffic congestion along Kūhiō Highway; illegal parking (inside and outside the park); and user group conflicts between fishers and those recreating in the nearshore waters. There is minimal interpretation of the Park's cultural, archaeological and ecological resources; thus, users of the Park may not know the sensitivity of the resources, nor are they provided with any information on how to conscientiously interact with them. Minimal management of the Park's flora has resulted in an overgrowth of alien plants and trees, impacting the Park's ecological health and scenic resources.

Potential Impacts and Mitigation Measures

An objective of the Master Plan is to balance outdoor recreational uses with the protection and preservation of the Park's natural and cultural features, enriching the experience for all. Existing outdoor recreational opportunities such as swimming, sunbathing and snorkeling along with access to the Kalalau Trail are proposed to continue. In addition, a picnic area is proposed to be added near the ECC and opening up the highway as an interpretive corridor will facilitate walking and sightseeing in the Park.

The probable reduction in total number of visitors per day will create both positive and potentially negative impacts if not mitigated. Limiting the number of visitors may have the positive effect of enhancing the recreational experiences within the Park. As examples, nature viewing such as bird watching may be enhanced with fewer vehicles driving in the area and snorkelers may observe reef life without interference by other humans. Picnicking near the ECC and overlooking the lo'i may expose a visitor to traditional agricultural practices unanticipated at a visit to a beach park. Beach goers may find more room on the sand and less trash in the receptacles.

However, negative effects may be the distribution of recreational demand to other facilities on the north shore and island-wide. The 2003 Hawai'i Tourism Authority's Natural

Resources Assessment found both Hā'ena State Park and its nearest neighboring park, Hā'ena County Park, to be “high use” parks and high priorities for improvements. Thus, if the number of visitors to Hā'ena State Park, are restricted, it may serve to redistribute the demand in Hā'ena to the County Park, placing greater demand on the County facilities and further degrading its resources. State Parks should monitor use of Hā'ena County Park to judge if the recreational demand is shifted from one facility to the other. If so, an adjustment to the number of visitors allowed per day to Hā'ena State Park might be considered as a mitigating measure. If a shuttle is employed, a mitigation measure may be to modify the proposed shuttle operation to include a stop at Hā'ena County Park.

6.0 CONSULTATION

6.1 PRE-CONSULTATION

The DLNR has initiated public and agency comment to the Master Plan project through letters and meetings requesting input prior to development of this document. Pre-consultation contacts are listed in Table 12 and comments can be found in Appendix B. A list of all public meetings is included in Table 2 on page 1-4 and meeting notes from the meetings are in Appendix A.

TABLE 12
PRE-CONSULTATION CONTACTS

Agency	Request Sent	Comment Received
Federal Agencies		
U.S. Fish and Wildlife Service	August 11, 2008	August 29, 2008
U.S. National Marine Fisheries Service	August 11, 2008	
U.S. Army Engineer District, Honolulu	August 11, 2008	
State of Hawai‘i		
Department of Accounting and General Services	August 11, 2008	August 25, 2008
Department of Accounting and General Services – Kaua‘i Branch	August 11, 2008	August 14, 2008
Department of Agriculture	August 11, 2008	
Department of Education	August 11, 2008	August 26, 2008
Department of Defense	August 11, 2011	August 28, 2008
Department of Hawaiian Home Lands	August 11, 2008	
Department of Land and Natural Resources – Commission on Water Resource Management	August 11, 2008	August 25, 2008
Department of Land and Natural Resources – Land Division	August 11, 2008	
Department of Land and Natural Resources – Office of Conservation and Coastal Lands	August 11, 2008	Sept. 15, 2008
Department of Land and Natural Resources – Division of Forestry and Wildlife, Kaua‘i District	August 11, 2008	August 28, 2008
Department of Land and Natural Resources – Division of Forestry and Wildlife, Nā Ala Hele	August 11, 2008	
Department of Land and Natural Resources – Chairperson’s Office	August 11, 2008	

Agency	Request Sent	Comment Received
Department of Land and Natural Resources – Division of Aquatic Resources	August 11, 2008	
Department of Land and Natural Resources – Division of Aquatic Resources, NOAA CORAL Fellow	August 11, 2008	
Department of Land and Natural Resources – Division of Boating and Ocean Recreation	August 11, 2008	
Department of Land and Natural Resources – Division of Boating and Ocean Recreation, Kaua‘i Office	August 11, 2008	
Department of Land and Natural Resources – Division of Conservation and Resources Enforcement	August 11, 2008	
Department of Land and Natural Resources – State Historic Preservation Division, Kaua‘i	August 19, 2008	
Department of Land and Natural Resources – State Historic Preservation Division	August 11, 2008	August 31, 2008
Department of Business, Economic Development and Tourism - Director	August 11, 2008	
Department of Business, Economic Development and Tourism – Strategic Industries Division	August 11, 2008	August 27, 2008
Department of Business, Economic Development and Tourism – Office of Planning	August 11, 2008	
Department of Transportation	August 11, 2008	September 4, 2008
Department of Transportation – Kaua‘i Office	August 11, 2008	
Department of Health – Environmental Planning	March 14, 2008	
Office of Environmental Quality Control	August 11, 2008	
Office of Hawaiian Affairs	August 11, 2008	August 28, 2008
Hawai‘i Tourism Authority	August 11, 2008	Sept. 2, 2008
County of Kaua‘i		
Department of Public Works	August 11, 2008	August 27, 2008
Department of Public Works - Engineering Division	March 14, 2008	August 27, 2008
Office of Economic Development	August 11, 2008	
Fire Department	August 11, 2008	August 25, 2008

Agency	Request Sent	Comment Received
Department of Water	August 11, 2008 and Follow up September 15, 2011	August 22, 2008
Department of Parks and Recreation	August 11, 2008	
Department of Planning	August 11, 2008	Meeting Notes September and October, 2008
Kaua‘i Historic Preservation Review Commission	August 11, 2008	Meeting Notes September and October, 2008
Police Department	August 11, 2008	
Transportation Agency	August 11, 2008	
Mayor	August 11, 2008	
County Council Chair, Vice-Chair and Members	August 11, 2008	
Utility Providers		
Hawaiian Telcom	August 11, 2008	Sept. 2, 2008
KIUC	August 11, 2008	
Other Organizations and Individuals		
Hui Maka‘āinana o Makana	August 11, 2008	
National Tropical Botanical Garden – Limahuli Garden and Preserve	August 11, 2008	
Halau Palaihiwa o Kaipuwai	August 11, 2008	
Community Conservation Network (now Hawai‘i Conservation Stewardship Network)	August 18, 2008	
Kaua‘i Planning and Action Alliance	August 11, 2008	August 29, 2008
Carlos Andrade	August 18, 2008	
Frederick Wichman	August 18, 2008	August 25, 2008
Makai Watch	August 11, 2008	
Hawai‘i Ecotourism Association	August 11, 2008	
University of Hawai‘i – School of Ocean and Earth Science and Technology	August 11, 2008	
University of Hawai‘i – Environmental Center and Water Research Center	August 11, 2008	

6.2 CONSULTATION THROUGH THE MASTER PLANNING PROCESS

In addition to pre-consultation letters, the Master Planning process involved public open house events and public meetings; several meetings of the MPAC, its transportation sub-committee; and a pre-consultation meeting with the Kaua'i Historic Preservation Review Commission. Records of these meetings are included as Appendix A and B.

6.3 EIS CONSULTATION

This EISPN has been distributed to the following individuals and organizations. Comment letters received in response to the EISPN will be included in the Draft EIS. A scoping meeting to allow the public's assistance in setting forth the scope of the draft EIS, will also be announced and conducted while this EISPN is available for public comment. Upon completion of the Draft EIS, the document will be submitted to the State of Hawai'i, Office of Environmental Quality Control for publication and opening of a 45-day public comment period, pursuant to HAR 11-22-200.

Agency
Federal Agencies
Department of the Interior, Geological Survey, Pacific Islands Water Science Center
Department of Commerce, National Marine Fisheries Service
Department of the Interior, Fish and Wildlife Service
Department of the Interior, National Park Service
Department of Agriculture, Natural Resources Conservation Service
Department of the Army, Army Corps of Engineers
Department of the Navy
Department of Transportation, Federal Aviation Administration
Department of Transportation, Federal Transit Administration
Department of Transportation, Federal Highways Administration
Department of Homeland Security, Coast Guard
Environmental Protection Agency
State of Hawai'i
Department of Accounting and General Services
Department of Accounting and General Services – Archives Division
Department of Accounting and General Services – Kaua'i Branch
Department of Agriculture
Department of Business, Economic Development and Tourism
Department of Business, Economic Development and Tourism – Research Division Library
Department of Business, Economic Development and Tourism – Strategic Industries Division
Department of Business, Economic Development and Tourism – Office of Planning
Department of Education
Department of Education, Hawai'i State Library – Hawai'i Documents Center

Agency
Department of Education, Hawai‘i State Library – Kaimuki Regional Library
Department of Education, Hawai‘i State Library – Kāne‘ohe Regional Library
Department of Education, Hawai‘i State Library – Pearl City Regional Library
Department of Education, Hawai‘i State Library – Hawai‘i Kai Regional Library
Department of Education, Hawai‘i State Library – Hilo Regional Library
Department of Education, Hawai‘i State Library – Kahului Regional Library
Department of Education, Hawai‘i State Library – Līhu‘e Regional Library
Department of Education, Hawai‘i State Library – Princeville Library
Department of Defense
Department of Hawaiian Home Lands
Department of Health – Environmental Planning
Department of Health – Environmental Health Administration
Department of Land and Natural Resources
Department of Land and Natural Resources – Land Division
Department of Land and Natural Resources – Division of Forestry and Wildlife, Kaua‘i District
Department of Land and Natural Resources – Division of Forestry and Wildlife, Nā Ala Hele
Department of Land and Natural Resources – State Historic Preservation Division, Kaua‘i
Department of Land and Natural Resources – State Historic Preservation Division
Department of Transportation
Department of Transportation – Kaua‘i Office
Office of Hawaiian Affairs
Hawai‘i Tourism Authority
University of Hawai‘i – Water Resources Research Center
University of Hawai‘i – Thomas H. Hamilton Library
University of Hawai‘i – Edwin H. Mo‘okini Library
University of Hawai‘i – Maui College Library
University of Hawai‘i – Kaua‘i Community College Library
University of Hawai‘i – Environmental Center
Legislative Reference Bureau Library
County of Kaua‘i
Department of Public Works
Department of Public Works - Engineering Division
Office of Economic Development
Fire Department
Department of Water
Department of Parks and Recreation
Department of Planning
Kaua‘i Historic Preservation Review Commission
Police Department
Transportation Agency
Elected Officials

Agency
U.S. Senators Brian Schatz and Mazie Hirono
U.S. Representative Tulsi Gabbard (2 nd District)
State Senator Ronald Kouchi (District 8)
State Representative Derek Kawakami (District 14)
County Council Chair, Vice-Chair and Members
Mayor
Utility Providers
Hawaiian Telcom
Kaua‘i Island Utility Cooperative
News Media
Honolulu Star Advertiser
Hawai‘i Tribune Herald
West Hawai‘i Today
The Garden Island
Maui News
Moloka‘i Dispatch
Honolulu Civil Beat
Other Organizations and Individuals
Hui Maka‘āinana o Makana
National Tropical Botanical Garden – Limahuli Garden and Preserve
Halau Palaihiwa o Kaipuwai
Community Conservation Network (now Hawai‘i Conservation Stewardship Network)
Kaua‘i Planning and Action Alliance
Carlos Andrade
Frederick Wichman
Makai Watch
Hawai‘i Ecotourism Association

7.0 REFERENCES

- Andrade, Carlos. 2012. *HaenaStParkCarCount.pdf*. Unpublished.
- Andrade, Carlos. *Hā'ena Through the Eyes of the Ancestors*. University of Hawai'i Press. 2008.
- Austin Tsutsumi and Associates. 2011. *Traffic Impact Analysis Report Hā'ena State Park Master Plan*. Prepared for PBR Hawaii and Associates, Inc. September 2, 2011.
- Bailey, Roselle Keli'ihonipua. 2008. "A Time Past, Breathed into Life, is Hula." *Humu Mo'olelo*. Vol. 1, Number 3.
- Baker, H.L. et al. *Detailed Land Classification, Island of Hawai'i*. Land Study Bureau, University of Hawai'i, 1965.
- Barrère, Dorothy, Mary Kawena Pukui, and Marion Kelly. 1980 *Hula: Historical Perspectives*. Pacific Anthropological Records No. 30
- Beckwith, Martha. 1970 *Hawaiian Mythology*. Honolulu: University of Hawai'i Press.
- Belt Collins Hawai'i Ltd. 2005. *Kūhiō Highway (Route 560) Historic Roadway Corridor Plan, Hanalei, Kaua'i, Hawai'i*. Prepared for the Department of Transportation. Prepared by Belt Collins Hawai'i Ltd. with contributions from Kūhiō Highway (Route 560) Community Advisory Committee.
- Bennett, Wendell C. 1931 *The Archaeology of Kauai*. Bernice P. Bishop Museum Bulletin 80.
- Blay, Chuck and Robert Siemers. 2004. *Kaua'i's Geologic History: A simplified guide. Updated edition*. Poipu: TEOK Investigations.
- Businger, Steven. 1998. "Hurricanes in Hawai'i." Poster developed for the Hurricanes and Extreme Weather Phenomena Symposium presented by the Center for the Study of Active Volcanoes and sponsored by the Federal Emergency Management Agency, the National Oceanic and Atmospheric Administration under cooperative agreement NA67RJ0154, and the COMET program (UCAR S98-87020). Website: <http://www.soest.hawaii.edu/MET/Faculty/businger/poster/hurricane/> Web layout by Ray Tanabe, September 25, 1998.
- Carpenter, Alan. 1996 *Burial Treatment Plan: Hā'ena, Hanalei District, Island of Kaua'i*. (Prepared for and by the Division of State Parks, Department of Land and Natural Resources).
- Clark, John. 1992. *Beach and Ocean Recreation Study, Hā'ena Kaua'i*. (For the Division of State Parks, Department of Land and Natural Resources). Honolulu.

County of Kaua‘i Building Division, Department of Public Works website. 2009. “Bike Path Project.” Website:
<http://www.kauai.gov/Government/Departments/PublicWorks/BuildingDivision/BuildingDivisionProjects/AhukiniLydgateBikePathProject/tabid/335/Default.aspx>.

County of Kaua‘i Department of Water. 2009. Website:
http://www.kauaiwater.org/current_operations.asp.

County of Kaua‘i Fire Department. 2007. Website:
<http://www.kauai.gov/Government/Departments/FireDepartment/tabid/107/Default.aspx>.

County of Kaua‘i Police Department. 2009. Patrol Services Bureau - Hanalei District Website: <http://www.kauai.gov/Government/Departments/PoliceDepartment/PatrolServicesBureauHanaleiDistrict/tabid/316/Default.aspx>.

County of Kaua‘i Transportation Agency. 2009. Website:
<http://www.kauai.gov/Government/Departments/TransportationAgency/tabid/58/Default.aspx>.

County of Kaua‘i, Department of Public Works 2006. *Final Environmental Assessment Hā‘ena County Beach Park Improvements*.

Duensing, Dawn. 2003 Kaua‘i Belt Road (North Shore Section) (State Site No. 30-02-9396). National Register of Historic Places Registration Form prepared on behalf of the Hanalei Roads Committee.

Earle, Timothy. 1978 *Economic and Social Organization of a Complex Chieftdom : The Halelea District, Kaua‘i, Hawai‘i*. Anthropology Papers, Museum of Anthropology, University of Michigan No. 63.

Earthplan. 1996. *Social Impact Assessment for Hā‘ena [sic] State Park Master Plan*. Prepared for The Keith Companies, Hawai‘i.

Emerson, Nathaniel B. 1998. *Unwritten Literature of Hawaii: the sacred songs of the hula*. Honolulu: Mutual Publishing, LLC. Available online: <http://www.ulukau.org/elib/cgi-bin/library?c=unwritten>

Emory, Kenneth P. 1929 “Ruins at Kee, Hā‘ena, Kauai: Famous Court of Lohiau.” *Hawaiian Annual for 1929*, 88-94.

Erickson, Terrell A. and Puttock, Christopher F. 2006. *Hawai‘i Wetland Field Guide*. U.S. Environmental Protection Agency.

- Federal Emergency Management Administration Map Service Center. Website:
<http://msc.fema.gov/webapp/wcs/stores/servlet/CategoryDisplay?catalogId=10001&storeId=10001&categoryId=12001&langId=-1&userType=G&type=1&dfirmCatId=12009>
- Gay, James N. 1871 “Hā‘ena” (Register Map 1369). In collection of Land Survey Division, Department of Accounting and General Services, State of Hawai‘i.
- Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte, 2013: Online Rainfall Atlas of Hawai‘i. *Bull. Amer. Meteor. Soc.* 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.
- Griffen, P. Bion, Richard M. Bordner, Hallett H. Hammatt, Maury E. Morgenstein, and Catherine Stauder. 1977 *Preliminary Archaeological Investigations at Hā‘ena, Halele‘a, Kaua‘i Island*. (Prepared by Archaeological Research Center Hawai‘i, Inc. for the Division of State Parks, Department of Land and Natural Resources).
- Hammatt, Hallett H, Myra J. Tomonari-Tuggle and Charles F. Streck. 1978 *Archeological Investigations at Hā‘ena State Park, Halele‘a, Kaua‘i, Phase II: Excavations of Beach Localities and Visitor Facilities Area*. (Prepared by Archaeological Research Center Hawai‘i, Inc. for the Division of State Parks, Department of Land and Natural Resources).
- Handy, E.S. Craighill and E.G. Handy. 1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bernice P. Bishop Museum Bulletin 233.
- Hawaiian Islands Humpback Whale National Marine Sanctuary website. 2011.
<http://hawaiihumpbackwhale.noaa.gov/>
- Juran, Megan. 2010. Personal communication and photographs.
- Juran, Megan. 2007. *Community-Based Marine Management Hā‘ena Ahupua‘a, Kaua‘i, Hawai‘i: Listening to Community Members and Respected Scientists to Better Understand the Implications of Community-Based Marine Management on Our Near-Shore Fisheries*. Kaua‘i: Community Conservation Network. Final Report.
- Juran, Megan. 2009. *Kalalau Trail Count Sunday 27 Dec 09 (7 Hours)*.
- Juvik, Sonia P. and Juvik, James O. 1998. *Atlas of Hawai‘i: Third Edition*. Honolulu: University of Hawai‘i Press.
- Kennedy/Jenks Consultants (formerly Engineering Solutions, Inc.). 2011. *Civil Baseline Report*. Honolulu. Prepared for PBR HAWAII & Associates, Inc. January 2011.
- Kido, Mike. 2001 unpublished. *Freshwater Resources*. Prepared for the Hawai‘i Stream Research Center (University of Hawai‘i).

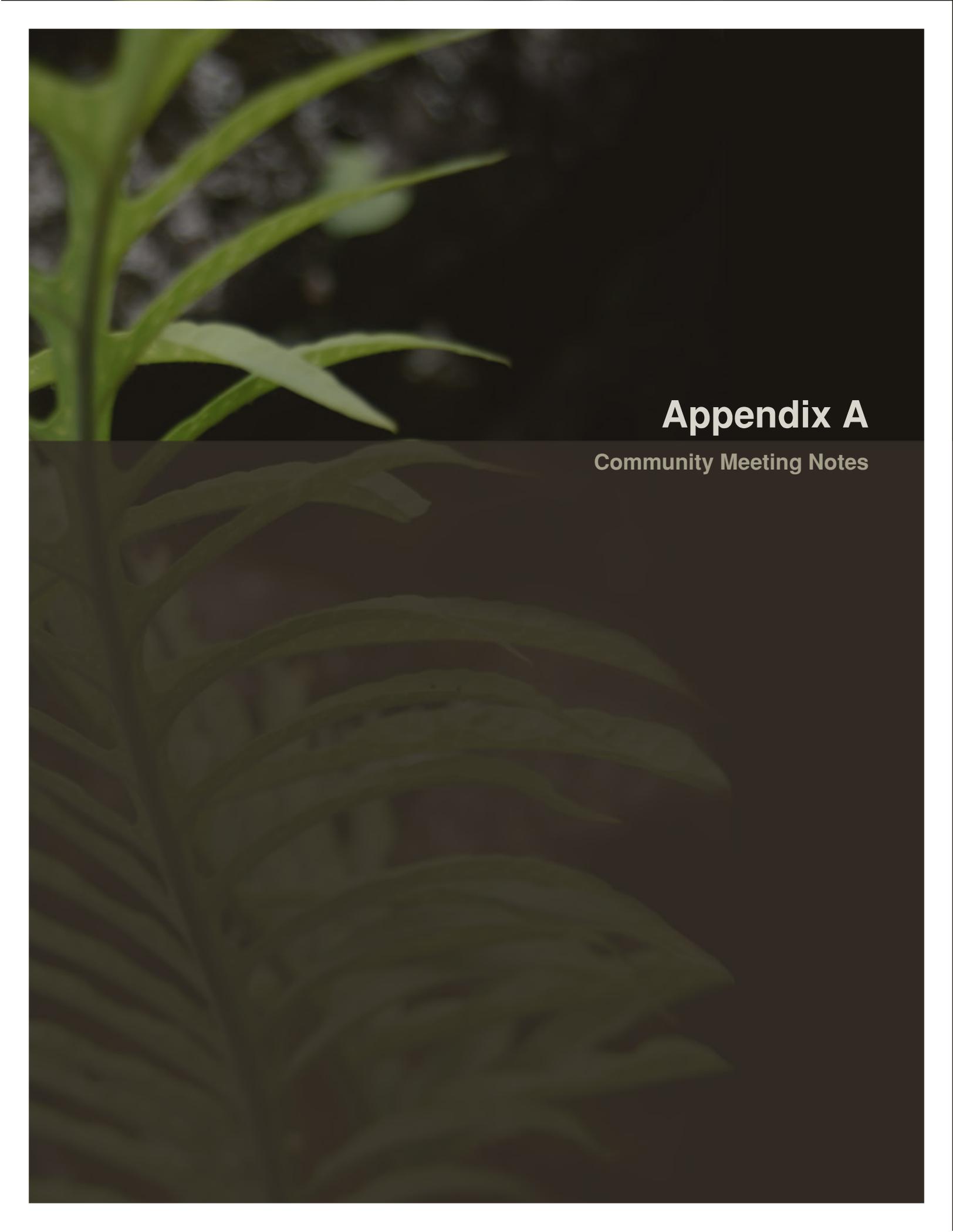
- Listman, Chad. 2008. Personal Communication.
- MacDonald, Gordon Andrew, Abbott, Agatin T., and Peterson, Frank L. (1983). *Volcanoes in the Sea: The Geology of Hawai‘i*. Honolulu: University of Hawai‘i Press.
- Major, Maurice and Alan Carpenter. (in prep.). *Data Recovery at Site 50-30-02-7001, Hā‘ena State Park, District of Hanalei, Island of Kaua‘i*. (Prepared by and for the Division of State Parks, Department of Land and Natural Resources).
- Major, Maurice and Carpenter, Alan. 2000. *Hā‘ena Lo‘i Draft Restoration Plan*. (Prepared by and for the Division of State Parks, Department of Land and Natural Resources).
- Major, Maurice and Alan Carpenter. 2001 *Supplemental Archaeological Inventory: Hā‘ena State Park, Kaua‘i*. (Prepared by and for the Division of State Parks, Department of Land and Natural Resources).
- McEldowney, Holly and Martha Yent. 2007 *Archaeological Monitoring Plan for New Comfort Station and Other Improvements, Hā‘ena State Park*. (Prepared by and for the Division of State Parks, Department of Land and Natural Resources).
- McEldowney, Holly, Archaeologist, State of Hawai‘i Department of Land and Natural Resources, State Parks Division. Personal communication. November 24, 2009.
- Murabayashi, Edwin T. and others 1967. *Detailed Land Classification, Island of Kaua‘i*. Honolulu: University of Hawai‘i Land Study Bureau.
- Nagata, Kenneth M. 1991. *Botanical Survey, Hā‘ena State Park, Hā‘ena, Kaua‘i*. (Prepared for the Division of State Parks, Department of Land and Natural Resources).
- National Climatic Data Center. 2009. “Climate Maps of the United States. Hawai‘i Annual Mean Relative Humidity.” Website: <http://cdo.ncdc.noaa.gov/climaps/hirh2313.pdf>.
- National Oceanic and Atmospheric Administration 2007. “*Daily Climatic Normals for Hawai‘i, PHLI Līhu‘e - (22.0N 159.4W) 1961-1990*.” Available at website: <http://www.prh.noaa.gov/hnl/pages/climnormals.php>
- National Oceanic and Atmospheric Administration Coastal Services Center. “*Coastal Hazards*”. Website: <http://coastalmanagement.noaa.gov/hazards.html>
- National Park Service, US Department of Interior. 2008. *Land and Water Conservation Fund State Assistance Program, Federal Financial Assistance Manual, Volume 69*. Effective Date: October 1, 2008. Website: <http://www.nps.gov/LWCF/manual/LWCF.pdf>.

-
- Orr, Maria. 2010. *Hā'ena State Park Master Plan/EIS Cultural Impact Assessment*. (Prepared for PBR HAWAII & Associates, Inc).
- Parnham, James E., Higashi, Glenn R., et al. 2008. *Atlas of Hawaiian Watersheds and Their Aquatic Resources*. (Prepared for the Division of Aquatic Resources, Department of Land and Natural Resources).
- PBR Hawaii & Associates, Inc. 2003. *Natural Resources Assessment*. (Prepared for the Hawai'i Tourism Authority).
- PBR Hawaii & Associates, Inc. 2010. *Hā'ena State Park Individual Wastewater System Improvements, Constructed Wetlands*. Final Environmental Assessment. (Prepared for the Engineering Division, Department of Land and Natural Resources).
- PBR Hawaii & Associates, Inc. 2011. *Hā'ena State Park Draft Master Plan Report*. (Prepared for the Division of State Parks, Department of Land and Natural Resources).
- PBR Hawaii & Associates, Inc. 2011. *Hā'ena State Park Master Plan Background Research and Analysis Report*. (Prepared for the Division of State Parks, Department of Land and Natural Resources).
- Plan Pacific. 2000. *Kaua'i General Plan*. (Prepared for the Planning Department, County of Kaua'i).
- Pukui, Mary Kawena, Samuel H. Elbert, and Ester T. Mo'okini 1974. *Place Names of Hawai'i, revised and expanded edition*. Honolulu: University of Hawai'i Press.
- Riley, Thomas J. and Jeffrey Clark. 1979 *Archaeological Testing and Excavation at Hā'ena, Kaua'i*. (Prepared for the Division of State Parks, Department of Land and Natural Resources by the Departments of Anthropology, University of Hawai'i, Mānoa and University of Illinois, Urbana-Champaign).
- Silva, Carol. 1995 *A Historical and Cultural Report of Hā'ena State Park, Halele'a, Kaua'i*. (Prepared for the Division of State Parks, Department of Land and Natural Resources).
- State of Hawai'i Department of Agriculture 1977. *Agricultural Lands of Importance to the State of Hawai'i*. Honolulu.
- State of Hawai'i, Commission on Water Resource Management, Department of Land and Natural Resources and The National Park Service. 1990. *Hawai'i Stream Assessment: Hawai'i's Streams and their Instream and Riparian Resources*.

- State of Hawai‘i, Commission on Water Resource Management, Department of Land and Natural Resources. 2011. Table of Limahuli Stream Diversions, as of September 9, 2011. Spreadsheet from Dean Uyeno, received October 14, 2011.
- State of Hawai‘i, Department of Business, Economic Development, and Tourism. GIS Data Files. Website: <http://www.hawaii.gov/dbedt/gis/>
- State of Hawai‘i, Department of Business, Economic Development, and Tourism. *2012 State Data Book*. Table 12.13, Jobcount by NAICS Industry, By County: Annual Average, 2012. <http://dbedt.hawaii.gov/economic/databook/db2012/>.
- State of Hawai‘i, Department of Education. 2009. “Kapa‘a,-Kaua‘i-Waimea Complex Area.” Website: http://165.248.6.166/data/complexarea.asp?key_complexarea=15 .
- State of Hawai‘i, Department of Labor and Industrial Relations. September 15, 2011. Hawai‘i’s Seasonally Adjusted Unemployment Rate at 6.2 Percent in August. Web. <http://hawaii.gov/labor/news/2011/20110915%20Aug%20UI%20Rate%20PR.pdf>
- State of Hawai‘i, Division of State Parks, Department of Land and Natural Resources. 1972. “Land and Water Conservation Fund Act, Hā‘ena State Park Acquisition, Grant Agreement No. 15-00061.” October 5, 1972.
- State of Hawai‘i, Division of State Parks, Department of Land and Natural Resources. 2006. “Curatorship Agreement, Hā‘ena Lo‘i Restoration- Phase I, Hā‘ena State Park, Hā‘ena, Halele‘a District, Kaua‘i, Historic Site #50-30-02-7009.” Draft renewal, August 2006.State of Hawai‘i. 2001 Hawai‘i Revised Statutes. Chapters 343 and 344. http://www.capitol.hawaii.gov/hrscurrent/Vol06_Ch0321-0344/HRS0343/HRS_0343-.htm
- Stepath, Carl M. 1999. “Ke‘e Lagoon and Reef Flat Users Baseline Study.” Save Our Seas, August 21, 1999. Website: <http://www.saveourseas.org/CarlStepath/Keebaselinestepath/KeeBaselineStudy.doc>.
- Stepath, Carl M. 2006. “Draft Kē‘ē Lagoon and Reef Flat Users Baseline Study.” Save Our Seas. Website: http://www.saveourseas.org/saveourseas/haena_files/Kee_report_update_9-06.pdf.United States Census Bureau (2000). Census Report. Website: <http://www.census.gov>.
- SWCA Environmental Consultants. 2010. *Marine Natural Resources and Recreation Assessment, Hā‘ena State Park, Kaua‘i, Hawai‘i*. February 2010.
- Terry, Ron and Patrick Hart. Geometrician Associates, LLC. 2009. *Biological Survey, Hā‘ena State Park, Island of Kaua‘i*.

- The Keith Companies – Hawai‘i, Inc. and Earthplan Planning and Design. (2001 unpublished) *Hā‘ena State Park Master Plan and Draft Environmental Impact Statement*. (Prepared for the Division of State Parks, Department of Land and Natural Resources).
- United States Department of Agriculture Soil Conservation Service (1972). *Soil Survey of the Islands of Kaua‘i, O‘ahu, Maui, Moloka‘i, and Lāna‘i, State of Hawai‘i*. Washington DC: US Government Printing Office.
- University of Hawai‘i Department of Geography. 1983. *Atlas of Hawai‘i, Second Edition*. Honolulu: University of Hawai‘i Press.
- Vaughan, Mehana. 2009. *Pawehe ke Kai a‘o Hā‘ena*. Community presentation.
- Vaughan, Mehana. 2009. *Summer 2009 Final Report*. Stanford University.
- Wichman, Frederick B. 1998. *Kaua‘i: Ancient Place-names and Their Stories*. Honolulu: University of Hawai‘i Press.
- Wilkinson, C., Brodie, J. 2011 *Catchment Management and Coral Reef Conservation: a practical guide for coastal resource managers to reduce damage from catchment areas based on best practice case studies*. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre. Townsville, Australia.
- Wilson Okamoto and Associates. 1980. *North Shore Development Plan Update, includes Kilauea*. (Prepared for the Planning Department, County of Kaua‘i).
- Wilson Okamoto. 2008. *Water Resource Protection Plan*. (Prepared for the Commission on Water Resource Management, Department of Land and Natural Resources).
- Winter, Kawika. 2011. Personal communication.
- Yent, Martha and Carpenter, Alan. 2009. Archaeological testing field notes. (Prepared by and for the Division of State Parks, Department of Land and Natural Resources).
- Yent, Martha and Jason Ota. 1983 Fieldcheck of dune erosion and exposed cultural materials at Hā‘ena State Park, Hā‘ena Kauai, TMK: 5-9-08- 18. Memorandum to Roy Sue, Administrator, Division of State Parks, Department of Land and Natural Resources.
- Yent, Martha. 1980 *Preliminary Archaeological Testing of House 4, Hā‘ena State Park, Halele‘a, Kaua‘i*. (Prepared by and for the Division of State Parks, Department of Land and Natural Resources).
- Yent, Martha. Hā‘ena Archaeological Complex (State Site No. 30-03-3201). 1983. National Register of Historic Places Register Form. (Prepared by and for the Division of State Parks, Department of Land and Natural Resources).

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\EISPN\EISPN-06.docx



Appendix A

Community Meeting Notes

PRINCIPALS

THOMAS S. WITTEN, ASLA
President

R. STAN DUNCAN, ASLA
Executive Vice-President

RUSSELL Y. J. CHUNG, FASLA
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP
Principal

CHAIRMAN EMERITUS

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

TOM SCHNELL, AICP
Senior Associate

RAYMOND T. HIGA, ASLA
Senior Associate

KEVIN K. NISHIKAWA, ASLA
Associate

KIMI MIKAMI YUEN, LEED®AP
Associate

SCOTT ALIKA ABRIGO
Associate

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

HONOLULU OFFICE

1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

HILO OFFICE

101 Aupuni Street
Hilo Lagoon Center, Suite 310
Hilo, Hawai'i 96720-4262
Tel: (808) 961-3333
Fax: (808) 961-4989

WAILUKU OFFICE

1787 Wili Pā Loop, Suite 4
Wailuku, Hawai'i 96793-1271
Tel: (808) 242-2878

MEETING NOTES

DATE: October 30, 2008

MEETING DATE: October 24 & 25, 2008

PRESENT: See Sign-in Sheets
Ka'imipono (Maria) Orr, Ka'imipono Consulting
Kimi Yuen, PBR HAWAII
Kanai'a Nakamura, PBR HAWAII
Catie Fernandez, PBR HAWAII

DISTRIBUTION: File

SUBJECT: Hā'ena State Park Master Plan Community Open House –
October 24 & 25, 2008

The purpose of this open house was to re-engage with the Hā'ena community to begin the process of updating the Community Preferred Master Plan that was initiated in the 1990's.

A. Limahuli Garden: Friday, October 24, 4:00 PM – 7:00 PM & Saturday, October 25, 9:00 AM – 12:00 Noon

1. In general, attendees knew of the former Community Preferred Master Plan, but wanted to spend more time with it to refresh their memory and see if it is still relevant. A number of people's first question was whether or not a gate at the entrance was still part of the plan. People were also interested in knowing if there would be more meetings, so that they could participate in the decision-making process. Questions were also asked as to how State Parks intended to fund any improvements to the park.
2. Auntie Louise – Organizing an All Soul's Day (Nov. 1) walk from Naue to Kē'ē to get a feeling from Hā'ena people what they want for their land.
3. Melinda Sandler – Suggested that a better way to inform Hā'ena and Hanalei people is to do a PO Box drop to announce future community meetings.
4. Alison Chaung – Requested a hard copy of the highlighted 1999 Community Preferred Master Plan.
5. Andrew Cabebe – Expressed concerns about the Wainiha Stream diversion. Wealthy land owners had promised to release water, but have not.

6. Barbara Robeson
 - a. Indicated that the Kuhio Highway was on the National Register to the ten mile marker. She indicated that this should be documented on register nomination forms. Dawn Duesing worked with Barbara on the register forms and Barbara could get PBR HAWAII Dawn's contact information if we would like it, however, Dawn is out of the country for an extended period of time.
 - b. Indicated that the Lihue Library, Hawaiiiana section had a number of old maps that may be of use. Barbara would be willing to accompany PBR HAWAII staff or sub-consultants if we would like to view maps.
 - c. Kauai Historical Society contains a number of oral histories.
 - d. Taylor Camp archaeology article from a Mainland journal or newspaper was recently written, but she could not remember the publication.
 7. Kawika Winter – requested an aerial and an electronic version of the Community Preferred Master Plan.
 8. Sailor DeCamp –
 - a. Concerned about private homeowners diverting water from Limahuli Stream.
 - b. Did not feel that the 1990's Community Preferred Master Plan had complete community buy-in.
 - c. Felt that those tourists that want and deserve to have a natural experience at Hā'ena will be willing to walk and explore the park, which is preferred to constructing facilities to improve capacity.
 - d. Development at Princeville is fueling large visitor numbers at Hā'ena State Park. A shuttle at Princeville, operated privately, with appropriate fees should be provided.
- B. Lihue, Saturday, October 25, 2:00 PM – 5:00 PM. The Saturday afternoon open house was sparsely attended, and primarily consisted of a discussion between State Parks Staff, PBR HAWAII Staff and Randy Wichman, a member of the Kaua'i Historic Preservation Review Commission.
1. Randy Wichman shared a number of thoughts and observations:
 - a. Multidisciplinary approach to planning and managing the park. He suggested that there are many facets to the park, and the various disciplines should have decision-making power over those facets. Examples include rules for fishery, Hui Maka'ainana o Makana with the curatorship of the taro lo'i. In addition, disciplines need to manage the hula platform, other cultural sites, land-based natural resources, etc. Suggested looking for public/private and educational partnerships.
 - b. Must have knowledge of key features before planning walking trails and the trail should parallel the dunes, closer to loko where the land is less environmentally sensitive than the dunes. The following sites must be considered in how the path will meander:
 - i. Archaeology
 - ii. Tree and rockfall hazards
 - iii. House sites/kuleana lots
 - iv. 'Auwai – mentioned flow charts that Alan Carpenter worked on
 - v. Poi mill site

- vi. Loihau's House
- vii. Hula Platform
- viii. Heiau

- c. Cultural Viewplanes should be considered in park layout.
 - d. Buffer around cultural resources such as Lohi'au's house, poi mill, grave sites.
 - e. Regarding fees, Randy inquired if the Governor would be making a decision to charge fees at Hā'ena and Kōke'e State Parks.
 - f. Suggested that what is labeled as Allerton's caretaker's cottage could be a staging area for Halau, cautioned that there will be challenges with re-constructing historic structure.
 - g. Regarding water, Wayne Souza explained that State Parks built the water system and gave it to the County.
 - h. Megan Juran inquired as to a landscape plan for the comfort station because the plant that looks like false taro or "elephant ears" is colonizing the disturbed areas quickly.
2. The group discussed management models such as Hanauma Bay, which includes collection of a fee, limits the number of visitors at any one time and has a mandatory educational component. Another alternative model is that of the CCC camp being taken over by hui laka as a management entity, with visitors restricted to researchers with the occasional tour group visiting and paying a fee to generate revenue. The group also discussed the possibility of making park reservations on line, similar to that of a campground.



This is our understanding of the topics discussed and the conclusions reached. Please give PBR HAWAII written notification of any errors or omissions within seven calendar days. Otherwise, this report shall be deemed an accurate record of the meeting. Thank you.

***Hā`ena State Park
Master Plan***

Public Meeting
July 10, 2010
1:00 – 4:00 PM

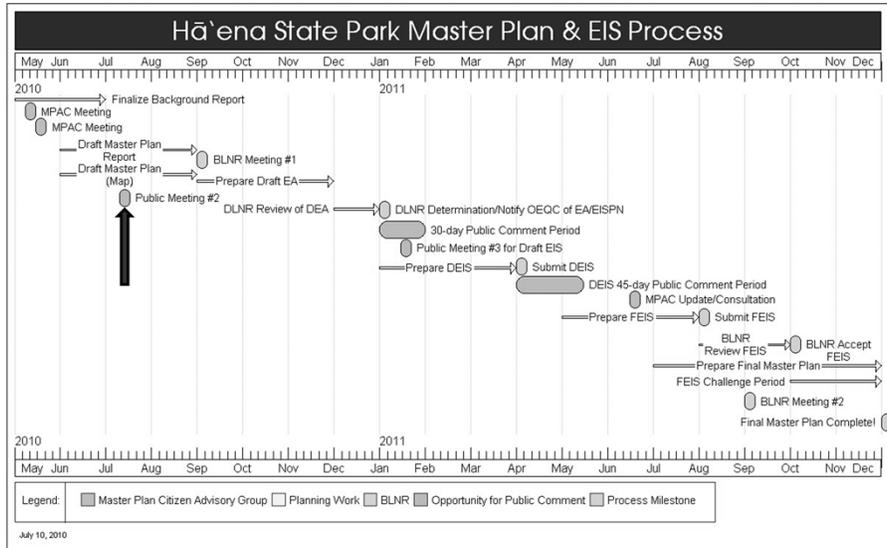
Welcome!

- **Pule**
- **Welcome**
- **Project Team Introductions**
 - **State Parks**
 - **Master Plan Advisory Committee**
 - **Kennedy Jenks**
 - **PBR Hawai'i**

Overview of Planning Process

- In the 1990's, a community-based plan was developed but not completed. The 1999 Community Preferred Master Plan is our starting point.
- Convened a Master Plan Advisory Committee (MPAC) for current effort to finish the master plan and EIS.
- Three MPAC meetings and a site visit held to evaluate, refine and ground-truth recommendations.
- Here today to present the proposed revisions to the Community Preferred Master Plan and proposed management strategies developed by the MPAC.

Process Overview



Priorities and Vision

- **ALL of the park is culturally significant.**
- **The park should be a living place...
cleanse, restore, and make useful again.**
- **Involve the families who are originally
from Hā'ena... reconnect the people to
the place.**
- **Uphold State Parks' responsibilities...
public safety and welfare, public access,
and outdoor recreational opportunities.**

Proposed Management Strategies

OVERALL PARK MANAGEMENT

- **Advisory Committee preference: community-based hui manages the entire park.**
- **Other options discussed:**
 - State/community partnership
 - State continues to manage park with available resources
- **Advisory Committee preference is to have funds generated by entrance or parking fees support park management, facilities and programs.**
- **Cultural Advisory Group provides guidance to State Parks and community-based management hui.**
 - Hula complex & sacred sites
 - Protocol
 - Any improvements, including safety & maintenance

NOTE: During meeting it was emphasized that the AC preference is to have funds generated by entrance or parking fees support park management, facilities and programs REGARDLESS of management entity (hui, state, or some combination thereof)

Proposed Management Strategies

HULA COMPLEX

- Management of the hula complex is a priority.
- Include education and enforcement of protocols.
- Management of complex must be included in management hui's responsibilities.
- Requires formal agreement between State Parks and County of Kaua'i (parcel's owner) to allow it to be managed as part of the larger park.
- Cultural Advisory Group should be consulted if interpretive displays are provided.

NOTE: Comments at the public meeting resulted in a change to the 3rd bullet with the community emphasizing that management of the hula complex must be included in the management hui's responsibilities – or responsibility of Cultural Advisory Group regardless of management entity.

Proposed Management Strategies

PARK ACCESS AND PARKING GOALS

- Ensure access for local community while managing volume of visitors.
- Access management should not discourage or diminish the experience for the local community.
- Keep it simple.
- Adjust over time as needed.

Proposed Management Strategies

VEHICULAR ACCESS AND PARKING

- Vehicular access along interpretive corridor for special access only - ADA, emergency vehicles, maintenance, lifeguards, cultural practices.
- Limit main visitor parking lot to 108 stalls.
- Consider having shuttles as an alternate means of access.
- Use parking fees and permits to control visitor numbers and turnover.
- Inform the public when parking lots are full.
- Provide options for kama'aina rates and annual passes.

NOTE: Limiting the parking lot to 108 stalls raised the concern about overflow parking on Kuhio Hwy outside the park's entrance – and the potential for impacts on the park's neighbors. This issue needs further examination and evaluation, including consideration of shuttles, limiting the total number of visitors per day, visitor passes, etc...

Proposed Management Strategies

PEDESTRIAN AND BICYCLE ACCESS

- Interpretive Corridor primarily for pedestrians and non-motorized bikes.
- Delete public pedestrian and bicycle path that is shown on the 1999 Community Preferred Plan within agricultural complex and along sand dunes.
- Manage public access to ag complex, other sites through educational/interpretive programs such as educational tours, community work days.

Proposed Management Strategies

NĀPALI TRAILHEAD MANAGEMENT

- Hiker check-in at orientation center.
- Consider dedicating a certain number of parking stalls for overnight hikers; charge a different rate for overnight parking permit.
- Guided tours could be organized by management hui, or if provided by a third party, reviewed by Cultural Advisory Group.

NOTE: A clarification was made to the last bullet to suggest that any future guided tours be organized by mgmt hui or reviewed by Cultural Advisory Group

Proposed Management Strategies

PARK HOURS OF OPERATION

- **Vehicle gates open from dawn to dusk. Pedestrians and bicycles, cultural practitioners allowed.**
- **Close park to the general public at least one day a week.**
 - Allow park to rest and resources to replenish themselves.
 - Closure day(s) could be used for park maintenance, community educational/work days.
- **Hikers who park overnight must see Caretaker to unlock gate.**

NOTE: the first bullet raised some concerns from community members who were not part of the AC and was amended to add pedestrians, bicycles and cultural practitioners. In particular they were concerned about night access for fishing and other cultural practices. The conversation that ensued between various community members revolved around the appropriateness or need to make special arrangements with the park caretaker for night access. Issue was left unresolved with community members noting their reservations about this strategy.

Proposed Management Strategies

ORIENTATION/EDUCATION/INTERPRETATION

- Provide orientation program for everyone entering. If sat through one time and sign in, don't need to go through it again for one year.
- Include interpretive displays to convey cultural importance, history, environmental information.
- Install interpretive displays at significant sites and throughout Interpretive Corridor, as appropriate.
- If shuttle service provided, there is an opportunity for orientation/education during transport.
- Locate signs with park rules/public safety information at the beginning of the Interpretive Corridor, Parking Lot and near Kē'ē Beach.

NOTE: AC members voiced that orientation should be provided to both visitors and Hawaii residents – similar to the requirement at Hanauma Bay

Proposed Management Strategies

NATURAL RESOURCES

- Stabilize and restore dune system – mālama ‘iwi kupuna is first priority.
- Continue restoration of agricultural complex.
- Restore native forest – a healthy forest system supports all aspects of a natural ecosystem including water resources, soil stabilization, even ocean resources... deep connection to hula.
- Source construction materials, fill and compost locally to prevent import of invasive seed banks.
- Prevent spread of apple snails to Limahuli Stream.

Proposed Management Strategies

RECREATION MANAGEMENT

- MPAC recommended swimmers and snorkelers be located in areas visible to lifeguards.
- No suntan lotion on before entering water.
- Do not bother lawai'a.
- What you bring in, you carry out of the park.
- Picnic areas are needed within park but should not be located on dunes.
- Park master plan will defer fishing issues to Hā'ena Community-Based Subsistence Fishery Rules (nearing completion).

NOTE: Bullets 2, 3 & 4 were added during the meeting based on community comments

Proposed Management Strategies

FEDERAL LAND AND WATER CONSERVATION FUND (LWCF)

- Outdoor recreation must be maintained within the park since land acquired by the State with federal LWCF funds.
- Develop and promote opportunities for public outdoor recreation that do not significantly impact natural and cultural resources.
- Proposed master plan will need to be reviewed by National Park Service to ensure compliance with LWCF requirements and original intent of park's acquisition.

Proposed Management Strategies

UTILITY MANAGEMENT

- **Water System:**
 - Replace deteriorating pipes
 - Supplement with water catchment systems
 - Keep options open for restoring ‘auwai, lo‘i irrigation
 - Review and manage stream diversion for lo‘i

Proposed Management Strategies

UTILITY MANAGEMENT

- **Wastewater System:**
 - R-2 treatment system for new Orientation/
Cultural Center and Caretaker's Cottage/
Baseyard, use parking lot for leach field.
 - Evaluate different low-impact options for
Cultural Gathering Area.
 - Reuse treated wastewater for landscape
irrigation (non-edible plants).
 - Require regular maintenance at least
once a year if not more.

Added a maintenance recommendation based on comments

Proposed Management Strategies

UTILITY MANAGEMENT

- **Drainage System:**
 - Reinstall 'auwai, where applicable. This will help mitigate flooding.
 - Restore a more natural look to existing drainage facilities (drain outlets and inlets).
 - Use bioswales and other low impact designs to fullest extent possible.

Proposed Management Strategies

UTILITY MANAGEMENT

- **Electrical System:**
 - Provide power to Orientation/Cultural Center and Caretaker's Cottage/ Baseyard
 - Use photovoltaic to maximum use
 - Consider hydropower

Discussion

- **Any questions or comments on the proposed...**
 - **Revisions to the 1999 Community Preferred Master Plan Map**
 - **Management Strategies**

Next Steps

- **Draft Master Plan Report**
- **Board of Land and Natural Resources (BLNR) Meeting**
- **Environmental Impact Statement (EIS) Process**
- **Finalize Master Plan Report & Map**
- **BLNR Approval**
- **Implementation...!**

Mahalo Nui Loa!

- If you wish to submit comments or be added to our mailing list, please contact...
 - Lauren Tanaka, State Parks, 587-0293
Lauren.A.Tanaka@hawaii.gov
 - Catie Fernandez, PBR Hawaii, 521-5631
cfernandez@pbrhawaii.com
- Please submit comments by July 31, 2010.

Mahalo!

**MINUTES FOR THE
MEETING OF THE
BOARD OF LAND AND NATURAL RESOURCES**

DATE: THURSDAY, OCTOBER 14, 2010
TIME: 9:00 A.M.
PLACE: KALANIMOKU BUILDING
LAND BOARD CONFERENCE ROOM 132
1151 PUNCHBOWL STREET
HONOLULU, HI 96813

Board Member Agor called the meeting of the Board of Land and Natural Resources to order at 9:05 a.m. The following were in attendance:

MEMBERS

Ron Agor
Jerry Edlao
Dr. Sam Gon

Rob Pacheco
John Morgan
David Goode

STAFF

Dan Quinn/PARKS
Charlene Unoki/LAND

Michael Constantinides/DOFAW
Randolph Lee/SHPD

OTHERS

Pam Matsukawa, Deputy Attorney General
Cynthia Rezentes, E-2
Bobby Titcomb, E-2
Hans Sin, C-1
Chipper Wichman, E-3
Douglas Halbert, D-19
Greg Kugle, D-16

William Aila, E-2
Josh Horowitz, E-2
Summer Nemeth, E-2
John Morton, E-1
Kimi Yuen, E-3
Zachary Helm, D-19

{Note: language for deletion is [bracketed], new/added is underlined}

Item A-1 September 9, 2010 Minutes – TO BE DISTRIBUTED.

Approved as submitted (Pacheco, Gon)

Mr. Quinn pointed out to the Board that the recommendation as to the approval of the design is also to delegate to the Chair should there be required approval of components of the design.

This item was moved to approve by Member Morgan and seconded by Member Gon.

Unanimously approved as submitted (Morgan, Gon)

Member Goode noted this relates to the Chair having discretionary down the road here. That is fairly broad. They still have some permit processes to go through where there could be a fair number of changes. It's hard to say what is significant. He thought the Board and the Chair should have full authority to handle those. He is not sure how those issues are worded, but there will be changes and the Chair should be able to handle that. Member Gon said he would be happy to leave it to the discretion of the Chair and staff to decide whether it is significant and whether it should come back to the Board or not.

Item E-3 Request the Board of Land and Natural Resources to Accept the Recommendations Proposed in the Draft Master Plan and Endorse the Preparation of an EIS for Haena State Park, Haena, Kauai

Mr. Quinn reported that in the Board package there is some additional information for the Board members one of which was in a different format - easier to follow objectives and management strategies as well as a plan view of the park at Haena. He described where Haena is referring to the map. Over the past decades it has been subject to overuse where there are way more vehicles than the area can accommodate. The impacts are significant. Mr. Quinn orientated the Board members pointing out landmarks. There is a DOT highway that ends at the Ke'e Beach. There is a graded area used for parking that fills up completely where people will park along another area and along the highway. This area is rich in cultural and archaeological sites -- taro lo'i, house sites and heiau where there is a heiau deeded to the County of Kauai. Also, caves and rock fall hazards. He related some history where about a decade ago the State undertook a master planning process that was never effectively wrapped up. Unfortunately, the consultant left the State and they never got a plan everyone was happy with. Staff has moved to a new master planning process which will take us to the EIS, but the biggest problem is how to deal with the vehicles. This is one of the recommendations in the plan which calls for limiting vehicular penetration to a certain point other than allowing special access for ADA or cultural access to the hula heiau. The limit is calling for a 108 parking stalls which are about a third of the vehicles in there now. One concept was to have people park outside and have them shuttled in citing the example of Pirates of the Caribbean movie who had to park out in Hanalei and ran a shuttle system for the park visitors all day long that worked well and showed it can work. The issue is finding a parking lot which still needs to be addressed. There are a number of recommendations where one of the considerations is to have a gate to charge for parking or access to the area. The community would like to manage that themselves and retain the funding to help operate the park. That is not impossible, but it is on a scale staff has not done yet. They do have non-profit organizations managing parks. There certainly is some capacity building that needs to happen before that can occur. Also, there are proposals regarding limiting

access to the hula platform. From staff's perspective whether they can tell people if they can go into a place or not or have particular groups go to it is potentially problematic, but through an educational process and requesting people to have consideration for the site – this is something that could be done. Mr. Quinn related the concept of the plan pointing it out on the map where people will park in the colored area with an orientation center for visitors to be educated. Where the caretaker's facility is there will be an interpretive corridor with signage. Right now, there is a restroom and there is a project for constructive wetlands for disposal of the effluent and water that comes up from the ground. This area serves as the trail head for the Na Pali Coast where many of the cars parked there are going beyond the park itself. There are hundreds of people a day who park there to hike to Hanakapiai which is 2 miles in which is substantial. And being this is the end of the road people want to park and explore. There is almost nothing you can do physically on the site without impacting an archaeological or cultural resource which makes it a challenge to accommodate people on the site. Mr. Quinn said he would like the Board to review and approve the draft master plan and they will be moving through the EIS process noting some folks in the community would like this to move along. He thanked Chipper Wichman for taking the lead in community discussions.

Member Agor inquired about driving in and dropping people off. Mr. Quinn confirmed that pointing out the ADA parking area. Staff needs to maintain emergency access. There is a plan to move the lifeguard tower away from the road. There will be some discussion with DOT in managing the road since it ends right on the beach. Also, there will be some discussions with the County since they have no active management program at the heiau which staff considers a resource part of the park.

Member Gon acknowledged the importance and richness of this area with the highest density of important sites in any State park. It's a huge challenge since it's at the end of a road. He apologized that he will have to leave for another meeting at 11:00am and hope to come to a decision on this item. Mr. Quinn noted that they have an active community group out there restoring the taro lo'i making the park come alive and are passionate to do so.

It was asked by Member Agor who makes the decision on the funds and Mr. Quinn said it would be up to the Board.

Chipper Wichman testified and acknowledged that in this process he is serving as a community member. He is a 5th generation Haena resident and it's his family's kuleana (responsibility) to malama (care) that place. He is personally involved in efforts to bring forward a Master Plan which he has 30 years of records and he wants to see the process finish. Mr. Wichman related that this place is the piko of the most famous ahupua'a on Kauai made famous throughout the archipelago because of the relationship of Pele and Lohiau. The entire property is a wahi pana. There are iwi kupuna in the dune system there and archaeologists have noted the earliest dates recorded are from this area. This area was used intensively as a cultural site as any in the pai aina. As a cultural resource it doesn't get more intense and more responsible.

Mr. Wichman said there has been no management of the area by the State and so it has been over run. In recent years they were successful in getting the State to put up a gate to stop vehicles from driving on the dune system. The State has assisted their non-profit organization, Hui Maka'ainana O Makana who is the curators of the lo'i system. They took out an alien forest and now have kalo growing. The State Park's archaeologist assisted with mapping.

Mr. Wichman said there is a question with who gets the funding from the gate access. The community has been proposing a gate for 15 years because it's about managing people. There are too many people in the State. There are problems with rage parties at night where a gate would secure the park. It is a great idea to limit the vehicle penetration into the park – the area that is already disturbed. This planning process started with the community preferred master plan in the 1990s with many stakeholder meetings. What is before the Board is a good compromise. The community feels in the end the ability for the State to properly care for this area is best achieved through a formal partnership with the community through a non-profit lease or something where the community becomes the stewards of this park. The key to proper resource management is money and the community has said they want 100% of the gate revenue. They want enough to do the job properly because this park demands it. There was a proposal to completely close the park 1 day out of the week. The aina needs to rest since it is overtaxed. This park is an end of road destination, has a safe place to swim, but there is so much more than just that.

Member Agor commented that families bring almost everything with them and this area warrants this type of plan which he agrees with. Mr. Wichman said he learned a phrase “the 1 cooler rule” - separating the parking from the resource that the community thinks that is a reasonable place for the parking.

Member Agor asked whether the community asked to set a number of people there. Mr. Wichman said determining a proper carrying capacity is a dangerous road to go down citing Hanauma Bay as an example. At the end it was determined Hanauma Bay's carrying capacity a day is 3000 people which is a scary number for the Haena community. It was difficult to determine and the best way was through parking stalls. At anytime there could be 100 to 150 people – it's dense, but not overly dense. The community has struggled with the shuttle concept in Haena, but they are overrun because there is illegal parking. Having a shuttle could dump hundreds of people and the community would have to define the carrying capacity. People could still be dropped off at the perimeter and walk in. They need to look at the carrying capacity for the island and the north shore. The community is looking at this process to retake their park because most of them are not willing to take their ohana down there because it's so overrun with visitors. The community is concerned with all the illegal parking along the highway beyond the DLNR's control, but it will have to be dealt with. Member Agor noted that at Hanalei if there is no parking vehicles are turned away, but people walk in.

Member Pacheco said that on the Big Island at Manini State Park the community group had the same idea of a limited number of parking, but it doesn't work because people will

park all over the place and he encouraged Mr. Wichman to find another way. Mr. Wichman agreed it is the toughest issue and the community's feeling is no matter how big you build the parking lot it will never be big enough. They've had up to 2000 people down there. If people park further away they are less likely to stay longer or bring all their accoutrements. It won't end unless a carrying capacity is set.

Member Morgan asked how they came up with the number of parking stalls because he had a concern with planning for a parking problem. He has hiked there and to come far away and not be able to hike is a downer. Mr. Quinn explained that is the number of cars that can fit in the already disturbed area. That was the same number the earlier community preferred plan had dealt with which he pointed out on the map. He agreed that 10 or 20 more isn't going to solve the issue and closing the gates when 108 cars come in is going to have an impact that has to be addressed which is an issue.

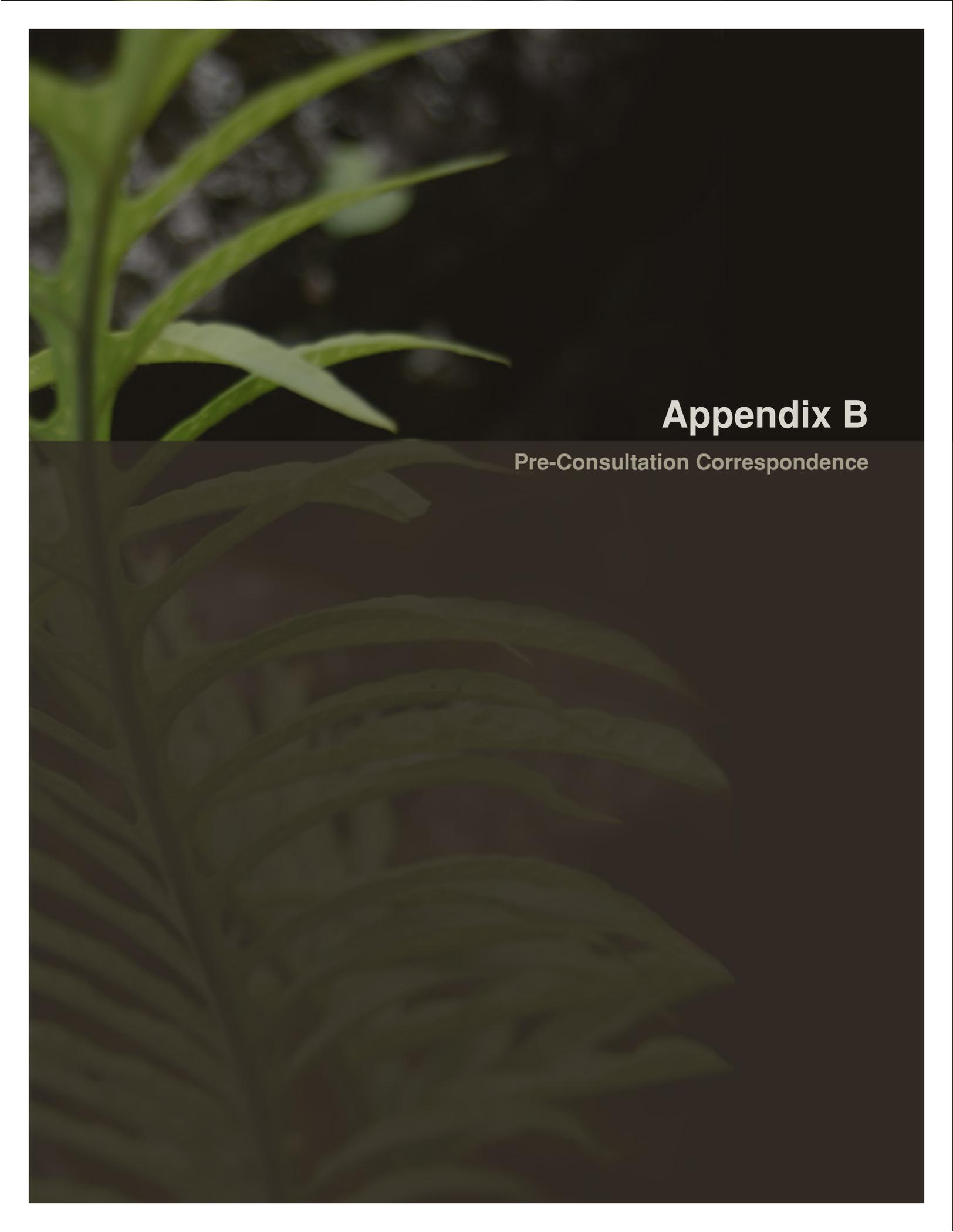
Mr. Wichman said that in the 1990s with the Community Preferred Master Plan had 3 scenarios and it was the one with the smallest number of parking stalls. The other scenarios had greatly increased parking capacity. The issue the community is wrestling with is how many of those stalls are dedicated to people hiking to Na Pali or vice-versa people swimming at Ke'e? It was suggested dedicating a certain number of stalls for people wanting to use the trail. They were looking at increased fees for leaving your car overnight like \$150 rather than \$10 as an example. The overflow parking will have to be addressed in the EIS process. This is for the Board to endorse to move to the next step. The viability of a shuttle system and community entrepreneurship appeared this past summer. Part of it is education for visitors to use the shuttle at Hanalei.

Kimi Yuen representing PBR Hawaii testified the key is education agreeing the place is overrun suggested having a permit system on-line for parking. A designated parking stall reserved for you for a certain day and a lot of tourists plan it in advance. At the same time these tourists are educated about the place from the State Parks website. Set this up ahead of time and then you can have a 108 parking stalls work. Or an island wide shuttle system permit for all the hotels that State Parks could charge. Have a visitors center there where people go for orientation and control numbers there.

Unanimously approved as submitted (Gon, Morgan)

Item D-18 Issuance of Right-of-Entry Permit to Monsanto Company on Lands Encumbered by Governor's Executive Order 3140 and Revocable Permit S-7582, Pulehunui, Kula, Maui, Tax Map Key: (2) 2-5-001:010.

Charlene Unoki, Assistant Land Administrator at Land Division conveyed that Monsanto Company plans to do some testing during an 8 month period at the site. There is an existing well that has been capped. In the First Phase, they plan to install a submersible pump and pump testing. In the Second Phase, they are going in to measure the water level in the State well. Staff is asking this permit be gratis for a period of 8 months. Any information from Monsanto will be turned in to Engineering as well as the Water Commission.



Appendix B

Pre-Consultation Correspondence

LINDA LINGLE
GOVERNOR OF HAWAII



LAURA H. THIELEN
CHAIRPERSON
MEREDITH J. CHING
JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
DONNA FAY K. KIYOSAKI, P.E.
LAWRENCE H. MIIKE, M.D., J.D.

KEN C. KAWAHARA, P.E.
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

August 25, 2008

RECEIVED
AUG 26 2008
PBR HAWAII

Ms. Kimi Mikami Yuen
PBR Hawaii & Associates, Inc.
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Drear Ms. Yuen:

Proposed Haena State Park Master Plan and
Environmental Impact Statement, Haena, Kauai
TMKs: (4) 5-9-001:022 (por.) and 025 and (4) 5-9-8:001

Reference is made to your August 11, 2008, letter requesting comments as to whether the proposed project will have any impacts on the Commission on Water Resource Management's (Commission) existing or proposed projects, plans, policies and programs.

The Commission on Water Resource Management (Commission), Stream Protection and Management Branch, has the responsibility to protect stream channels from alteration whenever practicable to provide for fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses in the State of Hawaii under the authorization of the State Water Code (Code), Chapter 174C, Hawaii Revised Statutes, and Chapter 13-169, Hawaii Administrative Rules (Protection of Instream Uses of Water).

Limahuli Stream flows through the National Tropical Botanical Garden (NTBG) and Haena State Park. In 1977, the Commission approved NTBG's application to construct a new stream diversion and petition to amend the interim instream flow standard (PAIIFS) to divert approximately 150 gallons per minute (GPM) at the 320-foot elevation and to restore approximately 200 GPM at the 180-foot elevation of Limahuli Stream. The approved diversion is used to irrigate the upper grounds of Limahuli Garden and an existing kalo loi.

Any new or increased diversion of water from Limahuli Stream will require one or more of the following permits from the Commission:

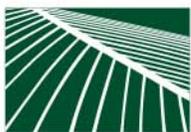
- Stream Channel Alteration Permit (SCAP)
- Stream Diversions Works Permit (SDWP)
- Petition to Amend Interim Instream Flow Standard (PAIIFS)

Should you have any questions, please contact Robert Chong of the Stream Protection and Management Branch at 587-0266, or by email at: robert.k.chong@hawaii.gov.

Sincerely,

A handwritten signature in black ink that reads "Ken C. Kawahara".

KEN C. KAWAHARA, P.E.
Deputy Director



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED®AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED®AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED®AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED®AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

February 22 , 2015

William M. Tam, Deputy Director
Commission on Water Resource Management
1151 Punchbowl St. Rm. 227
Honolulu, HI 96813

**SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK
MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT,
HĀ'ENA, KAUA'I, HAWAI'I**

Dear Mr. Tam,

Thank you for your agency's letter dated August 25, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from the Commission's Stream Protection and Management Branch indicating that any new or increased diversion of water from Limahuli Stream will require one or more of the following permits: Stream Channel Alteration Permit; Stream Diversion Works Permit; and/or Petition to Amend Interim Instream Flow Standards.

While the master plan does not propose any specific stream alterations, two suggested elements may involve Limahuli's stream waters or its riparian area. First, riparian restoration work is identified as potentially beneficial to the stream and its aquatic life. Specific restoration plans have not been prepared at this time. However, it is anticipated that this work will not involve instream activities and would more likely involve activities such as removal of alien trees and replanting appropriate natives for the location.

The master plan also suggests that alternative sources of energy be considered to supply power to the site facilities. One potential alternative energy source may be micro-hydro power. We acknowledge that water use for this purpose may require a permit(s) from the Commission.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\CWRM2015.doc

LINDA LINGLE
GOVERNOR



RUSS K. SAITO
Comptroller

BARBARA A. ANNIS
Deputy Comptroller

**STATE OF HAWAII
DEPARTMENT OF ACCOUNTING
AND GENERAL SERVICES**

Kauai District Office
1680 Haleukana Street
Lihue, Hawaii 96766-9063

KDO 09.0026

RECEIVED

AUG 15 2008

PBR HAWAII

August 14, 2008

Ms. Kimi Mikami Yuen, LEED AP®
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, HI 96813-3484

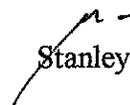
Dear Ms. Yuen:

**Subject: Pre-Consultation for the Proposed Ha'ena State Park Master Plan and
Environmental Impact Statement Ha'ena, Kauai, Hawaii**

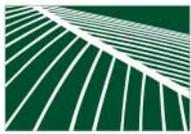
In regards to your letter dated August 11, 2008, on the subject project, the proposed project has no impact on any of our existing or proposed projects, plans, policies, or programs.

Thank you.

Sincerely,


Stanley S. Doi

kk



PBR HAWAII

& ASSOCIATES, INC.

PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

February 22, 2015

Eric Agena, District Engineer
State of Hawai'i
Dept. of Accounting and General Services
1680 Haleukana St.
Līhu'e, HI 96766

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Agena,

Thank you for your agency's letter dated August 14, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Transportation, Highways Division, we acknowledge the comments from DAGS-Kaua'i indicating that the Master Plan has no impact on any of your existing or proposed projects, plans, policies or programs.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\DAGS
Kauai2015.doc

LINDA LINGLE
GOVERNOR



RUSS K. SAITO
COMPTROLLER

BARBARA A. ANNIS
DEPUTY COMPTROLLER

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

(P)1286.8

AUG 25 2008

RECEIVED

AUG 26 2008

STATE OF HAWAII

Ms. Kimi Mikami Yuen, Associate
PBR Hawaii & Associates, Inc.
1001 Bishop Street, ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Ms. Yuen:

Subject: Pre-Consultation for the Proposed Haena State Park Master Plan and
Environment Impact Statement
Haena, Kauai, Hawaii

Thank you for the opportunity to comment on your letter dated August 11, 2008. This proposed project does not directly impact any of the Department of Accounting and General Services' facilities or projects, and we have no comments to offer at this time

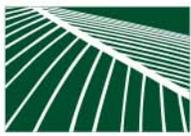
If you have any questions, please call me at 586-0400 or have your staff call Mr. Bruce Bennett of the Public Works Division at 586-0491.

Sincerely,

A handwritten signature in black ink that reads "Russ K. Saito".

RUSS K. SAITO
State Comptroller

c: Ms. Katherine Kealoha, DOH-OEQC
Ms. Lauren Tanaka, DLNR Parks Division



PBR HAWAII & ASSOCIATES, INC.

PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Douglas Murdock
State of Hawaii Comptroller
Department of Accounting and General Services
PO Box 119
Honolulu, HI 96810

**SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE
PARK MASTER PLAN AND ENVIRONMENTAL IMPACT
STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I**

Dear Mr. Murdock,

Thank you for your department's letter dated August 25, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from the Department of Accounting and General Services, indicating that the proposed master plan does not directly impact any of the Department's facilities or projects.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

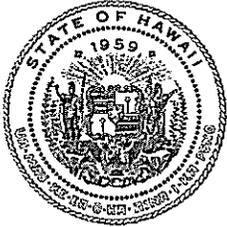
Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\DAGS.doc



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR

STRATEGIC INDUSTRIES DIVISION
235 South Beretania Street, Leiopapa A Kamehameha Bldg., 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-3807
Fax: (808) 586-2536
Web site: www.hawaii.gov/dbedt

RECEIVED

SEP 02 2008

PBR HAWAII

August 27, 2008

Kimi Mikami Yuen
PBR Hawaii & Associates
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Re: Pre-consultation for the Department of Land and Natural Resources (DLNR) proposed Ha'ena State Park Master Plan and Environmental Impact Statement, Ha'ena, Kauai, Hawaii

In response to your pre-consultation notice dated August 11, 2008, thank you for the early opportunity to provide comments on the proposed master plan and environmental impact statement for the Ha'ena State Park, Kauai. The project is comprised of 64 acres within the park and adjacent near shore water and Ke'e Beach.

We would like to call your attention to: (1) State energy conservation goals; and, (2) energy and resource efficiency and renewable energy and resource development.

- 1. State energy conservation goals.** Project buildings, activities, and site grounds should be designed and/or retrofitted with energy saving considerations. The mandate for such consideration is found in Chapter 344, HRS ("State Environmental Policy") and Chapter 226 ("Hawaii State Planning Act"). In particular, we would like to call to your attention HRS 226 18(c) (4) which includes a State objective of promoting all cost-effective energy conservation through adoption of energy-efficient practices and technologies.
- 2. Energy and resource efficiency and renewable energy and resource development.** We recommend that the planning and preliminary design for the project be conducted following sustainable development principles and guidelines and OEQC 1999 Planner's Checklist. We suggest that the plan look for opportunities for off-grid energy such as photovoltaic systems for lighting.

PBR Hawaii & Associates, Inc.

August 25, 2008

Page 2

Our website (<http://www.hawaii.gov/dbedt/info/>) provides detailed information on guidelines, directives and statutes, as well as studies and reports on aspects of energy efficiency and renewable energy. Please also do not hesitate to contact Carilyn Shon, Energy Efficiency Branch Manager, at telephone number (808) 587-3810, for additional information on LEED, energy efficiency, and renewable energy resources.

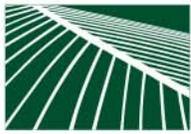
Sincerely,

A handwritten signature in cursive script that reads "Elizabeth Corbin".

Elizabeth Corbin
Acting Administrator

Cc: OEQC

Ms. Lauren Tanaka, DLNR Division of State Parks



PBR HAWAII

& ASSOCIATES, INC.

PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED®AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED®AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED®AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED®AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

February 22, 2015

Mark Glick
State DBEDT, Energy Division
PO Box 2359
Honolulu, HI 96804

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Glick,

Thank you for your agency's letter dated August 27, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from the Energy Division, providing information regarding State energy conservation goals and resource efficiency. The proposed master plan includes several recommendations for resource conservation and explores opportunities for use of solar and micro-hydro to help power proposed facilities.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\DBEDT StratIndDiv2015.doc

LINDA LINGLE
GOVERNOR

MAJOR GENERAL ROBERT G. F. LEE
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE



PHONE (808) 733-4300
FAX (808) 733-4287

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

August 26, 2008

RECEIVED

AUG 28 2008

PBR HAWAII

Ms. Kimi Mikami Yuen, LEED AP
Associate
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Ms. Yuen:

Pre-Consultation for Proposed Ha'ena State Park Master Plan,
Environmental Impact Statement, Ha'ena, Kaua'i, Hawai'i

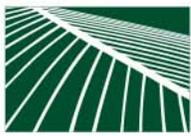
Thank you for the opportunity to comment on this project. After review of your letter and the accompanying map of this project, we recommend that a 25 sq. ft. area be set aside for possible future siren installation. Beyond that, we have no further comments to make at this time.

We anticipate reviewing the draft Environmental Impact Statement when it is completed, and will make any other appropriate recommendations at that time. If you have any questions, please call Mr. Richard Stercho, Hazard Mitigation Planner, at (808) 733-4300, ext. 583.

Sincerely,


EDWARD T. TEIXEIRA
Vice Director of Civil Defense

c: Ms. Lauren Tanaka, DLNR Division of State Parks



PBR HAWAII

& ASSOCIATES, INC.

PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

February 22, 2015

Doug Mayne, Vice Director
State Civil Defense
3949 Diamond Head Road
Honolulu, HI 96813-3484

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Mayne,

Thank you for your agency's letter dated August 26, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from State Civil Defense (SCD), requesting that a 25-foot square area be set aside for possible future siren installation. We have accommodated this request in the master plan, noting that the area near the main parking area can accommodate a 25-foot area for possible pole installation should it be deemed necessary by SCD.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Assessment and subsequent Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\DOD2015.doc



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

RECEIVED
AUG 27 2008
PBR HAWAII

OFFICE OF THE SUPERINTENDENT

August 26, 2008

Ms. Kimi Mikami Yuen, Associate
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Ms. Yuen:

SUBJECT: Pre-Consultation for the Proposed Ha`ena State Park Master Plan
and Environmental Impact Statement, Kauai, Hawaii

The Department of Education has no comment at this time on the master plan and environmental impact statement for the Ha`ena State Park. Should you have any questions, please call Heidi Meeker of the Facilities Development Branch at 377-8301.

Very truly yours,

A handwritten signature in cursive script that reads "Patricia Hamamoto".

Patricia Hamamoto
Superintendent

PH:jmb

c: Randolph Moore, Assistant Superintendent, OSFSS
Duane Kashiwai, Public Works Administrator, FDB
Lauren Tanaka, Division of State Parks, DLNR



PBR HAWAII

& ASSOCIATES, INC.

PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED®AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED®AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED®AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED®AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

February 22, 2015

Kathryn Matayoshi, Superintendent
State of Hawai'i, Department of Education
PO Box 2360
Honolulu, HI 96804

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Ms. Matayoshi,

Thank you for your agency's letter dated August 26, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge that the Department of Education had no comment at the time.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\DOE2015.doc

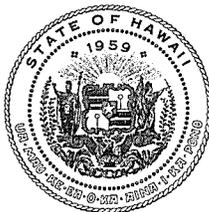
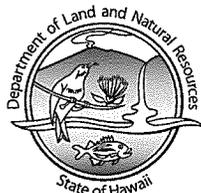
HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FORESTRY AND WILDLIFE
KAUAI DISTRICT
3060 EIWA STREET, ROOM 306
LIHUE, KAUAI, HAWAII 96766

August 28, 2008

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

Ms. Kimi Mikami
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, HI. 96813-3484

Re: Pre-Consultation for the proposed Ha'ena State Park Master Plan and Environmental Impact Statement, Ha'ena, Kauai, Hawaii'i.

We received a copy of the pre-consultation letter dated August 11, 2008 from Ms. Andrea Erichsen, DLNR-DOFAW Kauai Seabird Habitat Conservation Plan Coordinator on August 27, 2008.

We provide the following comments on the proposed project:

1. Federal and State listed threatened and endangered waterfowl species such as Hawaiian coot (*Fulica alai*), Hawaiian gallinule (*Gallinula chloropus*), Hawaiian stilt (*Himantopus mexicanus*) and Hawaiian duck (*Anas wyvilliana*) are known to use the wetland areas for feeding and possibly nesting. The Hawaiian goose (*Nesochen sandvicensis*), although not documented in the park proper, may occasionally visit the area for feeding. Care must be taken not to disturb nesting sites during planned development projects near the wetlands.
2. Federal and State listed T-E seabirds species are not known to exist in the proposed project area, however, the threatened Newell's shearwater (*Puffinus newelli*), the endangered Hawaiian dark-rumped petrel (*Pterodroma phaeopygia*), and candidate species, Band-rumped storm petrel (*Oceanodroma castro*) are known to transit these areas at night to and from their mountain nesting areas and the sea. Because of their nocturnal habit, and their known attraction to man-made lights, it is recommended that seabird safe lights be installed where lighting may be needed. As much as possible, artificial lights including parking lights and facility lights should be minimized or reduced during the fledging season of September to December. Please consult with Ms. Andrea Erichsen for seabird friendly lighting information at Andrea.L.Erichsen@hawaii.gov or call her at 808-245-9160.

3. The federally endangered Hawaiian hoary bat (*Lasiurus cinereus*) may transit the area at night, but are not likely to be impacted by the proposed project.
4. We recommend to strategically placing educational signage to inform the general public of native wildlife in the area.
5. We recommend that night time construction activities using overhead construction lights be avoided as much as possible during the period of September to December due to the Kauai seabird light attraction problem.
6. The Na Pali Coast trail at the end of the road near Ke'e beach is an important public hunter access route to the Na Pali Coast State Park. The Na Pali Coast State Park-Unit G is open to year-round, daily archery hunting for feral pig and feral goat. Because of the year-round hunting, the trail should be kept open so that hunters may enter and exit the park. It is not uncommon for hunters to start their trek at 4:00 a.m. and return after dark. Because vehicle parking has been an issue in the park, it is important that the proposed plan designate at least 2 parking stalls for public hunters near the Na Pali Coast trailhead. The reason for this is because hunters returning for the NPC are packing out harvested game and having their vehicles near the trailhead will allow them to quickly store the game in their vehicle out of view from the non-hunting public.

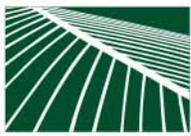
If you have any questions, please feel free to contact me at 274-3433. Please place my email address on your list. Mahalo. thomas.j.kaiakapu@hawaii.gov.

Sincerely,



Thomas Ka'iakapu
Kauai Wildlife Manager

Cc: Kauai DOFAW
Lauren Tanaka, State Parks Administration



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Thomas Ka'iakapu, Kauai Wildlife Manager
DOFAW, Kaua'i District
3060 Eiwa Street, Room 306
Līhu'e, HI 96766

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Ka'iakapu ,

Thank you for your letter dated August 28, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge DOFAW's comments.

We acknowledge that federal and state listed threatened and endangered species may utilize the site. In preparation for the master plan, a flora and fauna survey was conducted by Geometrician Associates, LLC in 2009. The survey included a physical survey of flora and fauna; a review of previous surveys of the area; report of the results describing plant communities and habitats; and, discussion of potential effects from increased recreation on wildland resources.

Thirteen species of birds were observed during the 2009 survey including the endangered Hawaiian Duck (Koloa Maoli, *Anas wyvilliana*), two indigenous shorebirds (Kolea, *Pluvialis fulva* and 'Ulili, *Heteroscelus incanus*) and an indigenous seabird (Koa'e Kea, *Phaethon lepturus dorotheae*). All other birds sighted were non-native introductions.

Additional species of seabirds, waterbirds, shorebirds and forest birds that are federally listed as endangered or threatened may use the park. The wetlands may also provide feeding and nesting areas to the indigenous Black-crowned Night-heron ('Auku'u; *Nycticorax nycticorax hoactli*).

We acknowledge that seabirds, including the threatened Newell's shearwater, endangered Hawaiian petrel and species of concern, the band-rumped storm petrel may fly over the site. Further, we acknowledge that seabirds are attracted to artificial lights, flying around the light source until they collide with objects or collapse from exhaustion, making them vulnerable to predators once on the ground. To avoid any impact to seabirds, the master plan does not include any parking lot lighting. Any security lighting that is deemed necessary at the ECC will be shielded downward to avoid any impacts to seabirds.

Thomas Ka'iakapu

PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Page 2 of 2

Other federally endangered waterbirds that would likely use the wetlands are the Black-necked Stilt (Ae'o; *Himantopus mexicanus knudseni*), Hawaiian Coot ('Alae ke'oke'o; *Fulica alae*), Hawaiian Moorhen ('Alae'ula; *Gallinulae chloropus sandvicensis*), and Nēnē (*Branta sandvicensis*). To avoid impacts to waterbirds no physical changes or new activities are proposed for the site's wetlands. However, there has been interest on the part of some community members to restore the wetlands (which are believed to be former Hawaiian fishponds or used for wet cultivation of taro) for ecological or cultural use. The master plan recommends that before any wetland restoration activities occur, that an analysis of the costs, benefits and liabilities associated with intentionally creating habitat for endangered waterbirds be conducted.

The 2009 biological survey also reports that although not sighted during the survey, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), probably utilizes Hā'ena State Park as it has been observed in the Hanalei and Princeville areas. To avoid any impacts to the endangered Hawaiian hoary bat, no large woody shrubs or trees over 15 feet in height will be removed during the bat pupping months.

We also acknowledge your suggestion to strategically place educational signage to inform the general public of the area's wildlife. Master plan recommendations include expanding the interpretive programming in the park, including interpretive signage and a required stop in the proposed Education & Cultural Center to gain a greater understanding of the park's many resources – ecological, cultural and archaeological.

We further acknowledge the information provided in your letter relating to the importance of the Nāpali trailhead as a hunter access for year-round archery hunting of feral pig and goat. Recommendations of the master plan include limiting access to the parking area nearest Kē'ē beach to those requiring special access, including ADA, lifeguards and cultural practitioners (to include fishermen/women and hunters).

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Assessment and subsequent Environmental Impact Statement documents.

Sincerely,

PBR HAWAII



Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

LINDA LINGLE
GOVERNOR



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

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.2979

September 4, 2008

Ms. Kimi Mikami Yuen
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

RECEIVED
SEP 12 2008
PBR HAWAII

Dear Ms. Yuen:

Subject: Haena State Park Master Plan
Environmental Impact Statement – Early Consultation

Thank you for requesting the Department of Transportation's (DOT) review of the subject project.

DOT's initial comments are as follows:

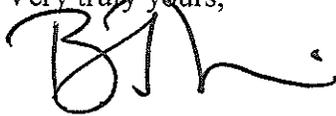
1. The subject project will impact traffic on Kuhio Highway (Route 560) in the vicinity of the state park.
2. The DOT understands that a Master Plan (MP) and a Draft Environmental Impact Statement (DEIS) will be prepared for the subject project. The DEIS should include a traffic assessment or traffic impact analysis report (TIAR), which covers both project impacts and mitigation measures attributable to the project.
3. The DOT Highways Division is particularly concerned with parking within Haena State Park. The MP & DEIS should address this and other concerns including, but not limited to, increase in traffic resulting from bicyclists, hikers & campers, drainage and surface runoff, varying park hours, overnight camping, etc.

Ms. Kimi Mikami Yuen
Page 2
September 4, 2008

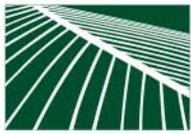
STP 8.2979

The DOT will provide additional comments upon receipt of the Master Plan and DEIS. DOT requests four (4) copies of these documents.

Very truly yours,

A handwritten signature in black ink, appearing to read 'B. Morioka', with a stylized flourish at the end.

BRENNON T. MORIOKA, PH.D., P.E.
Director of Transportation



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED®AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED®AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED®AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED®AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Glenn M. Okimoto, Ph.D.
State Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Director Okimoto,

Thank you for your agency's letter dated September 4, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from the Department of Transportation indicating that the project will impact traffic on Kūhiō Highway (Route 560) in the vicinity of the park. We also acknowledge DOT's concerns about parking inside the park itself. We further acknowledge that the DOT recommends a Traffic Impact Assessment Report (TIAR) addressing project impacts and mitigation measures; and that the master plan should address other impacts such as parking impacts and impacts from increases in bicyclists, hikers and campers as well as drainage and surface runoff, varying park hours, overnight campers, etc.

The master plan recognizes that there are serious traffic and parking issues inside and outside Hā'ena State Park. The park is accessed by Kūhiō Highway, a two lane roadway with gravel and asphalt concrete pavement shoulders. The highway enters into the park over Limahuli stream by a single lane bridge measuring 10-foot wide by 12-foot long. Once in the park, the highway resumes to two lanes, measuring approximately 24 feet in width. The highway within the park has no pedestrian or bicycle amenities and illegal parking on both sides of the highway forces pedestrians to compete with moving vehicles.

Within the park, there are two designated parking areas, one approximately 800 feet from the park entrance and one at the terminus of the highway near Kē'ē beach. The parking lot nearest the park entrance is dirt and gravel and measures approximately 30,000 square feet in area, it is unsigned and unstriped. Parking patterns are inefficient and haphazard. The parking area near Kē'ē beach is hard-packed dirt on each side of the highway. Two paved ADA accessible spaces are paved, striped and signed.

GLENN OKIMOTO

PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAII

Page 2 of 2

Because traffic and parking is of such great concern, a sub-committee of the Master Plan Community Advisory Committee was convened to look at various parking and traffic mitigation measures. The sub-committee meetings included attendance by DOT-Kaua'i Staff, County transit agency staff as well as the project's traffic engineer, Austin, Tsutsumi & Associates, Inc. (ATA). The outcome of the discussions with the community is a master plan that includes an alternative to establish a limit on the number of visitors to the park per day and/or institute a shuttle bus system to serve the majority of park visitors.

A Traffic Impact Analysis Report (TIAR) was prepared by ATA to help inform the master plan process and address mitigation measures. The TIAR includes vehicle counts, discussion of existing traffic operating conditions, parking conditions, projected traffic impacts for the proposed master plan and traffic/parking management options, including a shuttle. These issues along with the proposed mitigation measures will be discussed in the Environmental Impact Statement (EIS).

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

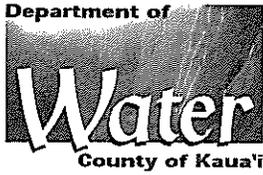
Sincerely,

PBR HAWAII



Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks



Water has no substitute.....Conserve it

RECEIVED
AUG 27 2008
PBR HAWAII

August 22, 2008

Ms. Kimi Mikami Yuen
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, HI 96813-3484

Dear Ms. Yuen:

Subject: Pre-Consultation for the Proposed Haena State Park Master Plan and Environmental Impact Statement TMK: 5-9-01:022 and TMK: 5-9-08:001, Kuhio Highway, Haena, Kaua'i, Hawaii

This is in regard to your letter dated August 11, 2008. The following are the Department of Water (DOW) comments to the proposed Haena State Park Master Plan and Environmental Impact Statement.

The proposed development has not been identified in your letter. The following are general comments of the DOW:

- Any actual subdivision or development of this area will be dependent on the adequacy of the source, storage, and transmission facilities existing at that time.
- The Department's water system ends near the Limahuli Stream along Kuhio Highway.
- Water service to TMK: 5-9-08:001 will be limited to the existing water meter serving the parcel until adequate water system facilities are available.

If you have any questions, please contact Mr. Keith Aoki at (808) 245-5418.

Sincerely,

A handwritten signature in black ink, appearing to read "Gregg Fujikawa".

Gregg Fujikawa
Chief of Water Resource and Planning Division

KA:ml
W5-9-08-001 yuen T-10225



November 10, 2011

UID #5629

Ms. Catie Cullison, AICP
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, HI 96813-3484

Dear Ms. Cullison:

Subject: Pre-consultation for the proposed Haena State park Master Plan and Environmental Impact Statement, TMK: 5-9-01:022 and TMK: 5-9-08:001, Kuhio Highway, Haena, Kauai

This is in regard to your letter dated September 15, 2011. The following are the Department of Water's (DOW) comments to the proposed Haena State Park Master Plan and Environmental Impact Statement:

- a) Any actual subdivision or development of this area will be dependent on the adequacy of the source, storage, and transmission facilities existing at that time. At the present time, the existing storage facilities are operating at capacity and the DOW is limiting water service to three 5/8-inch water meters or three single family dwellings per existing lot of record. The existing source facilities are nearing capacity. The Department's water system ends near the Limahuli Stream along Kuhio Highway. Adequacy of the existing transmission facilities will be dependent on the required domestic and fireflow demands of the proposed project (i.e. fire flow requirement may depend on the actual land use or zoning designation of the proposed development).
- b) Water service for TMK: 5-9-08:001 will be limited to the existing water meter serving the parcel until adequate water system facilities are available.
- c) Submit a formal request for water service for our review and approval. Include detailed water demand (both domestic and irrigation) calculations along with the proposed water meter size. Water demand calculations submitted by your engineer or architect should also include fixture count and water meter sizing worksheets. The Department's comments will be dependent on the approved water demand calculations.

It is recommended that request for water service, along with pertinent information, should be made to the Department, as soon as possible.

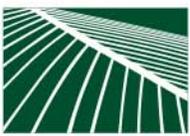
If you have any questions, please contact Mr. Edward Doi at (808) 245-5417.

Sincerely,

A handwritten signature in black ink, appearing to read "Gregg Fujikawa".

Gregg Fujikawa
Chief of Water Resources and Planning Division

T-13559 Haena, Cullison/ED:loo



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Gregg Fujikawa
County of Kaua'i
Department of Water
PO Box 1706
Līhu'e, HI 96766

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Fujikawa,

Thank you for your letters dated August 22, 2008 and November 10, 2011 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from the Department of Water, indicating:

- a) Any actual subdivision or development of the area will be dependent on the adequacy of the source, storage, and transmission facilities existing at that time. At the present time, the existing storage facilities are operating at capacity and the DOW is limiting water service to three 5/8-inch water meters or three single family dwellings per existing lot of record. The existing source facilities are nearing capacity. The Department's water system ends near the Limahuli Stream along Kūhiō Highway. Adequacy of the existing transmission facilities will be dependent on the required domestic and fireflow demands of the proposed project (i.e. fire flow requirement may depend on the actual land use or zoning designation of the proposed development).
- b) Water service for TMK: 5-9-008:001 will be limited to the existing water meter serving the parcel until adequate water system facilities are available.
- c) Submit a formal request for water service for our review and approval. Include detailed water demand (both domestic and irrigation) calculations along with the proposed water meter size. Water demand calculations submitted by your engineer or architect should also include fixture count and water meter sizing worksheets. The Department's comments will be dependent on the approved water demand calculations.

We acknowledge that development will be dependent on the adequacy of water facilities and that until adequate water system facilities are available, development will be limited to the existing water meter.

Gregg Fujikawa

PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND
ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I
PAGE 2 OF 2

As detailed design progresses, State Parks will continue to interface with the Department of Water to determine adequacy of water facilities. Prior to construction, a formal request for water service will be submitted for your Department's review and approval.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Assessment and subsequent Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

A handwritten signature in black ink, appearing to read "C. Cullison". The signature is fluid and cursive, with a long horizontal stroke at the end.

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

Bill "Kaipo" Asing
Mayor

Robert F. Westerman
Fire Chief



John T. Blalock
Deputy Fire Chief

COUNTY OF KAUAI
Fire Department
Mo'ikeha Building
4444 Rice Street, Suite 295
Lihu'e, Kaua'i, Hawaii 96766

RECEIVED

AUG 29 2008

PBR HAWAII

August 25, 2008

Ms. Kimi Mikami Yuen
LEED AP Associate
PBR Hawai'i & Associates, INC.
1001 Bishop St.
ASB Tower, Suite 650
Honolulu, HI 96813-3484

SUBJECT: Pre-Consultation for the Proposed Hā'ena State Park Master Plan and
Environmental Impact Statement, Hā'ena, Kaua'i, Hawaii

Dear Ms. Yuen:

We received your letter dated August 11, 2008 with a requested response date of August 29, 2008, however due to inadequate information regarding the proposed project, we are unable to respond appropriately.

I have tasked Mr. Kalani Vierra, Water Safety Supervising Officer of the Kaua'i Fire Department's Ocean Safety Bureau to contact you for more detailed information regarding this matter.

The Kaua'i Fire Department has many concerns and interest in the area as we maintain ocean safety at Ke'e Beach and any project would have an impact on the County of Kaua'i.

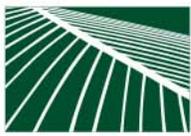
Please contact Kalani Vierra at (808) 241-4984 should you have any questions or require additional information regarding this matter.

Sincerely,

Robert F. Westerman
Fire Chief

RFW/eld

cc: Ms. Lauren Tanaka, DLNR Division of State Parks



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

February 22, 2015

Chief Robert F. Westerman
County of Kaua'i Fire Department
3083 Akahi Street, Suite 101
Līhu'e, HI 96766

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Chief Westerman,

Thank you for your letter dated August 25, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from KFD, indicating that Water Safety Supervisor Kalani Vierra, was tasked with contacting us for more information. Since 2008, a new lifeguard tower was installed at Kē'ē Beach, and based on information received from Water Safety staff and the community, the Master Plan includes a recommendation to move the tower to afford lifeguards greater visibility of Kē'ē Lagoon. Other master plan recommendations that may assist water safety staff may include limiting the total number of visitors accessing the park each day and requiring all visitors to view an educational video discussing Hā'ena's many resources and associated hazards.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\Fire2015.doc

From: Dionne Talia
Sent: Monday, August 25, 2008 12:17 PM
To: Kimi Yuen
Subject: FW: Ha'ena State Park

-----Original Message-----

From: fwichman@aloha.net [mailto:fwichman@aloha.net]
Sent: Monday, August 25, 2008 11:15 AM
To: sysadmin
Subject: Ha'ena State Park

To Kimi Mikami Yuen
PBR Hawaii & Associates, Ltd.

Re: Ha'ena State Park

The area covered by the Ha'ena State Park is rich with ancient Hawaiian place names, sites, legends and uses. I would like very much to enter into a dialogue with you concerning these. Meanwhile, here are preliminary thoughts:

1. The upper wet cave is an ancient sacred site and should be respected as such. There is also a room called "Blue Grotto" which can only be accessed by swimming through a water-filled tunnel and is therefore dangerous to a poor swimmer. The road leading up to the cave has already moved a named boulder, which, if possible, should be found and restored to its place.
2. Makana peak is the site of one of two "fireworks" cliffs. The last performance of this spectacle took place in 1912. Perhaps a plaque could illustrate this, as I doubt that anyone today could duplicate the fireworks display.
3. The lower cave used to have a flat-bottomed scow that took the curious deep into the darkness, up to the point where the cave splits into two. Curious stay out.
4. Lohiau's house site is now pretty well overgrown, but it should be preserved in its entirety. My mother, Juliet Rice Wichman, saved it from destruction when highway builders wished to take its rocks for road building. She stood between it and a bulldozer for several hours before the project was called off. This wall should date to at least the 1300s.
5. The restoration of the fishponds (loko) and taro fields (lo'i), already begun, should continue and be expanded. Indeed, the whole park should be aimed at reestablishing as many of its former uses as possible.
6. There are known burial sites within the park, one of which is being actively maintained by the 'ohana concerned. I would like to see this continued. There is an early photograph of the family that could be used in a memorial stele.

7. Parking should be confined at the site of the helicopter landing opposite the upper wet cave. There is no need for the congestion now occurring at the beach. As for the feasibility of asking people to walk a quarter mile, look to the park at Iao Valley on Maui, where a steep, narrow path of a quarter mile must be negotiated before seeing the needle itself.

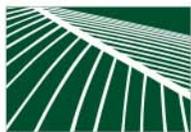
8. There are petroglyphs within the park which are totally unprotected now. They should be properly studied and rubbings taken.

9. I would suggest that someone on your staff should familiarize themselves with the pertinent legends and history indicated within all six of my books. The Kauai Historical Society is another source of information.

As I say, these are preliminary thoughts. I would like to be added to your list and I can be contacted at fwichman@aloha.net.

Thank you,

Frederick B. Wichman



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

February 22, 2015

Frederick B. Wichman
PO Box 1050
Hanalei, HI 96714

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Wichman,

As the planning consultant for the State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we thank you for your email comments dated August 25, 2008 in response to our pre-consultation request referenced above. Additionally, it is with gratitude we thank you for taking the time to share your mana'o by participating in the Cultural Impact Assessment interview process, conducted by Maria Orr (Ka'imipono Consulting).

The information provided in your email, interview and body of published writing contributed to a greater understanding of the park's cultural and archaeological resources, ultimately translating into recommendations for master plan physical improvements and management actions.

Recognizing the importance of Hā'ena to Hawaiian history and culture, the Master Plan endeavors to elevate consideration for these resources in both site design and management actions. In an effort to listen and expand understanding of Hā'ena's importance to the community, a 32-member Master Plan Community Advisory Committee (MPAC) was formed. This group has convened on several occasions to work together with State Parks in development of a plan that balances outdoor recreation with safety and respect for the park's many layered resources. MPAC and general community meeting notes are included within the appendices of the Environmental Assessment.

As a result of the MPAC discussions, and the Cultural Impact Assessment process, a key Master Plan recommendation is that a Cultural Advisory Group be formed and consulted on park management actions, construction projects as well as interpretive programs. The enhanced oversight is expected to result in improved interpretation of the park's cultural, ecological and archaeological resources, and as a result, a visiting public that is more aware and sensitive to the importance and fragility of these resources.

Frederick B. Wichman

**PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER
PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I**

Page 2 of 2

Mahalo for your contribution to the development of the master plan and the supporting environmental documents. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

A handwritten signature in cursive script, appearing to read "C. Cullison".

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

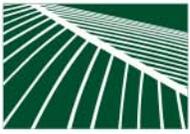
2008-09-02 Hawaiian Telcom

From: Jimmy Sone [mailto:James.Sone@hawaiiantel.com]
Sent: Tuesday, September 02, 2008 8:44 AM
To: sysadmin
Subject: Pre-consultation for the Proposed Haena State Park Master Plan & EIS
Attn: Kimi Mikami Yuen

Hawaiian Telcom has a pay phone and an emergency phone at Kee Beach. Both phones are serviced from a DLNR owned 6 pair cable running parallel to Kuhio Hwy on the makai side of the road, originating from Limahuli Stream. Any proposed projects in the area should consider the possible impact to this State owned telephone cable.

Thank you for the opportunity to comment on the subject plan. Call or email should you have any questions.

Jimmy Sone
Lead Network Engineer
Hawaiian Telcom
4040 Halau St.
Lihue, HI 96766
808-241-5052
jimmy.sone@hawaiiantel.com



PBR HAWAII

& ASSOCIATES, INC.

PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED®AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED®AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED®AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED®AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Jimmy Sone
Hawaiian Telcom
4040 Halau Street
Līhu'e, HI 96766

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Sone,

Thank you for your email dated September 2, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from Hawaiian Telcom, indicating that there is a pay phone and an emergency phone at Kē'ē beach and that the phones are serviced from DLNR-owned 6 pair cable running parallel to the highway on the makai side of the road, originating near Limahuli Stream. We will include this information in the environmental documents so that if and when development improvements are made to the park this facility is considered.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\HITelcom2015.doc



Hawai'i Tourism Authority

Hawai'i Convention Center, 1801 Kalākaua Avenue, Honolulu, Hawai'i 96815
Website: www.hawaii-tourism-authority.org

LINDA LINGLE
Governor

REX D. JOHNSON
President and Chief Executive Officer

Telephone: (808) 973-2255
Fax: (808) 973-2253

September 2, 2008

RECEIVED

SEP 03 2008

PBI, HAWAII

Ms. Kimi Mikami Yuen, LEED AP
PBR Hawaii & Associates, Inc.
1001 Bishop Street, ASB Tower, Suite 650
Honolulu, HI 96813-3484

Dear Ms. Yuen:

Thank you for the opportunity to comment on the proposed Hā'ena State Park Master Plan and Environmental Impact Statement for Hā'ena, Kaua'i, Hawai'i.

As you may know, the "Hawai'i Tourism Strategic Plan: 2005-2015" (TSP) includes nine strategic initiatives identified as critical to working towards the vision for Hawai'i's visitor industry future. One of those initiatives relates to the need to "respect, enhance and perpetuate Hawai'i's natural resources to ensure a high level of satisfaction for residents and visitors."

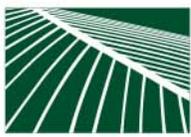
In our efforts to support work in this area, the Hawai'i Tourism Authority (HTA) has provided funding to both the Hawai'i State Department of Land and Natural Resources, to mitigate immediate needs at Hā'ena State Park, and the County of Kaua'i, to address needs at the County Park at Hā'ena. Both of these parks were identified as priority sites in the Natural Resources Assessment conducted on behalf of the HTA in December 2003.

These resources are invaluable from multiple perspectives. They support Hawai'i's residents' quality of life, provide recreational opportunities for residents and visitors, and add to Hawai'i's allure as a visitor destination. From both a visitor perspective and, more importantly, from a "protect the resource" perspective, careful planning that "balances the needs of public usage of the park's recreation resources with the protection and preservation of the significant cultural, natural and scenic resources" is critical and in line with the TSP and HTA's current efforts.

If you have any questions, please do not hesitate to contact me or Muriel Anderson at 973-2269.

Sincerely,

Rex D. Johnson
President and Chief Executive Officer



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED®AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED®AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED®AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED®AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Mr. Ronald Williams, CEO
Hawai'i Tourism Authority
Hawai'i Convention Center
1801 Kalakaua Avenue, Floor 1
Honolulu, HI 96815

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Williams,

Thank you for your agency's letter dated September 2, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from HTA indicating that the Hawai'i Tourism Strategic Plan 2005-2015 includes an initiative to, "respect, enhance and perpetuate Hawai'i's natural resources to ensure a high level of satisfaction for residents and visitors". Additionally, we acknowledge that the HTA Natural Resources Assessment identified Hā'ena State Park as a priority site and that the HTA has provided funding to State Parks to address needs at the park.

Recognizing the importance of Hā'ena to Hawaiian history and culture along with the many known archaeological and ecological resources in the park, the Master Plan endeavors to elevate consideration for these resources in both site design and management actions. A copy of the proposed master plan will be provided to you with the environmental documents.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\HTA2015.doc



KAUA'I PLANNING & ACTION ALLIANCE

August 29, 2008

Kimi Mikami Yuen
Associate
PBR Hawaii & Associates, Inc.
1001 Bishop Street, ASP Tower Suite 650
Honolulu, HI 96813-3484

Dear Kimi:

I am delighted to see that the contract to prepare a master plan and EIS for Hā'ena State Park is moving forward. Further, I am pleased to see that the project is building upon the extensive work already done, which included substantial input from the community. I fully support that approach.

Kaua'i Planning & Action Alliance (KPAA) has secured a grant in aid to improve the first two miles of the Napali Coast Wilderness State Park trail, which is adjacent to your project site. I am uncertain when that work will begin, as the contract is not yet completed. However, we are hoping to start planning and design work before the end of this year and construction will take approximately another 15 months. We are working through the Division of State Parks on the project.

Please keep me informed of your project events and meetings. You can reach me at 808-632-2005 or dzachary@kauainetwork.org.

Best regards,

Diane Zachary
President & CEO

Cc: Ms. Lauren Tanaka, DLNR Division of State Parks

BRINGING PEOPLE TOGETHER TO CREATE A BETTER FUTURE FOR KAUA'I

2959 Umi Street, Suite 201, Lihu'e, HI 96766 Phone 808.632.2005 Fax 808.632.2018
Email kpaa@kauainetwork.org www.kauainetwork.org



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

February 22, 2015

Diane Zachary
Kauai Planning & Action Alliance
2959 Umi Street, Suite 201
Līhu'e, HI 96766

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Ms. Zachary,

Thank you for your letter dated August 29, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from KPAA, informing the project team of the trail improvement work for the first two miles of the Kalalau Trail. We acknowledge your work on behalf of the area's recreational resources.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

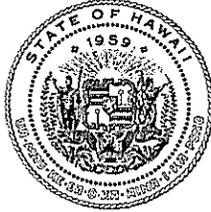
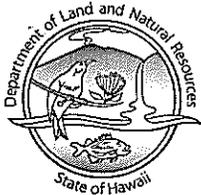
HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

printed on recycled paper

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\KPAA2015.doc

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Office of Conservation and Coastal Lands

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED

SEP 16 2008

HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

REF:OCCL:DH

Correspondence: KA-09-28

Ms. Kimi Yuen
PBR Hawaii
ASB Tower 1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

SEP 15 2008

Dear Ms. Yuen:

SUBJECT: Request for Comments Regarding Proposed Haena State Park Master Plan and Environmental Impact Statement, Haena District, Island of Kauai, Subject Parcels TMK's: (4) 5-9-001:022, 5-9-008:001, and 5-9-001:025

The Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) is in receipt of your letter dated, August 11, 2008, for a request for comments regarding the proposed Haena State Park Master Plan and Environmental Impact Statement (EIS), Haena District, Island of Kauai, Subject Parcel TMK: (4) 5-9-001:022 and 5-9-008:001.

The OCCL notes subject parcels TMK's (4) 5-9-001:001 and 5-9-001:025 are located in the State Land Use (SLU) Conservation District, Resource subzone; subject parcel TMK: (4) 5-9-001:022 is located in the Conservation District, Resource and Protective subzones.

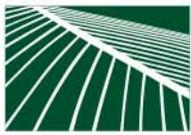
The OCCL notes Conservation District Use Application (CDUA) KA-1373 was approved by the Board of Land and Natural Resources (BLNR) on March 12, 1982 for the Division of State Parks (DSP). The OCCL is unsure at this time whether further CDUA actions are required until the Master Plan and EIS components are conceptualized. However, the OCCL notes you should contact the following community organizations: Hui Ho'omalua I Ka'aina (Maka'ala Ka'aumoana at makaala@hawaiian.net), Hui Maka'ainana o Makana (Jeff Chandler at Lohiau2@hotmail.com), National Tropical Botanical Gardens Limahuli Garden and Preserve (Kawika Winter at kwinter@ntbg.org), and Community Conservation Network (Atta Chandler-Forest 808-826-6118), and the DLNR Haena Stewardship Management Group (Megan Juran at 808-635-1633) that may contribute comments to the Master Plan and EIS. Should you have any questions please call Dawn Hegger of the Office of Conservation and Coastal Lands at 808-587-0380.

Sincerely,

A large, stylized handwritten signature in black ink, appearing to read "Samuel J. Lemmo".

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

c: KDLO/County of Kauai Planning Department



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Samuel J. Lemmo
Office of Conservation and Coastal Lands
PO Box 621
Honolulu, HI 96809

**SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK
MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT,
HĀ'ENA, KAUA'I, HAWAI'I**

Dear Mr. Lemmo,

Thank you for your letter dated September 15, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from the Office of Conservation and Coastal Lands, indicating that the subject parcels, TMK (4) 5-9-009:001 & 5-9-001:025 are in the Conservation District, Resource subzone and that TMK (4) 5-9-001:022 is in the Resource and Protective subzones.

We further acknowledge that in 1982, a Conservation District Use Application was approved by the Board of Land and Natural Resources (CDUA KA-1373). We also acknowledge that at the time of pre-consultation for the master plan, the OCCL did not have enough information to determine whether further CDUA actions are required. To that end, your agency will be provided a copy of the Environmental Assessment and any subsequent Environmental Impact Statements for review and comment.

Finally, we acknowledge OCCL's referrals to persons representing local community organizations. The master planning process included sustained public outreach, including formation of a 32-member Master Plan Community Advisory Committee (MPAC). The individuals identified in your letter are either members of the MPAC or otherwise contributed to the development of the plan as State Park staff. Notes from the MPAC meetings as well as general community meetings will be included as an appendix to the environmental documents.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\OCCL2015.doc



RECEIVED

SEP 02 2008

PBR HAWAII

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813

HRD08/3774

August 28, 2008

Kimi Mikami Yuen
PBR Hawaii Associates
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, HI 96813-3484

RE: Pre-consultation request for the proposed Hā'ena State Park Master Plan and Environmental Assessment, Hā'ena, Kaua'i, TMKs: 5-9-01: por. 22 and 5-9-08:1.

Aloha e Kimi Mikami Yuen,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated August 11, 2008. The state Department of Land and Natural Resources Division of State Parks has commissioned the development of a master plan and environmental impact statement (EIS) for the 64-acre Hā'ena State Park. The new master plan will refine a previous plan for the area, and the EIS will balance public usage of the park with the protection of the area's cultural, natural and scenic resources. OHA has reviewed the project and offers the following comments.

OHA asks that the Ceded Lands status of all parcels affected by the project be clearly indicated in both the master plan and the EIS to assist the public review process of these documents. Ceded Lands hold a considerable amount of sentimental, historical and legal significance for Native Hawaiians and OHA. These lands were illegally taken from the Hawaiian Kingdom after the 1893 overthrow and later transferred ("ceded") by the United States government to the State of Hawai'i upon statehood. Today, the state holds the Ceded Lands corpus in trust for Native Hawaiians and the general public.

In accordance with Chapter 343 of the Hawaii Revised Statutes (HRS), the applicant must complete a Cultural Impact Assessment (CIA) for the project. The CIA shall include information relating to the practices and beliefs of the Native Hawaiians who once inhabited this area, and it is recommended that the community be involved in this assessment, in accordance with Act 50, Session Laws of Hawaii 2000.

Kimi Mikami Yuen
August 27, 2008
Page 2

In addition, OHA requests that a comprehensive archaeological inventory survey for the project area be conducted and submitted to the Department of Land and Natural Resources – Historic Preservation Division for review and approval. OHA should be allowed the opportunity to comment on the criteria assigned to any cultural or archaeological sites identified within the archaeological inventory survey. Consideration must also be afforded to any individuals accessing the project area for constitutionally protected traditional and customary purposes, in accordance with the Hawai‘i State Constitution, Article XII, section 7.

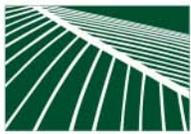
Thank you for the opportunity to comment. If you have further questions, please contact Sterling Wong by phone at (808) 594-1816 or e-mail him at sterlingw@oha.org.

‘O wau iho nō me ka ‘oia‘i‘o,

A handwritten signature in black ink, appearing to read 'Clyde W. Nāmu'ō', with a horizontal line extending from the end of the signature.

Clyde W. Nāmu‘o
Administrator

C: OHA Kaua‘i CRC Office



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Dr. Kamana'opono Crabbe, CEO
Office of Hawaiian Affairs
560 N. Nimitz Highway, #200
Honolulu, HI 96817

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Dr. Crabbe,

Thank you for your agency's letter dated August 28, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from OHA, requesting that the Ceded Lands status of all parcels affected by the project be indicated on the plan and in the EIS; that a Cultural Impact Assessment be prepared and that an Archaeological Inventory Survey (AIS) be conducted and submitted to the State Historic Preservation Division (SHPD).

Recognizing the importance of Hā'ena to Hawaiian history and culture along with the many known archaeological and ecological resources in Hā'ena State park, the Master Plan endeavors to elevate consideration for these resources in both site design and management actions. In an effort to listen and expand understanding of Hā'ena's importance to the community, a 32-member Master Plan Community Advisory Committee (MPAC) was formed. This group has convened on several occasions to work together with State Parks in development of a plan that balances outdoor recreation with safety and respect for the park's many layered resources. We acknowledge with appreciation that the MPAC includes OHA representation. MPAC and general community meeting notes are included within the appendices of the Environmental Assessment.

As a result of the MPAC discussions, a key Master Plan recommendation is that a Cultural Advisory Group be formed and consulted on park management actions, construction projects as well as the park's interpretive programs. The enhanced oversight is expected to result in improved interpretation of the park's cultural, ecological and archaeological resources, and as a result, a visiting public that is more aware and sensitive to the importance and fragility of these resources.

With respect to ceded lands, to our knowledge the master plan area does not contain any ceded lands. Title research conducted for the master plan is summarized in the Environmental Assessment and its supporting Cultural Impact Assessment (CIA).

Kamana'opono Crabbe

PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAII

Page 2 of 2

With regard to archaeological resources, State Parks relied on the many previous studies conducted throughout the park to help inform the master plan. State Parks' archaeology staff assisted in compiling previous studies and identified gaps in archaeological research. Additionally, State Parks' archaeology staff utilized these previous studies to develop an archaeological sensitivity map that helped to guide proposed new development activities to areas which have been previously disturbed and away from known areas of sensitivity. The master plan and its accompanying EIS are being prepared primarily as planning tools and will address development projects only in concept. If any of the projects contemplated are eventually funded and designed, they would be subject to the historic preservation project review process at that time and to other applicable state and county review requirements. Impacts to archaeological resources will further be avoided through archaeological testing and monitoring prior to all earth disturbing activities, regardless of location within the park.

Thank you for OHA's contributions to the Master Plan Community Advisory Committee and to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII



Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE A473
LIHUE, KAUAI, HAWAII 96766-1326

RECEIVED
SEP 17 2008
PBR HAWAII

MEMORANDUM

DATE: September 9, 2008
TO: Kimi Yuen, LEED AP
FROM: Kauai Historic Preservation Review Commission 
SUBJECT: Pre-Consultation-Haena State Park Master Plan/Draft EIS,
Department of Land & Natural Resources

The Kauai Historic Preservation Review Commission (KHPRC) met on September 4, 2008 to review your letter requesting input to be considered in the preparation of a draft Environmental Impact Statement and master plan for the Haena State Park.

The KHPRC deferred this matter until more information about the project could be made available to the members. Prior to their deferral, there was some general discussion which is reflected in the minutes attached.

We look forward to meeting with you on this important North Shore project in the near future.

Please feel free to call us should you require any further assistance regarding this matter.

Aloha.

Attach.

cc: SHPD- State

KAUAI COUNTY HISTORIC PRESERVATION REVIEW COMMISSION
Lihue Civic Center, Moikeha Building, Meeting Room 2A/2B

MINUTES

A regular meeting of the Kaua'i County Historic Preservation Commission (KHPRC) was held on September 4, 2008 in the Lihue Civic Center, Moikeha Building, Meeting Room 2A/2B.

The following Commissioners were present: Dennis Alkire, Chairperson, Patsy Sheehan, Vice Chairperson, Alan Faye, Jr., Kehaulani Kekua, and Randy Wichman.

The following Commissioners were absent: Annette Manaday, Molly Summers and Dr. John Lydgate.

CALL TO ORDER

Chairperson Alkire called the meeting to order at 3:03 p.m.

APPROVAL OF THE AGENDA

The agenda was approved as circulated however the Commission began with Unfinished Business Matters first, then discussed Communications and Announcements & General Business Matters.

APPROVAL OF THE MINUTES

The July 3, 2008 and August 7, 2008 minutes were approved as circulated.

ANNOUNCEMENTS AND GENERAL BUSINESS MATTERS

COMMUNICATIONS

Re: Letter (8/11/08) from Kimi Mikami Yuen, LEED AP, Associate, PBR Hawaii & Associates, Inc. requesting pre-consultation for the State of Hawaii Department of Land and Natural Resources Division of State Parks to prepare a master plan and environmental impact statement for the Haena State Park, Kauai.

Chair: Lets go back Communications, the 3 letters that are attached to our packets. B.1. letter from Kimi Mikami Yuen, LEED, AP, Associate, PBR Hawaii on the master plan and EIS for the Haena State Park. Rick?

Mr. Wichman: Ricky the County has no kuleana at the very end of the road or where is the idea that Kaulaulapaoa and the heiau are within in County?

Staff: There is a portion that is County property.

Mr. Wichman: And those metes and bounds?

Staff: There should be. I don't know if it surveyed but I know the County does own a parcel.

Mr. Wichman: Within the precinct itself?

Staff: I think the project area.

Mr. Wichman: Ok so the County is a definite player in this master plan.

Staff: And I believe they have identified that in their project. So I don't know what arrangement currently exists between the County and the State or the curators or...

Mr. Wichman: And how is this, since we don't have the master plan itself and I don't know how I defer it from the later, the earlier master plans that's been over the 60s, 70s, 80s, 90s there have been master plans coming out left and right out of there right. How is this one different from the rest?

Staff: I really don't know so I was wondering whether, since Kimi could not make it today, whether it seems like they identified the main archeological or cultural resources whether you might want to just reserve comments pending the actual draft EA and just see where they are going with that and we can make comments at that time.

Mr. Wichman: There would be a couple things for me personally in making sure that the lohiau house site itself is a little bit further away then what its currently cars are coming up to. So those are a little bit of details to. Also should the actual heiau itself fall within County property I think we need to know exactly where in the footprint County falls in.

Staff: I believe those items will more clearly addressed in the draft EA.

Mr. Wichman: And also the historical preamble also as I am fully aware of many excavations and reports that came out especially through the bathroom building and renovations and moving numerous burials and things have come up as a result of it. So we have a good idea where that is so we need kind of a little bit of an overlay master plan look see before we can actually be helpful in this matter.

Ms. Sheehan: Do you read the second paragraph as if the County does in fact own all of it? It says contains the heiau and the... it sounds like its all in there. No?

Chair: There is an exhibit 1 that's attached to the letter that shows, indicates the County owning a small on the extreme left hand end.

Ms. Sheehan: It doesn't tell you what that is.

Chair: No it doesn't.

Mr. Wichman: It contains...

Ms. Kekua: It gives you an idea of where it is.

Chair: I think it's the heiau because the road ends and then it shows...

Mr. Faye: It says it includes the platform...

Ms. Sheehan: The verbiage is kind of misleading to me and this picture is even worst.

Staff: It looks like the County owns this piece.

Mr. Wichman: That's the heiau itself right. It's on County property.

Staff: Again there is some kind of informal agreement between the County and SHPD.

Mr. Wichman: I think part of our responsibility is to define the relationship of County within State parks in regards to the heiau. If we want to we can examine the history of it and to see if...

Ms. Sheehan: Why would they have it? Why would the County have it?

Mr. Wichman: Francis Li Brown had it prior to that it could have always been in the County inventory.

Mr. Faye: I thought Allerton had that house?

Mr. Wichman: Later on but it was Francis Li Brown who actually built it.

Mr. Faye: Is that the same property that Allerton, there was 2 houses there.

Mr. Wichman: Later on Allerton.

Mr. Faye: That's what I mean later. That's the one we are talking about the 2 houses right?

Ms. Sheehan: Yes. No, no I can't tell by the map but I guess I was under the impression that when it burned down those houses burned down it was because of the State profile not a County profile.

Mr. Wichman: My understanding County has really had no involvement with the actual decision making in regards to the activities over the last 20 years over there on the heiau grounds itself.

Ms. Sheehan: So this deadline, August 29th?

Chair: That's come and gone hasn't it?

Ms. Sheehan: Yes I know. So we are too late for it anyway.

Chair: Well Ricky says we're still waiting for a draft EA although in the letter they are talking about an EIS. So I am confused.

Staff: Well unless they made a decision to skip the EA and go into an EIS, a full EIS, which means they would be a draft EIS and the entire process with the draft EIS. So I am sure, I think this is at this point a preconsultation.

Chair: I agree that we can wait to see the draft document. There is not enough here to really comment on.

Mr. Wichman: Yes especially the locations of the parking lots. The proximity, well anyway we all know what the problems are out there but as soon as we have something concrete.

Staff: I will give Kimi a call and just review the timelines and see where the draft EIS.

Mr. Wichman: How about a motion to defer until next meeting and request that DLNR, well we are looking at these guys right here PBR as we see it as a preconsultation, we would like this preconsultation to occur as it is nonbinding to either party at this point. It's just information seeking. So motion to defer the preconsultation until next meeting.

Ms. Sheehan: Second. I mean I think that's enough to say but if there is any information that's going to be a lot if we could get it sooner. It would be good to get this packet a little earlier so we can read.

Mr. Faye: Mail it when you get it.

Ms. Sheehan: Yes if you get something you can mail it out cause the minutes alone take us a long to read.

Mr. Faye: Yes if you have a package next week.

Ms. Sheehan: If it turns out thick send it to us.

Ms. Kekua: Her letter is only dated on August 11th and I don't know the exactly situation her except in a previous conversation that I had with Kimi sometime ago and it was a very brief conversation, they are basically being contracted by the DLNR to complete work that got dropped by the ball, I mean the ball got dropped by a previous consultant. And so I think they are coming in on a clean slate and almost kind of starting over.

Chair: That could be a good thing.

Ms. Sheehan: She still doesn't give us much time.

Ms. Kekua: Right, right so I am not really sure.

Mr. Faye: She doesn't know when we meet either.

Mr. Wichman: I think to better understand the historic ramifications I am taking it that an informal agreement between State and County regards to the heiau means nothing is in writing.

Staff: I would think so.

Mr. Wichman: Ok but just to double check to make sure that that discussion in order to understand the perimeters of the County during that particular time of the agreement. If we can take a look on the inside that would help us, that would help us ensure should the County's historic objective with this particular piece of land are met.

Staff: Just a question if in fact there is a lot of times we deal with this and if we are able to get information by the next meeting is it ok if we, if it's not ready by the next meeting can we bring it back by the first earliest meeting we can get the consultants to come and whatever materials...

Mr. Wichman: Do you want me to amend the motion to reflect that?

Staff: As long as it's ok with you guys.

Mr. Wichman: Ok.

Chair: I believe there is a motion on the floor we have a second, motion to defer. All those in favor? (Unanimous.) Ok motion carries.

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE A473
LIHUE, KAUAI, HAWAII 96766-1326

MEMORANDUM

DATE: October 22, 2008

TO: PBR Hawaii & Associates, Inc.
Attn. Kimi Yuen, LEED AP, Associate

FROM: Kauai Historic Preservation Review Commission 

SUBJECT: Pre-Consultation-Haena State Park Master Plan/Draft EIS,
Department of Land & Natural Resources

Thank you for attending the Kauai Historic Preservation Review Commission's October 2, 2008 meeting. Your presentation regarding the project background, scope and status was very informative.

It is the KHPRC's understanding that input is being solicited at this time to identify issues and concerns to be considered in the preparation of a draft Environmental Impact Statement and master plan for the Haena State Park. As such, there will be ample future opportunity over the next two years to review and comment on the project as these documents are refined during this informational/developmental stage. The following are some of the areas of interest were raised by the KHPRC: consider nominating the complex to the National/State Register, relationship of trails with respect to cultural resources and practices, fishing zones, interpretive program, maintenance and management/overlapping jurisdictions, mapping and buffers of specific resource preserves within the overall complex preserve. An excerpt of the KHPRC's meeting minutes is attached and provides a more comprehensive and detailed record of the discussions on this matter.

We look forward to meeting with you again as more information and details become available on the master plan for this important North Shore cultural and recreational resource.

Please feel free to call us should you require any further assistance regarding this matter.

Aloha.

Attach.

cc: SHPD- State

DRAFT

KAUAI COUNTY HISTORIC PRESERVATION REVIEW COMMISSION
Lihue Civic Center, Moikeha Building, Meeting Room 2A/2B

MINUTES

A regular meeting of the Kaua'i County Historic Preservation Commission (KHPRC) was held on October 2, 2008 in the Lihue Civic Center, Moikeha Building, Meeting Room 2A/2B.

The following Commissioners were present: Dennis Alkire, Chairperson, Patsy Sheehan, Vice Chairperson, Alan Faye, Jr., Dr. John Lydgate, Annette Manaday, Molly Summers and Randy Wichman.

The following Commissioner was absent: Kehaulani Kekua.

CALL TO ORDER

Chairperson Alkire called the meeting to order at 3:06 p.m.

APPROVAL OF THE AGENDA

The agenda was approved as circulated.

APPROVAL OF THE MINUTES

The September 4, 2008 minutes were approved as amended as follows:

Page 5, paragraph 3, delete Li and I'i.

ANNOUNCEMENTS AND GENERAL BUSINESS MATTERS

There were no new Announcements and General Business Matters.

COMMUNICATIONS

There were no new Communications.

UNFINISHED BUSINESS

Re: Serikawa Hotel (Hanapepe Hotel, LLC)

Chair: We have a letter from the architect for Serikawa hotel.

Mr. Faye: That was nice. He wrote a nice letter.

Staff: Mr. Wilson is here today.

Mr. Faye: Are you the architect?

Mr. Juan Wilson: Yes I am.

Chair: Juan Wilson welcome to the Historic Preservation Review Commission.

Mr. Wilson: Well do you want me to speak to it?

Chair: Please.

Mr. Wilson: Ok. I really don't have a contest really with the recommendations that your commission has made. The only issue that seemed concern to me was the pitch of the lanai roof. The original roof was shown as 3 and 2/3 to 12 and reducing it to 3 to 12 which should be recommended for that type of the roof would bring it close to where you are looking down to the hip but it's still on the lower foot of that hip and I have a drawing I could show you what that might look like.

If it gets showers in that I am a little bit worried about 2 things one is recommended pitch with that kind of construction and secondly there are 2 plumbing vents that are right at the break that would occur where these 2 vents would meet it would be a difficult detail to keep waterproof with the flashing. So we stay a little bit above that point and having the plumbing vents clearly one side of the break in the roof would be helpful. Getting below that break would cause problems for that roof. I think the profile continuing in the back of the building is not visible from the street. I think if we have it would be acceptable, I hope, to the commission. I have got some drawings

Chair: Can you remind us again what the material is for the lanai roof?

Mr. Wilson: The original building had an unusual roofing material which was metal shingles and over the years many of them have rusted away on the back side of the building. The front of the building still has metal shingles on it. The back of the building has gone through a couple of repairs over time and now has relatively and well conditioned corrugated roof. We were going

to match that. In other words the new roof that was going to be on the back of the building to the lanai would butt into the existing corrugated roof. It would be in the same material.

Chair: And the roof on the front of the building is still the metal shingles and so is the 2 hips on the sides.

Dr. Lydgate: Was there an issue?

Mr. Wilson: Excuse me let me just add that the owner tried very exhaustibly to find the manufacturer for metal shingles and was not able to find one. It's kind of like tin roofs are not readily available. So anyway I have got a couple of drawings here that show and I think it also addresses the other points French doors, picket fence, all the points that are in your.

Chair: If you would like to pass them around.

Staff: Chair is it alright if we just post it up here?

Chair: That would be good actually. Let's give it an eyeball and see.

Mr. Wilson: This is what was originally shown. This is 3 – 12. We are putting French doors in here instead of sliders. There is a correction up here. There was a stair that came off that shed roof here and this is showing the picket fence (inaudible).

Dr. Lydgate: What is a French door?

Mr. Wichman: Double door.

Mr. Wilson: They are actually sliding French doors they look like French doors but they actually slide. These would be swinging wood doors so all the doors where wood doors.

Ms. Sheehan: (Inaudible) that you can't find that metal shingle.

Mr. Wilson: (Inaudible).

Ms. Sheehan: I was just wondering how old it was.

Mr. Wilson: I think it was probably the 30s.

Ms. Sheehan: I was just curious as to how it got all the way over here. Maybe they should make it again.

Mr. Wilson: It almost looks like its stainless steel, but it almost looks like.

Chair: We have the owner here. Donna would you like to say a few words about your beautiful building?

Ms. Donna Holevoet: Yes it is beautiful and (inaudible) we absolutely love the building and we love Hanapepe. We are trying to be really good citizens of the town and to maybe, fortunately, for the building we don't have a large amount of money so we are not about to come in and change it too dramatically. You know we have had it since about 2001. We just slowly worked on it and do a little modifications to it.

Ms. Sheehan: You have done a great job.

Dr. Lydgate: (Inaudible).

Ms. Holevoet: I really think you could tear that building down and try to rebuild it and it would never look quite the same.

Chair: That is certainly true. You are both to be commended for your efforts toward the preservation of that important building.

Mr. Wichman: Do we need to finish with the motion.

Chair: We should in response to the letter that Juan wrote.

Mr. Faye: Well basically the motion would be that we acknowledge all of your changes we have recommended that you have come back and said to us that these are ok. The only question is that the roof pitch, did we have a motion on that? Did we say something about the roof pitch?

Chair: We did.

Mr. Wilson: You said you wanted to bring as shallow as it was practical to try and meet the hips on the sides. It's about a foot higher and it's around the back of the building.

Mr. Faye: As far as the motion is concerned that we should agree with that.

Chair: I think you just made the motion.

Ms. Manaday: Second.

Chair: We are happy to see the changes. They are consistent with our recommendations. We thank you for listening and for responding in a positive way. It's very gratifying to see that. We understand the technical issues with the shed roof over the new lanai and 3 and 12 is acceptable. We are not going to push that issue of cause additional problems that might occur with going below the minimum recommended pitch for that materials, therefore everything we see looks great.

Mr. Faye: Looks very nice. Thanks for the letter.

Chair: Thank you both for coming. Good job. We should finish the motion though.

Mr. Faye: It was seconded. You just didn't call for the vote.

Chair: All in favor of the motion? (Unanimous voice vote.) Any opposed? (None.) Motion is carried unanimously.

Re: Letter (8/11/08) from Kimi Mikami Yuen, LEED AP, Associate, PBR Hawaii & Associates, Inc. requesting pre-consultation for the State of Hawaii Department of Land and Natural Resources Division of State Parks to prepare a master plan and environmental impact statement for the Haena State Park, Kauai.

Chair: Hello Kimi Yuen, AP, Associate, PBR. Tell us all about Haena State Park master plan.

Ms. Kimi: Ok thank you, all of you, for having me here to talk about the project and I apologize I wasn't able to make your earlier meeting last month but Ricky and Shan called and said just come out so I am here basically to give you an overview of where we are at. That letter we sent you was a pre consultation letter and I apologize with the due date because for the most typical agency we want a quick turn around on any concerns they may have with our potential project. But I understand for an organization like you that it will take more time then that and so disregard that due that obviously since its way past anyway.

What we are doing out there is that the State Parks contracted us to finish up the master plan and do an EIS for the state park and it doesn't include the trail. It just goes up to the trail heads and then the State property right by Kee lagoon and then all the way back I think there is, I don't know how familiar some of you are, but there is taro loi and also along the state highway. So what I have with me is back in the mid to late '90s there was an original effort to do a master plan for the state park and I think I was reading in the minutes that, yes she was saying that there was a previous effort and so this, what I have today, is the result of that effort. It was a community preferred master plan that never got formally accepted and approved.

Mr. Wichman: It was 90% done.

Ms. Yuen: 90% done.

Mr. Wichman: And the woman was hapai and then it ended right?

Ms. Yuen: Yes I don't know the whole story but somewhere the ball got dropped and so what we are doing is finishing that up so that the State can actually move ahead with improvements and whatever needs to get done at the park and obviously a lot of people that go there. There is a lot of concerns with traffic you know public safety in terms of rock fall issues because of heavy rains.

There is a lot of different issues that have come up and another big concern that State Park has voiced to us and we fully agree is that this previous effort maybe didn't consider cultural historic issues as much as it should have and so that is going to be a big part of it and I welcome your comments that pre-consult letter is basically something to invite you to the process.

There is a small County parcel where the heiau and the hula mound is and so we realize that I don't and we don't know what the County and SHPD and Start Parks is. So that is 1 element if it is under Ricky's or whatever that...

Mr. Wichman: We can discuss 3 different options or 4 that the County may want to consider with it.

Ms. Yuen: Yes so whatever that is you know you don't have to make any decisions now this is just the initial introduction of the project to you folks to get you involved very early in the process to see where the County may want to stand on that kind of maintenance issues of that site. It is a County parcel and you know what let me, is it ok Ricky if I just kind of talk, basically what we have suggested to the State in terms of a process is that we don't start from scratch because we have been talking with a lot of community folks there is a lot of energy and effort and a lot of actually some agreement that came out and generated this plan. It's just a matter of fine tuning it incorporating the cultural and historic aspects into the plan and from my perspective to me the plan should be driven by those things actually.

To me this park is more than just something at the end of the road. It's not something where tourist just drive just to drive. There is so much more there that really needs to be recognized in the master plan and those things need to drive all the proposed improvements or proposed use of the park. There is a lot of issues and history behind it but at the same time I think if we take that perspective that history and culture should be at the forefront and what drives the master plan I think we will come up with a plan that you know everybody will be happy with. To me it's an opportunity to do something really amazing. If it's a partnership with the County, State, you know the tourist industry because of how popular this site is. People just go to go because it's the end of the road and you know to me it's so much more than that and to make a real statement about the cultural/history of the place would be fantastic and what I think should be driving the master plan.

Like I said we are still very early in this process but we do intend to have public meetings in some form or fashion. We are still talking with the community about what is most effective because we already have this community preferred plan and there is a lot of things that already have been implied to us that maybe not be good things in this plan so don't look at this like this is set in stone in any way but we welcome your thoughts. This is very early like is said there is no necessarily time line for your comments you know how involved you want to be throughout the process. We estimate you know it's going to be 2 years because we are going the full EIS route so the master plan we want to make sure we get enough public input that we get all the background studies done.

We have several consultants on board on this contract including geologist, rock fall specialist, cultural specialist, marine, we have flora fauna wild lands specialist, we have traffic consultant so this is a full blown effort. We want to make sure we do this right. We get everything involved and you know just basically finish up the master plan, the EIS so the State can really take care of this place.

Mr. Faye: Is that helicopter pad for just emergency?

Mr. Wichman: Yes.

Mr. Yuen: Yes.

Mr. Wichman: That's moving out or that's up for negotiation to another place to have an actual heli drop and also with other things having to do with the parking which is not necessarily under our provision to actually tell you about but there are parking issues and the (inaudible).

Mr. Wichman: If you want I will start.

Chair: Please.

Mr. Wichman: We will take the first issue that you brought up which is the fact that the heiau itself is on County property. Our understanding is that no memorandum of agreement has been made between the County and DLNR over it. That's option one, a MOU and then an MOA right with the County that would be option number 1. Number 2 would be the trade. The County can trade that with the State. Say for example something next to Kaneouluma if that is something that's on that could be considered there is a trade. So therefore the lands will come under pure State Parks jurisdiction because it's already State parks around it except of the heiau. C, the County could retain the heiau portion and that should anything be to arise culturally that needs to be settled down would be within the Commission to deal with the other particular issues. So those are 3 ways of looking at it. I know it depends on what the County wants to do and it wants to deal with it. So it would add some sort of idea which way they would want to go.

Dr. Lydgate: Who manages it best? State or County?

Mr. Wichman: Neither.

Dr. Lydgate: Surely it's been a State DLNR thing.

Mr. Wichman: But there are been some exceptions there has been some mismanagement issues in Haena over the last 10 plus years, serous ones. So it all depends on the long term philosophy of the County.

Dr. Lydgate: Do have input?

Ms. Yuen: You mean in terms of the...

Dr. Lydgate: What you would like in this plan have you been talking with the County people?

Ms. Yuen: You know I have spoken actually, I think when I was trying to figure out who was managing or what the agreement was I did end up speaking with Mel Nishihara at Parks and think that is technically where it had fallen once at one time. Even then it was a little loose, you know what I mean nobody really claimed responsibility of it per say and I think it just ended up falling under SHPD as kind of a default and State Parks but there is actually I mean it's a very active site. I mean there are people I mean halaus and all that going there very frequently. So it's just been this understanding of a community that's been out there to help make those things happen. So a lot of it like Mr. Wichman has said it is what it is. People realize it, they respect it. They still, it is an important site so they take care of it on their own but there isn't any format.

Mr. Wichman: As far the title to the piece of property now if the State wants to make it into 1 piece then they need to negotiate with the County and they may want to consider a trade cause they own some of the lands boarding the complex on the south side. But then it could be anything or if not you know I am just throwing that out there.

The second one is to preserves within preserves within preserves by isolating the real sensitive areas. The first one a pretty good size circle needs to be drawn around the Lohiau house site. That's right there on the road you have got cars coming down and people are not aware of what is going on with that nor it's significance and then we will deal with interpretive later on cause it's all part of it. So the Lohiau house site because of it's proximity to the parking and the road itself has to have a pretty good sized buffer and special attention to that site, the stabilization and then maybe not very little restoration if any on that.

The second one is the burial grounds which clearly came up when they built the bathrooms. It's sitting right on top of it right? Several so you have this, this is all house site. The hale and burial my guess is it continues further out however we know within this and then here is the other the one right there around Lohiau's house site. There have been issues over and over the years but because of the Haena community they stopped the actual bulldozing of the house sites and stuff like that. The bulldozers where right there but then as we identify those particular areas another one was the development of the particular Taylor camp beach area.

We know that here along Limahuli stream it's also, Bishop Museum has pulled canoes out of there so the Bishop Museum contains quite a bit of artifacts that were actually pulled out of this sector. The locals I think are going to have to worry about it. The taro loi right there is under Hui Makaainanaomakana and over the years they are doing a better and better job and that intends to expand further out. But the idea was the development, the pathways through the parking lots that lead to this beach and around however I think most of the area is to be concentrated but because the parking lot is so far very few people actually make the walk right, or willing to make that walk. So there is still some larger issues about getting the ADA stuff close to the end. There is all kinds of alternatives parking right there by the Makas and Mahuikis but that all becomes you know seriously problematic.

There is also the element of the fishing stones over there it's actually an area that has developed out of the Haena Wainiha fisherman now have. It could be a preserve also within the marine sanctuary within the reefs right? There are 5 different overlaps of government right? Cause isn't it the ocean itself is what department? And then the near shore reefs is another department, the beach itself a department. So there is and County is in the middle of this so the idea was to consolidate that all into one particular so the permitting process in the long run is going to be a lot easier in order to do this historical overlay right. As you incorporate that into one, there is a term for it. Chipper knows what it is cause we talked about it a couple of weeks ago. So I think the idea of facilitating the different branches of government who has all the various jurisdictions here at the end of the road.

Ms. Yuen: Yes I know that DLNR within themselves have been coordinating with all the different branches.

Mr. Wichman: You can bring it all down together into one comprehensive decision maker and I think in the long term of the historic preservation will be a lot better if it was under one. And then the interpretive are coming I know my father is working on giving you a chronology or timeline of all the various interpretive parts of it. So for us that's a no brainer but it's really where all the people are going to be expansion on the parking lots. The trails as they move through certain areas as they get close but not through em. So the there is as we get down to the actual foot print we can walk the trails itself right. As long as it doesn't go over a wall we can walk the trail itself right? As long as it doesn't go through a wall we can go around it you know as you actually put the footprint of that and then the additional bathrooms too but you still have quite a bit of a...

Chair: Have you developed other drawings beyond this?

Ms. Yuen: No like I said we are still really early. We are still having our consultants do their baseline study at this point. We are still having our consultants do their base line studies at this point. We are just taking off. So any kind of formulation of what all that means is going to be several months out.

Ms. Sheehan: I have to go back to square one because I don't even know, how big of a piece is this?

Ms. Yuen: It's about 64 acres.

Ms. Sheehan: 64 acres and then when this community was so that those things that is on this map are where it's going or as is?

Ms. Yuen: No, no this is the community preferred master plan. So this isn't an existing site plan.

Ms. Sheehan: The cemeteries are where they are.

Ms. Yuen: Some of the elements are definitely there.

Mr. Wichman: Yes the parking and the element and the helipad is there already. Maybe not as big as this but actually the footprint is still there for this parking lot.

Ms. Yuen: Yes the parking lot is pretty close to what is there now. They had recently expanded it.

Ms. Sheehan: So most of the descriptions or places are actually what exists it may not be developed like the cemetery that's there and identified. So like the poi factory is that an identified something?

Mr. Wichman: The platform the poi factory is still there. We have good 1920 photos of the poi factory.

Ms. Sheehan: So most everything on here is not what you are putting on the land it's what there. I just needed to know the difference between where you are, where the plan is and what exists. So this is pretty much what exists.

Ms. Yuen: It's pretty close to what exists. But things like the picnic area they have out on the coast is you know restricted vehicular access that's been gated off.

Ms. Sheehan: Yes I just couldn't tell the difference between what you have found like it says terraced agricultural complex that's been discovered that is there.

Ms. Yuen: Yes.

Ms. Sheehan: Ok so this is what you have discovered as cultural things on this. Ok so right now the plan is not to disturb. I mean if you take the road and you take where the bathrooms are now and where you take the footpath is I mean it's not disturbing what you have, what exists.

Ms. Yuen: If you look by the larger parking lot there is that caretaker's cottage that is not, visitors center you know those kinds of...

Mr. Faye: You got a whole lot of footpaths and things like that. You have these little rows of trees are those supposed to be footpaths too? That dotted line that says bike lane.

Ms. Yuen: Yes so those if you can see there is this restricted vehicular access that may have been there at one time but that's necessarily something that we may keep you know. Yes this one I was talking about this. So that...

Mr. Faye: So all of this is going to be new right?

Ms. Yuen: That goes proposed in this plan.

Mr. Faye: That's part of the plan and then new vegetation along this.

Ms. Yuen: That was part of this plan.

Mr. Faye: Is that still a part of this plan?

Ms. Yuen: No that is why I am saying this is where they ended in 1999. We are starting from here seeing like maybe that path does not make sense so...

Mr. Faye: This is a draft I take it?

Ms. Yuen: Yes this was the community proposal that came out of that Keith Company's effort in the late 90s right.

Ms. Sheehan: But in this plan you have, I don't know you where satisfied or you know that all the cultural things that you need to know about have been identified.

Mr. Wichman: No.

Ms. Yuen: Not necessarily.

Ms. Sheehan: Ok.

Mr. Wichman: You are which I think part of the recommendations was to continue the mapping. You already have really good mapping of the Huimakaainana area. I don't think you have a really good map of the Lohiau area or the subsequent post holes that they have found during excavations.

Ms. Yuen: The archeologist within State Parks is supposed to be helping us do that.

Mr. Wichman: Yes so better mapping of the Lohiau complex area especially. You don't have to worry about the heiau because Kekahuna did that in 1953. No need we already have a really good map. The other one too is that it is under an archeological preserve all the complexes. It is my understanding is not on the State or National Registry.

Ms. Yuen: There is and we are trying to track that down, there is some kind of Haena...

Mr. Wichman: It is an archeological preserve but I am not sure whether it's at, cause all the sites have been grouped but whether its actually on the registry which is another one which might be a recommendation coming out of here is that you actually place the entire Haena archeological complex on the State and Federal Registry.

Ms. Yuen: You know there were and I didn't bring my list but there where 3 potential sites or places that were either on the State or historic. One is the highway the belt road and there was a listing for archeological complex and that is what I am trying to figure out exactly. That is we are trying to get the nomination paper to see what that involved. And then there was a third

which escapes me at this point in time. So we are trying to track those down definitely to make sure we take care of that and if it does then expand it or add it. Something we will look at yes.

Chair: What is the schedule for the draft EIS?

Ms. Yuen: The draft EIS is going to come at the tail end. We are hoping the master plan we can get through pretty good version for public comment and we are kind of overlapping so that feedback from the EIS process can get invoked before we finalized the plan. So we are hoping master plan you know mid to late '09 and then the EIS would be in 2010 and then the finalized by the mid.

Mr. Wichman: Yes there are other parts of this plan that will not be handled by us. The concession issue for the end of the road is not us. The toll booth issue is not us right just like Kokee they wanted a toll booth Haena right there as you get across Limahuli Stream right there. That's also right up there on the radar.

Ms. Sheehan: So what is your time table to do all the mapping? Do you even have a timeline that says you are going to go back and take this, what you know now and do more cultural studies for 9 months or do you have a timeline?

Ms. Yuen: It's all kind of rolling in together. We had a preliminary deadline for all the background research to be done by mid next year so hopefully at that point we are generating a cleaned up master plan.

Mr. Wichman: It's a tentative time line. You guys are down the road already. (Inaudible) has actually taken over that particular portion of the plan. Laura Thielen when she was down there a couple of months ago with you right?

Ms. Yuen: I think right around the time that we did a site visit yes.

Mr. Wichman: And so what has happen because Laura Thielen has placed this number 1 on the plan. To get things done so she is pushing it personally and watching it personally. So my guess is Laura is not going to let this thing sit around and percolate like it has before she needs to see it done. And her particular perspective is the way all of the different science and disciplines come together here at the end of the road. Multidisciplinary so you have culture, fishing and many different levels going on here. I know DLNR especially Laura Thielen wants to see this; she has a personal stake in it now.

Ms. Sheehan: I am just asking that you would maybe come back in front of us with a lot of information in the middle of next year.

Ms. Yuen: Sure exactly. We will be happy to see a presentation of the next iteration of the master plan.

Mr. Wichman: We can do a tentative recommendation right now and then that would help you.

Ms. Yuen: Yes anything, either way.

Mr. Wichman: Yes cause we are still here on the pre-consultation right? Nothing is official right now so this is pre-consultation.

Ms. Sheehan: Do you have to make a statement with a pre-consultation?

Staff: I am wondering if a copy of this meeting will be satisfactory for you or if you wanted to make a motion.

Ms. Yuen: Either way. What ever you are comfortable with submitting to us.

Mr. Wichman: There are certain no brainers at this particular point you know but there will be positions taken up and there are still... and it helps to for example if we make the motion the first would be that you would enter in with the County with some sort of discussion in regards to an MOU to and MOA in regards to those lands. So that I give you the marching orders to make the appointment with the County and the State. You will have to find out where the State really wants to go on that. The sooner we end up with a little bit more clear idea of how that piece of property is going to be handled in the State and the County.

So whether you need that or not I doubt it, you know you could probably start that already without motions anyways. The other motions would be that for now the preserves within the preserves would be the Lohiau house sites and the known burial areas are treated extra special for now within the plans. And that the sites, especially the Lohiau complex has a good map done now and a report generated as to its condition.

Dr. Lydgate: Didn't you mention the bathrooms being on a site?

Mr. Wichman: Yes it's over burials and over house sites. It's actually over...

Ms. Yuen: There is a separate CIP project and I think there is an agreement between the County and State...

Mr. Wichman: Let's not touch the bathroom yet we will get to that the next time we see you. Right now they know we know.

Ms. Yuen: It would be, basically there is an existing comfort station and they are basically updating that and there was an agreement with the community and the State to do some mediation and try not to impact those as much as they can. So that's where they are at right now.

Mr. Wichman: And then in the mean time the Commission would also want you to continue investigating the State and National Registry just exactly how it is listed. It's kind of shocking that I haven't been able to find it and put my hands on it right away right? Haena not on the State and National Registry, where is it? So we need to settle down with that one. Just exactly

how the status of it over it now and just whether it has all the State and Federal protection measures for it to go on the registry is a standard operation procedures. Its part of it right? It's going to help the site that it is a National Historic Landmark or a district. It's already preserved but those we can discuss at a further and then we would be, we can help you with the actual nomination process if you need it. If it was on the registry we would have known about it already. But there is something different in the arrangement that they have out there.

Dr. Lydgate: Tell us what the word Haena means.

Mr. Wichman: Haena. It's actually Ha is the breath and ena – hot. The other one is Kee means that it's a very twisty, windy road but the end result is far worth the effort. That's what Kee means so Kokee same thing right. Anybody else, for now I think that will help you and it kind of lays out the County position to it at a specific point.

Dr. Lydgate: I am horrified that Parks and Recs (inaudible).

Ms. Yuen: No don't get Mel, there is a deeper story and so I just (inaudible).

Mr. Wichman: There is the County park right there in Kee also. That's County right there in front of the dry cave. That's a County park.

Ms. Yuen: Yes don't give Mel a hard time. He told me some stories about what was going on and it was hard for them. They tried. It's just one of those things that got a little bigger you know what I mean.

Mr. Wichman: Since this land was confiscated by the...

Ms. Yuen: Yes so I think part of what is going to come out of this plan is a bit of a management. You understand that they are going to be things driving this that will hopefully help the State to better manage.

Mr. Wichman: And you have room for different volunteer groups that could develop in there not just Huimakaainana cause you have the whole maritime aspect of a group that has plenty room in there. You also have marine biology.

Ms. Yuen: Yes there is a fishery going on. There is a lot going on to help coordinate all that energy and get it focused in the right direction.

Mr. Wichman: I don't think you need a motion.

Ms. Sheehan: You have got a lot.

Chair: It's all in the minutes. Thank you very much for coming.

Mr. Wichman: This is a 1940s photo you have probably seen it.

Ms. Yuen: I haven't.

Mr. Wichman: That's just a zerox but the photograph is absolutely clear.

Ms. Yuen: That was one thing that shocked me to when we saw historic photos of the site it was such an open kind of space.

Mr. Wichman: These taro complexes are intense.

Ms. Yuen: It's such a different landscape. Thank you.

Re: Letter (8/25/08) from Jim Niermann, AICP, Senior Planner – addendum to the Draft Environmental Assessment (EA) for proposed Nawiliwili – Ahukini Shared-Use Path Project, County of Kauai Job No. CMAQ-0700(57), TMK: (4)(por)3-2plats: 02, 03, 04, 06, 07; 3-3-03:3-5-plats 01, 02; 3-6-plats 02, 08; 3-7-02, Lihue District, County of Kauai, Hawaii.

Chair: Welcome to the KHPRC.

Mr. Doug Haigh: I am Doug Haigh with the Department of Public Works. I am here to present and provide information cause Ricky told me to be here. We have just published the draft environmental assessment for the Nawiliwili to Ahukini bike and pedestrian path. We have submitted cultural survey and our archeological report to the State Historic Preservation Division and right now analyzing all of our responses from the various agencies and concerned people. So I guess what I would like to do is kind of give you an overview of what the project is and then maybe point out a couple of historic properties/issues that we have identified that may be near or may possibly be affecting. So if Randy wants to relinquish (laughter in the background).

Ok we have been to you folks before on the Ahukini to Lydgate project so this project is the last phase that we are working on but actually we have not come to you on the Kuna Bay to Anahola project because our first meeting in Anahola scared us. It's been 2 years and we are so scared but we will return to Anahola and hopefully after the election we will get underway. But any how we're here and the key of this phase is to go from Nawiliwili to Ahukini to make the final connection for the project going from Nawiliwili to Anahola.

I will start from the Ahukini side just because that's kind of easier for me and it (inaudible) of this parcel here which is primarily privately owned but I just got formal notice that the developer is doing the environmental assessment adding density in this area and they are planning on giving this land to the County. So we already have an easement for fishing access but it's in the process that this entire parcel, some of this is State parcels but the major portion of this land is private and is in the process of being donated to the County.

Our goal is to have a coastal path here. In our community meetings we have had 2 community meetings. There was mixed feelings about being along the coast but our feeling is to go along the coast. There are some historic properties (inaudible) a wall in this area in Ninini Point that could have been part of the heiau. We may be near that but clearly we would not touch it. We will potentially do an inventory survey in this area. I am trying to have a meeting with SHPD. My feeling is its not necessary because of the type of improvements we are doing we are not doing much disturbance and really its when we put our path in that we have an archeologist on board in the sensitive areas. But if SHPD feels that it is important for us to do a survey we move toward a survey.

So you come around Ninini Point and then there is a pedestrian path that the developer is doing that we will tie into for pedestrian that will actually go around the coast here and come up to the elevator and then you can get down and go along Kalapaki. But the bike/pedestrian path will come from here and use existing easements to get up to Kapule Highway. The developer for these projects is putting in a traffic signal so that (inaudible). Our goal is to make a connection to the Civic Center and the community of Lihue so that we can both provide recreational access to the community and provide work access for people in the community working at the resort area. We are working closely with the resort were area looking at a path so how we get up to the community we haven't finalized. Kaana Street right now we have developed Kaana Street up to the Police Station shared building. We are not sure we are meeting with Grove Farm to try to see if it's realistic to do a share use path or maybe there is a shared use path. So we need to make that connection preferably at Wilcox Elementary School will be a destination where you want to have a safe pedestrian access.

There really no historical issues in that. The developer is providing us a way to come down into their property in this manner. This is the limo road the carriage road and then coming around getting down to Kalapaki/Nawiliwili. In Nawiliwili there is the historic bridge crossing Nawiliwili Stream is the firs historic property that we will affect if we go over the bridge. Of course we will be working to restore the historic character and will certainly come back here with designs for that.

And then when we come into Nawiliwili Park and that's the end of the major path. The major path is coming along like this and then coming back to coastal connection. This is a spur going into Lihue. We are also looking at a spur to go from Nawiliwili Park all the way to Niumalu Park and part of that is to provide a connection to the harbor and connection to the park. There is a historic bridge I believe its right here, an historic one way bridge that it would be part of. I can assure you that we will not be tearing down that bridge as part of this project. We are looking at a shared use road so basically we are going to just put signs on the road from the Harbor toward Niumalu Park so minor improvements for the bike/pedestrian path. So that's pretty much a quick summary of the project we are looking at.

Dr. Lydgate: Question is the airport Federal, State or County?

Mr. Haigh: The airport is State owned and the comments we got back from the airport, really their only concern is they have a navigation aide somewhere over here and we have to be at least

300 feet away from it. We are looking at a potential comfort station at Ninini Point and that we have to be sensitive of the navigational. There is a historic light house I am sorry I should have mentioned that of course the archeological they don't acknowledge that as being historical. That's funny you know it's not mentioned on their maps, wait, wait, 11-100 actually they are referring to the stone wall over there. They didn't even pick up the light house. Our goal of course would be to provide informational signage that would tell the story of the light house cause we are looking at that as being the trail head area because there is vehicular access easily access to that point. So we will be looking at some parking in the light house area and the comfort station.

Dr. Lydgate: How big is the comfort station?

Mr. Haigh: It would be a small one probably similar to the one at the Lihi Park or Kealia Kai. Just a small one, it's you know people use these things. There is a function and along these trails it's good to have places periodically where people can you know. We have had some comment from the public or at least one comment where they weren't happy with the idea of doing any kind of improvement.

Mr. Wichman: Sierra Club right?

Mr. Haigh: Yes and of all of these certainly is to try to treat it in a manner that is not a, in fact I even talked to consultant that might be an area we could do partially underground. I don't know how much elevation we have there but we are going to try to look at a creative way of doing a comfort station without having to have an impact.

Mr. Wichman: You have a leach field system that goes in right there.

Mr. Haigh: Yes we would have to put in a septic tank system.

Mr. Faye: Is this a, you know last time you showed some down town shared paths is that part of this whole plan?

Mr. Haigh: Ok we have, we are looking at a lot of options. Basically we were looking at one spur that gets to down town. And we were looking at going down Kaana Street as the primary. That's the primary one we are looking at but we need to meet with Grove Farm, Planning Department, go over Grove Farm's future plans in that area cause they are moving quite rapidly for developing that area and make sure we are putting that into the right place. And the key is to provide safe access use so that you will let your 10 year old 8 year old children ride their bike down to the light house to the beach and if you are coming to Lihue Town how can we create a path that's going to allow parents to feel that degree of comfort.

Chair: The new light you are referring to would be the light at the intersection of the road with no name by Vidiniha Stadium?

Mr. Haigh: Yes.

Chair: Why doesn't that road have a name?

Mr. Haigh: Because it's actually a driveway at this point I suppose. It's a stadium driveway.

Ms. Sheehan: Can I ask when you start at Ahukini if you wanted to sort of drive there and start are you, I can't see that far, is it where the road already goes to Ahukini and then you park your car and get on your bike and do that?

Mr. Haigh: Yes in the previous phase Ahukini to Lydgate we discuss the development of a trail head there at Ahukini Point. We work closely with State Parks and so we need to provide a comfort station and striping of the parking lot.

Ms. Sheehan: Is there anything historic about Ahukini?

Mr. Wichman: Oh yes.

Ms. Sheehan: So is that trail head there?

Mr. Wichman: Where the trail head is right now is where the existing gate is now right?

Mr. Haigh: Well the plan is for the trail head would be at Ahukini Park by the piers because there is already a big parking lot area there and it is a popular fishing area and the historic Ahukini Pier is there and so we are working closely with State Parks because that's their facility and we would build a comfort station there. They were concerns about impacts to traffic so our agreement was we'd stripe that parking lot so that you know you could delineate where the parking is and make sure you get adequate parking cause something I hear it gets very popular during certain fishing times.

Mr. Wichman: If you want I will go through some. This we have all the blue prints from the development of Ahukini and all its World War II function. Right here is the old camp, the Hanamaulu Mill Camp so you have one of the old camps and then we still have people who are researching it right there. As you go along here there really isn't all that much to worry about because my guess they are following the old footprint of the road, the cane road that is still there right? You are still drive it right?

Mr. Haigh: We are looking at pushing closer to the coast.

Mr. Wichman: How much off the road?

Mr. Haigh: We are trying to get as close to the coast as we can and still be outside of the shoreline setback.

Mr. Wichman: Yes there is some engineering problems but let's not get into that.

Mr. Haigh: Yea but see we didn't want to because we are leaving the road separately for safety reasons for fisherman access and so we don't want to interfere with that and we also don't want to have a joint use because then you would have vehicles in.

Mr. Wichman: (Inaudible) your path through here.

Mr. Haigh: I mean that's part of when we get farther along with the actual design. That's where that map was an earlier one and it doesn't show the actual roof.

Mr. Wichman: They may not be there, you will see the certain rock alignments but then we need to get some other people to take a hard look at that. There are some things but nothing really heavy so far as we know till you get here. Need to know exactly where the footprint of the comfort stations is going to be in relationship to the light house and the Ninini Heiau. I would need to see that, the footprint.

Mr. Haigh: We are actually going to need the guidance to help. I mean that is part of the design requirements to make sure that we are sensitive to the existing.

Mr. Wichman: It's compounded by you having to stay away 300 feet from that particular, that I need to see. I think that will compound it. It forces you into a specific area. But Ninini I am suspecting that the heiau is still underneath the construction cause actually when you look at it and we have all the photographs when you are ready I can bring them over to you. The whole sequence of the lighthouse but that retaining wall was built and then it was filled in for the upper main platform that the lighthouse is sitting on. The road area was also filled in because it was undulating on that side. Chances are part of the heiau is still underneath the road, portions of it could be underneath the road itself.

So there could be and we will walk it out and I will show you why and then you look at it and you make up your own mind. I haven't been able to, those walls that are going off of course I have looked at them really carefully for the last 6 months I have been out there a dozens times already but also within the photographs they don't show up so they are very late historic. Go figure that one and I will show you that through the sequence of photographs cause it took me a long time to figure out the walls are this tall right?

Mr. Haigh: So then it's probably, they probably weren't part of the heiau then?

Mr. Wichman: No however it was also part of Hanamaulu off loading certain things like they did in Kilauea off the rail so there is a period also that they may have off loaded certain things early, early plantation activity. As you get into the Coast Guard Station and the lighthouse that in its own way is quite historic as its own particular bid right there so it's exactly where you are going to be putting the comfort station is going to make all the difference in the world and before I go any further I need to see the exact footprint.

Mr. Haigh: And I can tell you we don't have one at this point.

Mr. Wichman: Yes but we would love to be able to go out there with you and spend, I don't think it will take you more than a half an hour or forty five minutes to get the gist of the way and then from then on you can now probably maneuver around those things right?

Mr. Haigh: What I will probably do is when our planning consultants are back on I will try to see if I can get in touch with you and see if we can set some kind of...

Mr. Wichman: Yes like I said it won't take long cause then after that after you have seen the photographs and the actual physical then you guys will make up your minds.

Ms. Sheehan: Are you constrained by having a comfort station every 5 or 6 miles?

Mr. Haigh: There is no set standard for how often you are supposed to have a comfort station.

Ms. Sheehan: So if you moved it around the corner or something...

Mr. Haigh: Yes there is actually a comfort station being put in by the developer on the other side of you know where Sharkys used to be on the other side over there. But it's really not conveniently located for the path cause that's not part of the bicycle path.

Ms. Sheehan: What's the mileage from the Ahukini start to the lighthouse?

Mr. Haigh: It's, I am not sure I would have to, there is a scale. Yes ok it's almost 2 miles then. And that's a, it would be very beneficial if we could get a comfort station somewhere in that area.

Mr. Wichman: I think so. If you could arrange it because you can develop that area into something that special but it will have everything to do with the exact footprint you choose. Not too close, not too far away and then it all depends on where you, the County property is right? Cause where you want to locate it may not be on County land. So I am not sure, we have to walk that.

Mr. Haigh: Yes unfortunately I don't think we are going to, with these neighboring landowners we have good relationships with all of them so it should be, if it becomes such that we need to acquire a little bit off of one of the lands and its feasible then that would not be a big stumbling block I don't think.

Mr. Wichman: The lighthouse is a beautiful area to hang out.

Mr. Faye: What's the schedule on the funding?

Mr. Haigh: The schedule we don't, right now we are completely in this environmental assessment. We hope to publish the final EA in January or end of this year early next year. Right now this phase is not on the statewide transportation improvement plan. It's too far out in the future. Our goal is to get the planning done so as the developer does things in this area we

can get them to you know at least make sure they allow room for us and prefer to have them do a lot of the improvements as part of their development. So it's really hard to say. Now federal funding right now especially federal highway funding is fairly questionable. So it's hard to know what's going to be happening in the future.

Mr. Wichman: So also this plan is actually encompassing 6 ahupuaa. I don't know if you are aware of that.

Mr. Haigh: In just this little area?

Mr. Wichman: Yes it's the most concentrated portion on Kauai where we have as many as 6 coming down. You have the Hanamaulu line that is coming through here right there. Then you have the Kalapaki and then you have Nawiliwili, then you have Haiku and then you have Niunalu, then you have Kipu. So there is actually, this encompasses 6 ahupuaa your plan. So we'll get to that later being able to divide it up. Also this whole sector right here as we look into the really, really old aerial photographs to see what was there as early as we can get no big flags come up in that sector. So that is why we are not even at this particular point there is no particular need to go there right? There is any big flags like you have at Ninini. I think at this particular point the camp and the Ninini but even the camp you know most of that is buried under rubbish anyways or dirt.

Mr. Haigh: Yes we also have an old dump that we are looking at going by and we are going to try to work with the State and hopefully by the time we are ready to go they will have already restored the dump, stabilized it so we can go over it rather than have to go around it.

Mr. Wichman: Hanamaulu is the most polluted bay in the nation supposedly.

Mr. Faye: It doesn't look polluted looks nice and crispy.

Mr. Haigh: I love to go snorkeling. It's gorgeous when the winds are light.

Staff: Randy didn't we have the Harbor Master's House site on the Ahukini side?

Mr. Wichman: Yes that's the one we reviewed and got moved over to Kealia right?

Staff: And I thin an archeological survey was done for Ninini Point or portions of it in one of the earlier Marriott or Westin.

Mr. Haigh: There have been a lot of surveys done in this area in the report and that's why the reason I am question a need to do another one. So we will be meeting with SHPD and going over that.

Dr. Lydgate: (Inaudible).

Mr. Haigh: Well it's the Kauai Lagoon owners. I am not sure, my guess it would be about 60 acres.

Mr. Faye: So they are going to build on the Mokihana Golf Course.

Mr. Haigh: They have got I believe 3 different sites within their development that are getting added density based on, cause what they are doing they are getting 22 building site density, 22 unit density by dedicating this land to the County of Kauai. That's what they are proposing.

Mr. Wichman: The other one too is the light house probably eligible for the State and National Registry so that's another consideration but that is something that you can work with the Commission to do.

Mr. Haigh: There is an opportunity too for any restoration work or appropriate work for the light house. Funds that we are using for the project are also used for lighthouse work. So we could if there was a group that was interested in doing some enhancements in preserving it or if there is stuff that needs to be done it could possibly be incorporated.

Mr. Wichman: And then there is also a vegetation plan you got going but I think you can review that later after we see the footprint or as you have developed your landscaping plan right?

Mr. Haigh: I mean right now would probably be minimal landscaping improvements cause if anything it would be when we finally get into design maybe around the light house but it's such a harsh environment you know so I wouldn't want to try to create that hotel resort environment there.

Ms. Sheehan: So actually the path is how wide?

Mr. Haigh: In that area probably about 10 to 12 feet wide.

Ms. Sheehan: And it's paved?

Mr. Haigh: It's paved.

Mr. Wichman: Yes cemented. Usually they go down to about 10 inches.

Mr. Haigh: 6 inches of concrete.

Mr. Wichman: So they are actually digging in 10 inches to 12 inches I think.

Mr. Haigh: Well we don't necessarily in a lot of places we just do the 6 inches so in fact I am trying to think any place I can't think of any part of the path where we put base course to actually build below the concrete cause the concrete is 6 inches thick so it's pretty self sustainable.

Mr. Wichman: Chances are they are really no burial issues along here not like they were in Wailua.

Mr. Haigh: Yes it's not a sandy area.

Chair: Thank you Doug.

Mr. Faye: I hope you get the money.

Mr. Wichman: Get Anahola done.

Mr. Haigh: My goal is in my career at least get from Lydgate Park to Kuna Bay.

Mr. Wichman: Talk to Kane, just go right to him.

Mr. Haigh: We'll be there, I mean Anahola I think is we have made a lot of we let Department of Hawaiian Homes Land do a lot of ground work for us so I think there is a solution there that we will find.

Chair: Thank you for coming by.

Mr. Faye: Very good.

NEW BUSINESS

There were no New Business matters.

SELECTION OF NEXT MEETING DATE AND AGENDA TOPICS

The next KHPRC Meeting is scheduled on November 6, 2008.

ADJOURNMENT

The meeting was adjourned at 4:27 p.m.

Respectfully Submitted,

Shanlee U. Jimenez

Secretary

Date: _____



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Kaua'i Historic Preservation Review Commission
c/o County of Kaua'i Planning Department
4444 Rice Street, Suite A473
Līhu'e, Hawai'i 96766-1326

SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Chair & Commission Members,

Thank you for your letter dated September 9, 2008 responding to our request for pre-consultation comments and your letter dated October 22, 2008 following discussion of the above referenced project at your October 2, 2008 meeting.

As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from the Commission. We acknowledge your comments that areas of interest discussed at the Commission's October 2, 2008 meeting include: *"consider nominating the complex to the National/State Register, relationship of trails with respect to cultural resources and practices, fishing zones, interpretive program, maintenance and management/overlapping jurisdictions, mapping and buffers of specific resource preserves within the overall complex preserve"*.

The master plan addresses these areas of interest. Recognizing the importance of Hā'ena to Hawaiian history and culture along with the many known archaeological and ecological resources in Hā'ena State park, the Master Plan endeavors to elevate consideration for the Park's cultural and ecological resources in both site design and management recommendations.

In an effort to listen and expand understanding of Hā'ena's importance to the community, a 32-member Master Plan Community Advisory Committee (MPAC) was formed. This group has convened on several occasions to work together with State Parks in development of a plan that balances outdoor recreation with safety and respect for the park's many layered resources.

With respect to your comment regarding the National and State Registers of Historic Places, we note that the Hā'ena Archaeological Complex is on the National and State Registers of Historic Places (Site # 50-30-02-1600). We also note that Kūhiō Highway, within and adjacent to the park, is also listed in the National Register (Site #30-02-9346). The State Historic Preservation Department has been consulted as part of the Master Planning and environmental documentation process.

With respect to trails and their proximity to cultural resources and practices, the Master Plan documents existing trails within the park, while recommending that the majority of park visitors utilize Kūhiō Highway to access the Park's outdoor recreational activities. Within the Park, the Master Plan limits vehicle access on Kūhiō Highway and anticipates that the road will serve as an Interpretive Corridor, accommodating most park visitors on foot. Trails through the restored lo'i are recommended to serve operations functions for restoration and maintenance of the agricultural complex. Trails leading to the Ka Ulu a Paoa heiau and Ke Ahu a Laka hula platform are recommended to remain in place for use by cultural practitioners.

With respect to an interpretive plan, a key Master Plan recommendation is that a Cultural Advisory Group be formed and consulted on park management actions, construction projects as well as the park's interpretive programs. The enhanced oversight is expected to result in improved interpretation of the park's cultural, ecological and archaeological resources, and as a result, a visiting public that is more aware and sensitive to the importance and fragility of these resources.

The Master Plan also identifies several alternatives for management of the Park's resources, including a variety of cooperative arrangements between the State and community groups. Please note that the Master Plan's physical improvements and management recommendations seek to provide the visiting public with greater understanding of the Park's resources, without restricting any areas within the park as a preserve. Limiting access to culturally sensitive areas was discussed at length at MPAC meetings, however, excluding classes of individuals from areas within the Park may potentially create a conflict with commitments that the State made when it accepted federal monies for the development of the park through the National Park administered Land and Water Conservation Fund (LWCF). Thus, the Master Plan includes development of an Education and Cultural Center (ECC) near the park entry which all visitors must pass through. The accompanying management recommendation is to require visitors to view a video that informs guests of the many sensitive resources within the Park. Visitors are then directed toward outdoor recreation areas such as Kē'ē Beach and the Kalalau trailhead via an Interpretive Corridor. Throughout the park, interpretive signage is proposed to educate visitors to their surroundings and advise on appropriate behavior. Specific details relating to interpretive content are recommended to be developed in consultation with the Cultural Advisory Group formed for the Park.

The Master Plan defers management of fishery resources to the Hā'ena Community-Based Subsistence Fishery, which has been an on-going community effort. The Master Plan anticipates special access parking for fishermen/women within the existing parking area at Kē'ē.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII



Kaua'i Historic Preservation Review Commission
PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND
ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I
PAGE 3 OF 3

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015
Responses\Planning_KHPRC2015.doc

BILL "KAIPO" ASING
MAYOR



DONALD M. FUJIMOTO
COUNTY ENGINEER
TELEPHONE 241-4992

GARY K. HEU
ADMINISTRATIVE ASSISTANT

EDMOND P.K. RENAUD
DEPUTY COUNTY ENGINEER
TELEPHONE 241-4992

AN EQUAL OPPORTUNITY EMPLOYER
COUNTY OF KAUA'I
DEPARTMENT OF PUBLIC WORKS
4444 RICE STREET
MO'IKEHA BUILDING, SUITE 275
LIHU'E, KAUA'I, HAWAII 96766-1340

August 27, 2008

RECEIVED
SEP 05 2008
PBR HAWAII

PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Towers, Suite 650
Honolulu, HI 96813-3483
Attention: Ms. Kimi Yuen

**SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HA'ENA STATE PARK
MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HA'ENA,
KAUA'I, HAWAII TMK: 5-9-001-022 & TMK: 5-8-008-001 PW 8.08.072**

Dear Ms. Kimi Yuen,

This is in response to your letter dated August 11, 2008 requesting our comments for the proposed State Park Master Plan and Environmental Impact Statements for the captioned properties. We wish to inform you that are comments are similar to those previously commented on April 1, 2008 in regards to the pre-consultation request to construct wetlands as an alternative secondary treatment facility for waste associated with the proposed park's comfort station. A copy of our letter is enclosed for your information and use.

We also recommend comments be solicited from our Parks and Recreation Department and from our Flood Plain Coordinator.

Thank you for this opportunity to provide our comments. We wish to remain on your mailing list in receiving a copy of the draft EIS. Should you have questions, please contact me at (808) 241-4981.

Very truly yours,

CONCUR:

Wallace Kudo, P.E.
Chief, Engineering Division
WK
attachment

DONALD M. FUJIMOTO, P.E.
County Engineer

cc: Parks and Recreation Department w/attachment
Design and Permitting w/attachment
Building Division w/attachment

BRYAN J. BAPTISTE
MAYOR



DONALD M. FUJIMOTO
COUNTY ENGINEER
TELEPHONE 241-6600

GARY K. HEU
ADMINISTRATIVE ASSISTANT

EDMOND P.K. RENAUD
DEPUTY COUNTY ENGINEER
TELEPHONE 241-6640

AN EQUAL OPPORTUNITY EMPLOYER
COUNTY OF KAUA'I
DEPARTMENT OF PUBLIC WORKS
4444 RICE STREET
MO'IKEHA BUILDING, SUITE 275
LIHU'E, KAUA'I, HAWAII 96766-1340

April 1, 2008

PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Towers, Suite 650
Honolulu, HI 96813-3483
Attention: Mr. Vincent Shigekuni

RECEIVED
SEP 05 2008
PDR HAWAII

SUBJECT: PRECONSULTATION FOR THE DEPARTMENT OF LAND AND NATURAL RESOURCES HÄ'ENA STATE PARK COMFORT STATION CONSTRUCTED WETLANDS DRAFT ENVIRONMENTAL ASSESSMENT PW3.08.116

Gentlemen,

We reviewed the subject pre-consultation request to construct wetlands as an alternative secondary treatment facility for the waste water associated with the proposed park's comfort station. We offer the following comments:

1. Based on Panel no. 80 E of the FIRM (Federal Insurance Rate Maps) dated September 16, 2005, the subject property along the coastal reaches are susceptible to flooding from the Pacific Ocean. The flood zoning is a Zone VE, or Coastal High Hazard Area, or Tsunami Zone. The Coastal High Hazard Area is subject to high velocity waters, including but not limited to coastal and tidal inundation or tsunami. We recommend comments be solicited from our Flood Plain Coordinator for building within a flood zone.
2. Our Flood Plain Management Ordinance No. 831 prohibits filling for structural support and manmade alteration of sand dunes and mangrove stands are prohibited.
3. A grading permit can be exempted for the wetland constructions since the work will be within a self contained government controlled area. However, we expect the State to be responsible for implementing Best Management Practices (BMP's) at all times to the maximum extent practicable to prevent damage by sedimentation, erosion, or dust to streams, watercourses, and natural areas and the property of others and to monitoring the grading activities. The grading exemption does not exempt the sites receiving the excess wasted excavated material or the borrow site if the site requires embankment. A separate grading permit may be required for the disposal sites and/or borrow sites.

PBR Hawaii & Associates, Inc.

April 1, 2008

Page (2)

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

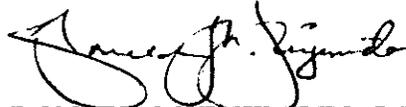
Thank you for this opportunity to provide our comments. We wish to remain on your mailing list in receiving a copy of the draft Environmental Assessment. Should you have any questions, please contact me at 808-241-6498.

Very truly yours,



Wallace Kudo, P.E.
Chief, Engineering Division

CONCUR:



DONALD M. FUJIMOTO, P.E.
County Engineer

wk

cc:

Building Division
Design and Permitting
Construction Inspection

APR 15 2008



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y.J. CHUNG, FASLA, LEED®AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED®AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED®AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED®AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED®AP
Associate

DACHENG DONG, LEED®AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE
1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE
1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Larry Dill
County of Kaua'i
Department of Public Works
4444 Rice Street
Līhu'e, HI 96766-1340

**SUBJECT: PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK
MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT,
HĀ'ENA, KAUA'I, HAWAII**

Dear Mr. Dill,

Thank you for your agency's letter dated August 27, 2008 regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from Public Works which reference previous comments made for the Hā'ena State Park Comfort Station Constructed Wetlands Environmental Assessment Process, which relate to the floodplain, the County's Flood Plain Management Ordinance No. 831, grading permit exemptions and referral to the Army Corps.

The Environmental Impact Statement documents will include information relating to the location of flood hazard areas as well as previously documented wetland areas and the relationship between these resources and park elements proposed by the master plan. Further, we acknowledge that the Flood Plain Ordinance No. 831 prohibits filling for structural support and that in the Coastal High Hazard Zone (VE Zone), manmade alterations of sand dunes and mangrove stands are prohibited.

We further acknowledge that while grading permits may be exempted within a self-contained government controlled area, best management practices (bmps) for erosion control and sediment is expected. Additionally, we acknowledge that the grading exemption does not exempt off-site borrow or receiving sites from permits. With regard to Federal Permits, we have also consulted with the Army Corps of Engineers to assess and document their requirements.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks

O:\Job26\2627.01 DLNR-Haena State Park Master Plan\EIS\Pre-Consultation\Response Letters\2015 Responses\public works2015.doc

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

Laura H. Thielen
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

Russell Y. Tsuji
FIRST DEPUTY

Ken C. Kawahara
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

August 31, 2008

Kimi Yuen, LEED, AP, Associate
PBR Hawaii & Associates
1001 Bishop St., Suite 650 ASB Tower
Honolulu, Hawaii 96813

RECEIVED
SEP 04 2008
PBR HAWAII

LOG NO: 2008.3780
DOC NO: 0808NM48
Archaeology

Dear Ms. Yuen:

SUBJECT: Chapter 6E-8 - Historic Preservation Review – Preconsultation on Haena State Park Master Plan and EIS
Haena Ahupua‘a, Hanalei Districts, Island of Kaua‘i
TMK: [4] 5-9-001: 22, 5-9-008: 001

The aforementioned is regarding the Master Plan and EIS for Haena State Park. There are several significant historic sites in Haena State Park as your letter of August 11, 2008 clearly points out, in addition, there is a lo'i complex with lokos, which still need more archaeological mitigation (i.e., monitoring plan, burial treatment plan, data recovery plan, preservation plan) shall be submitted for review and approval.

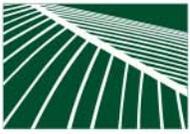
We look forward to reviewing a more refined plan than the latest draft, at which point we can then give you some better comments. If you have any questions please call me at 692-8021.

Aloha,

A handwritten signature in cursive script that reads "Nancy A. McMahon".

Nancy McMahon, Deputy Administrator
State Historic Preservation Division

NM:



PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2012

Alan Downer, Administrator
State Historic Preservation Office
Kakuhihewa Building, Room 555
601 Kamokila Blvd.
Kapolei, HI 96707

SUBJECT: SHPD LOG NO: 2008.3780; DOC NO: 0808NM48, PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAI'I

Dear Mr. Downer,

Thank you for your agency's letter dated August 31, 2008 (LOG No. 2008.3780, DOC No. 0808NM48) regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the comments from SHPD, indicating that additional archaeological mitigation will be required for the park's agricultural complex.

In preparing the Master Plan, State Parks archaeology staff assisted in compiling previous studies and identified gaps in archaeological research. According to State Parks archaeology staff, most of the park has been the subject of systematic archaeological surveys beginning in the early 1970's when the park was first acquired and subsequent surveys have been conducted for various projects or initiatives. Only a few gaps remain. Extensive archaeological excavations were conducted within the coastal sand dunes and inland irrigated lo'i system. One house site was also excavated. More recent archaeological work augmented early efforts to document the area's most noted sites, particularly the heiau, Lohiau's house site, and the caves, and to portray their traditional and cultural significance. Most recently, archaeological testing was conducted in the vicinity of the comfort station prior to recent improvements to the individual waste water system. The traditional significance of the park as a whole, as well as that of individual features within or immediately adjacent to the park, can be drawn from published and unpublished materials and an overview of the park's recorded traditions commissioned by State Parks soon after the park was acquired. State Parks archaeological staff has concluded that when combined, existing information is sufficient to characterize the basic distribution pattern of archaeological sites and other historic property types in the park.

For the preparation of the master plan, State Parks' archaeology staff utilized these previous studies to develop an archaeological sensitivity map and help guide proposed development to areas which have been previously disturbed and away from known areas of sensitivity. Impacts to archaeological resources will further be avoided through archaeological testing and monitoring prior to all earth disturbing activities, regardless of location within the park. The master plan and the accompanying EIS are being prepared primarily as a planning tool and will address development projects only in concept. If any of the projects contemplated are eventually funded and designed, they would be subject to the historic preservation project review process at that time and to other applicable state and county review requirements.

**SHPD LOG NO: 2008.3780; DOC NO: 0808NM48, PRE-CONSULTATION FOR THE
PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT
STATEMENT, HĀ'ENA, KAUA'I, HAWAII**

Page 2 of 2

Thank you for contributing to the development of this document. SHPD's comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

A handwritten signature in black ink, appearing to read "C. Cullison". The signature is fluid and cursive, with a long horizontal stroke at the end.

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
2008-TA-0305

AUG 29 2008

RECEIVED

Ms. Kimi Mikami Yuen
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

SEP 02 2008

PBR HAWAII

Subject: Technical Assistance Regarding the Proposed Haena State Park Master Plan and Draft Environmental Impact Statement, Kauai, Hawaii

Dear Ms. Yuen:

Thank you for your letter, received August 12, 2008, providing the opportunity for input on the development of a master plan and draft Environmental Impact Statement for Haena State Park. You requested comments as to whether the development of a master plan could have an impact on any existing or proposed U.S. Fish and Wildlife Service (Service) projects, plans, policies or programs.

The Service contributed funding to the development and implementation of a Community Based Marine Management Area (CMMA) for the Haena region, including waters off of Haena State Park. The intent of the CMMA is to engage the local community in Haena in marine conservation practices and to assist them in planning, managing and monitoring a community-based marine managed area. Project goals include establishing the Marine Management Area with effective rules and active management and the establishment of effective monitoring approaches to track the progress of the CMMA. The boundaries of the marine area, which are established in State regulations, include the waters in front of the park. The proposed Master Plan for Haena State Park should be compatible with the goals and community involvement established by the CMMA. We recommend community members involved in the CMMA be involved in the development of the proposed Master Plan.

We searched our databases, including data compiled by the Hawaii Biodiversity and Mapping Program, in order to identify species in the proposed project area that are protected under the Endangered Species Act (ESA) of 1973 [16 U.S.C. 1531-1544], as amended. There is no designated critical habitat in project area. One endangered plant species (*Peucedanum sandwicense*) is reported from the area, and three bird species collectively referred to as seabirds, may fly over the area: the threatened Newell's shearwater (*Puffinus auricularis newelli*); the endangered Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*); and a species of concern,

TAKE PRIDE[®]
IN AMERICA 

the band-rumped storm petrel (*Oceanodroma castro*). Seabirds are attracted to artificial lights and they fly around the light source until they either collide with a tall object such as an adjacent building, light pole, wire, or fall to the ground from exhaustion. Once grounded, they are vulnerable to predators or often struck by vehicles along roadways.

To assist you in developing your project to minimize impacts to species listed under the ESA, we provide the following guidance. We recommend that surveys be conducted by a biologist familiar with Kauai's flora and fauna to document the presence of listed species in the proposed project area. To minimize impacts to listed seabirds, we recommend that all existing and additional lighting be downshielded and that motion detectors and timers be installed on all light fixtures.

The proposed Haena State Park Master Plan and EIS are programmatic in nature and are planning documents. If, as project planning progresses, you determine actions that may adversely impact federally listed species or critical habitats, please contact our office for further assistance. If you have questions regarding these comments, please contact Megan Laut, Fish and Wildlife Biologist, Consultation and Technical Assistance Program (phone: 808-792-9400, fax: 808-792-9581).

Sincerely,

Christa Russell

for

Patrick Leonard
Field Supervisor



PBR HAWAII

& ASSOCIATES, INC.

PRINCIPALS

THOMAS S. WITTEN, ASLA
Chairman

R. STAN DUNCAN, ASLA
President

RUSSELL Y. J. CHUNG, FASLA, LEED® AP BD+C
Executive Vice-President

VINCENT SHIGEKUNI
Vice-President

GRANT T. MURAKAMI, AICP, LEED® AP BD+C
Vice-President

TOM SCHNELL, AICP
Principal

W. FRANK BRANDT, FASLA
Chairman Emeritus

ASSOCIATES

RAYMOND T. HIGA, ASLA
Senior Associate

KIMI MIKAMI YUEN, LEED® AP BD+C
Senior Associate

SCOTT ALIKA ABRIGO, LEED® AP BD+C
Managing Director - Kapolei

ROY TAKEMOTO
Managing Director - Hilo

SCOTT MURAKAMI, ASLA, LEED® AP
Associate

DACHENG DONG, LEED® AP
Associate

MARC SHIMATSU, ASLA
Associate

CATIE CULLISON, AICP
Associate

HONOLULU OFFICE

1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-mail: sysadmin@pbrhawaii.com

KAPOLEI OFFICE

1001 Kamokila Boulevard
Kapolei Building, Suite 313
Kapolei, Hawai'i 96707-2005
Tel: (808) 521-5631
Fax: (808) 535-3163

HILO OFFICE

1719 Haleloke Street
Hilo, Hawai'i 96720-1553
Tel/Cel: (808) 315-6878

February 22, 2015

Field Supervisor
USFWS, Pacific Islands Office
300 Ala Moana Blvd. Room 3-122
Box 50088
Honolulu, HI 96850

**SUBJECT: USFWS FILE: 2008-TA-0305
PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA
STATE PARK MASTER PLAN AND ENVIRONMENTAL
IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAII**

Dear US Fish and Wildlife Staff,

Thank you for your agency's letter dated August 29, 2008 (2008-TA-0305) regarding the above referenced pre-consultation request. As the planning consultant for the applicant, State of Hawai'i, Department of Land and Natural Resources, Division of State Parks, we acknowledge the information pertaining to the Service's involvement with the Community-Based Marine Management Area (CMMA) (also referred to as the Hā'ena Community-Based Subsistence Fishery). We further acknowledge the recommendation that the master plan be compatible with the CMMA and that community members involved in the CMMA be involved in the development of the Master Plan.

In an effort to develop a plan that balances outdoor recreation with safety and respect for the park's ecological, cultural and archaeological resources, a 32-member Master Plan Community Advisory Committee (MPAC) was formed. This group includes individuals involved with the CMMA. The MPAC has convened on several occasions to work together with State Parks in development of a plan. MPAC and general community meeting notes will be included in Environmental Impact Statement documents. The MPAC members involved with the CMMA provided insights to the master plan physical layout and management recommendations so that the plan does not interfere with the goals of the CMMA.

We further acknowledge that in your agency's letter, one endangered plant species (*Peucedanum sandwicense*) is reported from the area and your agency recommends that a biological survey be conducted for the site. In preparation for the master plan, a flora and fauna survey was conducted by Geometrician Associates, LLC in 2009.

The survey included a physical survey of flora and fauna; a review of previous surveys of the area; report of the results describing plant communities and habitats; and, discussion of potential effects from increased recreation on wildland resources. The survey suggests that human disturbance for agriculture and habitation over the last centuries probably changed the vegetation within the park and that the present vegetation is a haphazard collection of natives, cultivated plants and a variety of alien plants. The biological survey report identifies eleven vegetation zones in the park and documents the zones in a map. The survey report also includes a table of plants identified in and near the park. *Peucedanum sandwicense* is not listed among those identified plants.

With regard to faunal resources, we acknowledge that seabirds, including the threatened Newell's shearwater, endangered Hawaiian petrel and a species of concern, the band-rumped storm petrel may fly over the site. Further, we acknowledge that seabirds are attracted to artificial lights, flying around the light source until they collide with objects or collapse from exhaustion, making them vulnerable to predators once on the ground. To avoid any impact to seabirds, the master plan does not include any parking lot lighting. Any security lighting that is deemed necessary at the park will be shielded downward to avoid any impacts to seabirds.

Thirteen species of birds were observed during the 2009 survey including the endangered Hawaiian Duck (Koloa Maoli, *Anas wyvilliana*), two indigenous shorebirds (Kolea, *Pluvialis fulva* and 'Ulili, *Heteroscelus incanus*) and an indigenous seabird (Koa'e Kea, *Phaethon lepturus dorotheae*). All other birds sighted were non-native introductions.

Additional species of seabirds, waterbirds, shorebirds and forest birds that are federally listed as endangered or threatened may use the park. The wetlands may also provide feeding and nesting areas to the indigenous Black-crowned Night-heron ('Auku'u; *Nycticorax nycticorax hoactli*). Other federally endangered waterbirds that would likely use the wetlands are the Black-necked Stilt (Ae'o; *Himantopus mexicanus knudseni*), Hawaiian Coot ('Alae ke'oke'o; *Fulica alae*), Hawaiian Moorhen ('Alae'ula; *Gallinulae chloropus sandwicensis*), and Nēnē (*Branta sandwicensis*). To avoid impacts to waterbirds no physical changes or new activities are proposed for the site's wetlands. However, there has been interest on the part of some community members to restore the wetlands (which are believed to be former Hawaiian fishponds or used for wet cultivation of taro) for ecological or cultural use. The master plan recommends that before any wetland restoration activities occur, that an analysis of the costs, benefits and liabilities associated with intentionally creating habitat for endangered waterbirds be conducted.

The biological survey also reports that although not sighted during the survey, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), probably utilizes Hā'ena State Park as it has been observed in the Hanalei and Princeville areas. To avoid any impacts to the endangered Hawaiian hoary bat, no large woody shrubs or trees over 15 feet in height will be removed during the bat pupping season. Our most recent discussions with Fish and Wildlife biologists have informed us that the breeding season is now considered to be June 1st through September 15th.

Finally, we acknowledge that when your agency's letter was written in 2008, it stated that there is no designated critical habitat in the area. We further acknowledge that in 2010, new Critical

PRE-CONSULTATION FOR THE PROPOSED HĀ'ENA STATE PARK MASTER PLAN AND ENVIRONMENTAL IMPACT STATEMENT, HĀ'ENA, KAUA'I, HAWAII

Page 3 of 3

Habitat ecosystems were designated for the Island of Kaua'i. A review of Geographic Information Systems (GIS) data found that no new Critical Habitats have been designated for the Master Plan area.

Thank you for contributing to the development of this document. Your comments will be included in the Environmental Impact Statement documents.

Sincerely,

PBR HAWAII

A handwritten signature in black ink, appearing to read "C. Cullison". The signature is fluid and cursive, with a horizontal line extending from the end.

Catie Cullison, AICP
Associate

cc: Lauren Tanaka, State Parks



Appendix C

Rockfall Hazard Assessment

Rockfall Hazard Assessment Haena Park Kauai, Hawaii

Prepared for

State of Hawaii
Department of Land and Natural Resources
Division of State Parks
1151 Punchbowl Street, Room 310
Honolulu, Hawaii 96813

Prepared by

Earth Tech AECOM
841 Bishop Street, Suite 500
Honolulu, Hawaii 96813-3920

December 2008

OVERVIEW

Earth Tech AECOM, Inc. (Earth Tech) has prepared this rockfall assessment for the State property within Haena Park along the mauka side of Kuhio Highway in accordance with Federal Highway Administration (FHWA) publications and construction industry standards. The purpose of the assessment is to evaluate rockfall potentials and hazards and to recommend rockfall mitigation methods best suited for this site. It is Earth Tech AECOM's opinion that it is impossible to speculate with great certainty as to when any of the rockfall areas referenced in this report could result in an actual rockfall event; however, it is possible to identify the areas that show a potential for rockfall hazard.

This rockfall study was performed in two consecutive phases: a) geological survey of the site and rockfall hazard identification, and b) engineering planning study of the rockfall condition and development of preliminary rockfall protection design alternatives and cost estimates. During the geological survey phase, areas with potential for rockfall or landslide were identified and site-specific descriptions were obtained. The geological conditions of the site and the key rockfall features are presented in a report format including color photographs. The engineering planning phase identifies engineering solutions in terms of alternative designs for reducing potentials of rockfall hazards. A preliminary construction cost estimate is provided for each alternative design. All work is based on the research data and the recommended procedures by FHWA, United States Department of Transportation, and the engineering and construction standards accepted by the industry.

Many rockfall features and many recent rockfall activities were found during field investigation. Some of the recent rockfalls occurred right next to and ended on the Kuhio Highway close to the Wet Cave. The area around the Wet Cave is the most hazardous rockfall area because: 1) many rockfall features exist there; 2) very high probability for rockfalls to reach the roadway or Wet Cave; and 3) almost constant presence of visitors in this area. The Wet Cave area is rated rockfall hazard Class A entailing a high hazard rating. Rockfalls are less likely to reach the roadway or beach at other places.

The annual probability of loss of life from rockfall along Kuhio Highway and the beach within Haena Park is estimated at 1.3×10^{-3} , higher than the recommended tolerable level of 10^{-5} for general public. Therefore rockfall mitigation is recommended for Haena Park to reduce rockfall risk to park users.

The recommended permanent engineering mitigation design alternative for Haena Park is a combination of rockfall impact fence and anchored wire mesh system due to its easiness of construction, least disturbance to environment, and relatively low cost, with a cost of 9.8 million dollars and a construction period of eight months.

For temporary rockfall mitigation design, scaling is recommended due to its ease of construction, least disturbance to environment, and cost-effective in rockfall hazard reduction, with a cost of \$750,000 and a construction period of four months to scale the high hazard area around the Wet Cave and all the identified boulder sites in this report. An additional 1.5 million dollars and a construction period of six months are needed to scale other areas. Only rocks that are likely to reach the roadway or other protected structures need to be scaled.

TABLE OF CONTENTS

OVERVIEW	i
ACRONYMS AND ABBREVIATIONS	v
1.0 INTRODUCTION	1-1
1.1 Scope of Services	1-1
1.2 Implementation Plan	1-1
2.0 GEOLOGICAL SURVEY OF THE SITE AND ROCKFALL HAZARD IDENTIFICATION	2-1
2.1 Rock Formations–Foundation of Rockfall	2-1
2.2 Weathering and Erosion Processes–Cause of Rockfall	2-1
2.3 Precipitation–Timing of Rockfall	2-2
2.4 Rockfall Hazard Rating System	2-2
2.5 Rockfall Computer Simulation	2-5
2.6 Rockfall Sites and Potential Rockfall Hazards at Haena Park	2-11
2.7 Rockfall Risk Estimation for the Haena Park Site	2-14
3.0 ENGINEERING PLANNING STUDY	3-1
3.1 Rockfall Engineering Mitigation Methods	3-1
3.2 Recommended Rockfall Mitigation Design at Haena Park	3-4
3.3 Similar Rockfall Projects and Experienced Contractors	3-5
4.0 REFERENCES	4-1

APPENDIXES

Appendix A Rockfall Simulation Data

Appendix B Cost Estimates

FIGURES

Figure 1-1: Site plan of Haena Park rockfall assessment project.	1-2
Figure 2-1: Rockfall simulation results for profile P1.	2-7
Figure 2-2: Rockfall simulation results for profile P2.	2-8
Figure 2-3: Rockfall simulation results for profile P3.	2-9
Figure 2-4: Rockfall simulation results for profile P4.	2-10
Figure 2-5: Rockfall simulation results for profile P5.	2-11
Figure 3-1: Draped Wire Mesh	3-6
Figure 3-2: Anchored Wire Mesh	3-7
Figure 3-3: Impact Fence	3-8
Figure 3-4: Combination Impact Fence & Wire Mesh Drape System	3-9
Figure 3-5: Catchment Ditch	3-10
Figure 3-6: Retaining Wall	3-11

TABLES

Table 2-1: Representative Identified Potential Rockfall Outcrops at Haena Park, Kauai.	2-13
--	------

PHOTOS

Photo 2-1. Round boulder on steep slope at B1.	2-15
Photo 2-2. Highly fractured and weathered steep slope with many loose rocks at B3.	2-16
Photo 2-3. An overhanging and standing boulder with large opened back fracture at B4.	2-16
Photo 2-4. A completely overhanging boulder with steep back fracture dipping out of slope at B5.	2-17
Photo 2-5. Loose boulders on talus slope at B7.	2-17
Photo 2-6. Root wedging enlarged fractures at B12.	2-18
Photo 2-7. A recent fallen boulder at B14.	2-18
Photo 2-8. Recent fallen boulders. Notice the fresh impact marks on the trees.	2-19
Photo 2-9. Old impact marks on the tree and stopped boulders.	2-20
Photo 2-10. A rock perched on tree branches at B17.	2-21
Photo 2-11. A recent rockfall boulder on steep slope with potential for further fall.	2-21
Photo 2-12. An overhanging boulder partly supported by rotten tree roots at B19.	2-22
Photo 2-13. An overhang loose boulder on steep slope at B19.	2-22
Photo 2-14. A loose boulder on steep slope.	2-23
Photo 2-15. Rocks stopped by a tree.	2-23
Photo 2-16. Recent rockfall boulders and fresh impact marks on trees.	2-24
Photo 2-17. Recent rockfall boulders perched on tree roots and fresh impact marks on trees.	2-24
Photo 2-18. The source of the recent rockfall at B21.	2-25
Photo 2-19. An overhanging fractured rock with potential for wedge failure.	2-25
Photo 2-20. Fractured and overhanging rocks at B21.	2-26
Photo 2-21. Opened columnar joint of a dike. Kuhio Highway is at the left of the photo at B21.	2-27
Photo 2-22. A major fracture separates a small ridge from the main rock slope at B21.	2-28
Photo 2-23. Overhanging and fractured rocks at B23.	2-28
Photo 2-24. A protruding rock sitting on a steep fracture dipping out of slope at B25.	2-29
Photo 2-25. An overhanging loose rock sitting on top of a ledge at B26.	2-30
Photo 2-26. Overhanging loose boulders on a steep talus slope.	2-30
Photo 2-27. Overhanging loose boulders on a steep talus slope at B30.	2-31
Photo 2-28. An overhanging fractured rock on a high cliff face.	2-32
Photo 2-29. An overhanging and fractured block on top of a high cliff face.	2-33
Photo 2-30. A major fracture separates a large block on a high rock cliff.	2-34

Photo 2-31. A recent rockfall source and a large overhanging rock with back fractures.	2-35
Photo 2-32. An overhanging portion of a high cliff.	2-35
Photo 2-33. Loose boulders perched on a steep ridge.	2-36
Photo 2-34. An overhanging large bolder on the very top of a high slope.	2-36
Photo 2-35. The thick lava flow layer on the very top of the high slopes.	2-37

ACRONYMS AND ABBREVIATIONS

AGS	Australian Geomechanics Society
CRSP	Colorado Rockfall Simulation Program
FHWA	Federal Highway Administration
ft.	feet/foot
GPS	global positioning system
lf	linear feet
mph	miles per hour
RHRS	Rockfall Hazard Rating System
USDOT	United States Department of Transportation

Section 1.0

Introduction

1.0 INTRODUCTION

Faced with potential for rockfalls on the mauka side of Kuhio Highway at Haena Park, the Department of Land and Natural Resources, State of Hawaii, tasked Earth Tech AECOM to perform a study of the present rockfall condition for the site (Figure 1-1). Earth Tech AECOM geotechnical engineers and geologists performed the field investigation using visual means and methods. Rockfall locations identified in this report are based on coordinates shown on a hand-held global positioning system (GPS) unit with +/- 30 ft accuracy under normal condition. These identified sites are representative samples of potentially hazardous rocks. Similar types of rocks may exist along the project site which were not identified and documented in this report. Topographic surveying and sub-surface investigation were not a part of the scope of this study. The specific conditions described in this report pertain to those present at the time of field investigation.

1.1 SCOPE OF SERVICES

The scope of services included the following tasks: (1) conduct field reconnaissance; (2) assess and delineate the falling rock hazards; (3) identify and articulate options to mitigate the potential hazard; (4) identify and articulate the risks associated with each option; (5) identify products required for each option; (6) identify locations (in Hawaii if applicable) where the options have been implemented; (7) provide budgetary cost estimates for work required under each option; and (8) identify experienced contractors qualified to perform the work.

1.2 IMPLEMENTATION PLAN

The project was implemented in two phases, as follows:

1. Geological survey of the site and rockfall hazard identification:

Earth Tech AECOM performed a visual assessment of the geological formation and rock outcroppings along accessible areas of the mountain slope.

A geological report was prepared to identify the key features of the site geology and to locate rock outcroppings including GPS readings and color photography. The study methodology is based on applying suitable methods recognized by the Federal Highway Administration (FHWA), United States Department of Transportation (USDOT), and the prevailing construction standards used in the industry.

2. Engineering planning study of the rockfall condition and development of preliminary rockfall protection design and cost estimates:

Performed an engineering study for identifying alternative mitigation procedures and to prescribe a recommended methodology based on accepted engineering practice and sound economics to reduce rockfall hazards.

A budgetary cost estimate was provided for each design option.



Figure 1-1: Site plan of Haena Park rockfall assessment project.

Section 2.0

Geological Survey of the Site and Rockfall Hazard Identification

2.0 GEOLOGICAL SURVEY OF THE SITE AND ROCKFALL HAZARD IDENTIFICATION

2.1 ROCK FORMATIONS—FOUNDATION OF ROCKFALL

Knowing local geology knowledge is essential to understanding the potential hazards of rockfall events and the associated mitigation methods.

The island of Kauai consists of a single shield volcano, which is deeply eroded and partly veneered with much later volcanics. The rock formation exposed at Haena Park belongs to the Napali Formation (or Napali Member), the oldest exposed shield volcano formation above ocean water (Stearns 1985; MacDonald et al. 1983). Talus, formed by fallen rocks piled against the high cliffs, is another major rock formation exposed at the project site.

The Napali Formation consists of mainly basaltic lava flows with two morphology types: 'a'a and pahoehoe. 'A'a flows are formed by dense (low volatile content) and viscous lava. As the viscous lava flows, it constantly shears apart its top crust formed by cooling to produce the top rough and jagged clinkers. At the front of a'a flows, the top clinkers—carried along by the flowing lava like on a conveyor belt—tumble down and are buried by the advancing lava over them, forming the bottom clinkers. A typical 'a'a flow unit, therefore, consists of three layers: the top and bottom clinker layers and the middle interior. Vesicles in the middle interior are commonly stretched or of irregular shapes. Due to differential erosions—the fast erosion of the weak, very vesicular, and poorly cemented clinkers and the slow erosion of the dense interior, a'a interiors are often overhang and prone to rockfall.

Pahoehoe flows are formed by fluidal lava (low viscosity) with high volatile content. Consequently, pahoehoe flows commonly are thin characterized by smooth, billowy, hummocky, or ropy surfaces and contain large amount of spherical vesicles. Pahoehoe flows are essentially tunnel or tube lava flows: once crusted over on the surface due to cooling, the fluidal lava is less likely to shear apart its crust and thenceforth flows within a tunnel or tube of its own making. A main feeding channel or lava tube, usually thick, is typically associated with a pahoehoe flow unit.

2.2 WEATHERING AND EROSION PROCESSES—CAUSE OF ROCKFALL

Weathering and erosion are chiefly responsible in creating rockfall.

Several natural mechanisms contribute to the alteration and breakdown of rocks. Mechanical weathering represents breaking up of rocks by physical disintegration without changing their chemical composition. Chemical weathering involves an alteration in chemical composition and the formation of new minerals. Examples of mechanical or physical weathering are stream and wave erosion, the wedging action of growing plant roots and stems, or the fragmentation of rock faces caused by enlargement of fractures due mainly to gravity. Clay minerals and hydrated iron oxides are typical products of chemical weathering. Due to high temperature and rainfall and abundant vegetation, conditions for chemical weathering are nearly optimum at the Haena Park site.

Breaking up of the rock by mechanical weathering greatly aids chemical weathering because it increases the area of rock surface exposed to chemical action. Chemical weathering, in return, reinforces mechanical weathering. For example, chemical weathering normally increases the volume of weathered rocks as compared to the original volume of the unweathered rock, setting up stress between the outer more weathered and inner less weathered portions, and causing the rock to break apart. The mutual reinforcement of chemical and physical weathering effects is an ongoing process, the degree and rate of which will largely determine the stability of rock in the area.

'A'a flows are especially prone to boulder rockfall due to their differential erosion. The thick and dense interiors of 'a'a flows are relatively resistant to weathering due to their large thickness and low permeability (low porosity). The clinkers, on the other hand, are rapidly eroded away by both

chemical and mechanical weathering. Consequently, overhangs of thick 'a'a interiors are seen almost at every 'a'a flow outcrop. These overhangs are unstable because: (1) the top and bottom supporting layers of the overhangs are poorly cemented and often deeply weathered clinkers; (2) the dense interiors have columnar joints formed naturally by the thermal contraction of lava during cooling; (3) overhangs exert extra stresses on vertical joints and fractures that may increase over time, enlarging the fracture and/or joint spaces. Because it is unlikely for the interior and the clinkers to have similar weathering rates, the only natural way to eliminate a'a interior overhangs is through rock falls or slides. Once dislodged, boulders of the dense interior could roll far due to their large potential energy (large size) and the focus of the energy (without breaking up into small pieces of rocks).

Massive pahoehoe flows (main feeding channels) embedded in thin pahoehoe flows behave similarly as 'a'a interiors. Massive pahoehoe flows are relatively resistant to weathering due to the lack of internal bedding, low permeability, and large thickness. Thin pahoehoe flows, on the other hand, are prone to weathering due to their thin bedding and large amount of vesicles. The piling style of thin pahoehoe in which small oval toes stacked together with little welding-in-between creates adverse geologic structure. Although thin pahoehoe layers themselves are much less prone to boulder rockfall as they easily splinter into small and often flat pieces, their fast differential erosion, however, leads to the overhang of their main feeding channel that could create spectacular rockfall events.

Both a'a and pahoehoe flows are subject to jointing and fracturing where focused weathering occurs. Fracturing and jointing in basalt flows are most commonly initiated as contraction cracks during cooling of lavas. Joints and fractures are enlarged by weathering and gravitational stresses.

Spheroidal weathering is a common form of weathering in which concentric shells of progressively weathered material form around a core of less weathered basalt. Because edges and corners of fractured basalt are exposed to weathering through two or more surfaces, the increased weathering there results in rounding of blocks. Spheroidal weathering produces spherical rocks that could roll easily on a slope.

Over-steepened talus slopes consisting of soil and boulders are prone to rockfall. Rainfalls induce the erosion of soil materials, leaving behind loose and overhanging boulders. During exceptionally heavy rains when the quantity and speed of surface runoff reach certain limits under which the cohesion and gravity of the soil material can be overcome, great quantities of material can be eroded away in relatively a short period of time.

2.3 PRECIPITATION—TIMING OF ROCKFALL

Water does not only promote weathering but also a determinant factor in the timing of rockfall events. Due to hydraulic pressure and erosion, rockfall events tend to occur more frequently during or after heavy rains in Hawaii.

The average yearly rainfall for Haena Park is quite high at about 122 inches per year according to data at rainfall station PH Wainiha 1115 about 1.7 miles away with similar elevation. The precipitation data were taken from the Hawaii State Climate Office at website: <http://lumahai.soest.hawaii.edu/Hsco/ppt.htm>. The weather station information was taken from the National Climatic Data Center at website: <http://www.ncdc.noaa.gov/oa/climate/surfaceinventories.html#A>.

2.4 ROCKFALL HAZARD RATING SYSTEM

A rockfall mitigation procedure begins with an understanding of the structural geology and relative orientation of the discontinuities of a slope, the water run-off condition, and the site geometry. To assess potential rockfall hazards, the FHWA and the DOT have sponsored extensive research to develop a series of rockfall mitigation methods and a systematic procedure for rating rockfall

conditions. The results of this research were presented in a series of publications and guidelines *Rockfall Hazard Mitigation Methods* (Publication No. FHWA SA-93-085, March 1994) and *Rockfall Hazard Rating System* (Publication No. FHWA SA-93-057, November 1993). These manuals introduce a multitude of up-to-date techniques and materials to mitigate each condition, hence providing a sense of uniformity during assessment, design, and maintenance. The basic concept behind the DOT/FHWA Rockfall Hazard Rating System is summarized below.

Rockfall rating groups the hazard conditions into three classes, as described below:

- Class A — High estimated potential for rockfall on adjacent property(ies) with high historical rockfall activity. A Class A rating means that the chances of rock falling in a site is moderate to high, and that when the rockfall occurs, it will certainly reach adjacent property(ies). An example of a Class A condition is where rocks on the cut slope overhang the adjacent property(ies) and in areas, between the rockfall property and adjacent property(ies), where little or no rock catchment ditch is present.
- Class B — Moderate estimated potential for a rock to fall on adjacent property(ies) with moderate historical rockfall activity. As the rockfall risk is reduced, a Class B rating indicates that although a rockfall is probable, the chances of it reaching the adjacent properties are low to moderate. A possible scenario for Class B is a condition where a rockfall from the slope is clearly possible, and the catchment ditch is large enough to prevent most of the rocks from reaching the adjacent property(ies).
- Class C — Low estimated potential for rockfall on adjacent property(ies) with low historical rockfall activity. Class C rating pertains to a condition in which there is a low chance for a rockfall event, but should one occur, there is low to no chance for the rocks to reach other properties.

To evaluate a rockfall condition for a given property, certain criteria must be evaluated. These criteria are identified below:

- Slope height
- Ditch or catchment effectiveness
- Structural condition, Case One slopes (movement along discontinuities)
- Rock friction
- Structural condition, Case Two slopes (differential erosion or oversteepening leads to rockfall)
- Difference in erosion rates
- Volume of rockfall event
- Climate and the presence of water on slope
- Rockfall history
- Slope topography

Slope Height evaluates the risk associated with the vertical height of a slope. Slope height represents the highest elevation from which a rock could roll down the slope. This value is reasonably estimated from existing topographic maps, through use of a GPS unit, or from trigonometric relationships. High slopes are associated with high rockfall hazard because they have more materials available for rockfall and higher potential energy for rock acceleration. A larger rockfall potential energy is associated with an increased hazard.

The slopes at Haena Park are high, at places over 1000 ft.

Ditch Effectiveness estimates the effectiveness of a catchment ditch or zone in restricting falling rocks from reaching adjacent property(ies). The risk related to a rockfall situation varies based on how effectively a catchment ditch or zone can avert the rocks from reaching the adjacent property(ies). The risk of rocks reaching other property(ies) is lower where a good catchment is in place, regardless of the volume of rock that has fallen. Conversely, the risk heightens where there is limited or no catchment available to stop the falling rocks.

Rockfall catchment varies along the project site. Portions of the mauka side of the Kuhio Highway at Haena Park have relatively wide flat area with dense trees, providing almost adequate rockfall catchment. Other portions, however, have narrow or no flat areas, providing little rockfall catchment.

Structural Condition. For the purpose of the rockfall assessment, the geologic conditions of slopes are evaluated based on two distinct cases. Where both rockfall cases are present, the condition that is more severe should be considered.

Case 1. Structural Condition represents slopes for which discontinuities, bedding planes, and joints are the dominant features. Movement within the discontinuities of the slope is the major cause of rockfall for the Case 1 category. "Movement occurs along these joints where the resistance to movement is significantly less than the intact strength of the rock itself. When the joints are oriented adversely to the slope, the potential for rockfall is greater. Adverse joints are those that singularly or in combination with other joints make planar, circular, block, wedge or topping failures kinematically possible" (Pierson and van Vickle 1993, p. 49).

Rockfall movement along structural joints is controlled by the roughness of the joint planes. The degree of roughness ranges from rough and irregular to slickensided. "Friction along a joint, bedding plane, or other discontinuity is governed by the macro and micro roughness of surfaces. Macro roughness is the degree of undulation of the joint relative to the direction of possible movement. Micro roughness is the texture of the surface. On slopes where the joints contain hydrothermally altered or weathered material, movement has occurred causing slickensides or fault gouge to form, or the joints are open or filled with water, the rockfall potential is greater" (Pierson and van Vickle 1993, p. 52).

Case 2. This case represents slope conditions in which differentially eroded rock units and over-steepened slopes are dominant features. Over-steepening of slopes and unsupported rock overhangs increase the risk of rockfall. As described in the RHRS manual, "Rockfall is commonly caused by erosion that leads to a loss of support either locally or throughout a slope. The types of slopes that may be susceptible to this condition are layered units containing more easily erodible units that undermine more durable rock; talus slopes; highly variable units, such as conglomerates, and mudflows, that weather differentially, allowing resistant rocks and blocks to fall; and rock/soil slopes that weather allowing rocks to fall as the soil matrix material is eroded" (Pierson and van Vickle 1993, p. 55).

Where the slope is composed of different rock/soil materials, which exhibit significant differences in composition and characteristics, the rate of erosion may vary within different layers and zones. Progress of soil erosion under these conditions could result in loss of support of portions of the slope, increasing the risk for rockfall.

Block Size or Volume of Rockfall Event is evaluated based on individual blocks of rock or a volume of rocks of various sizes. "Larger blocks or volumes of falling rock produce more total kinetic energy and greater impact force than smaller events... the larger the blocks or volume the greater the hazard created..." (Pierson and van Vickle 1993, p.62).

During field investigations, both large and small boulders were identified within this property posing potential hazard.

Climate and Presence of Water on Slope. This category evaluates the effects of climate including precipitation, and the presence of water on the slope surface. "Water ... contributes to the weathering and movement of rock materials and a reduction in overall slope stability. This category evaluates the amounts of precipitation ..." (Pierson and van Vickle 1993, p. 65).

Generally a rainfall of 122 inches per year at the site is considered high.

Rockfall History at a site is an important indicator of future rockfall activities. Sites with a history of frequent rockfall are more likely to experience future rockfall events. The magnitude of historical rockfalls is also an indicator of future rockfall behavior at a site.

During site investigation, recent rockfall activities were apparent, some of them occurred right adjacent to Kuhio Highway.

Based on the above rating criteria, the rockfall section at the mauka side of Kuhio Highway at Haena Park consists of both Class A and Class B rockfall ratings.

2.5 ROCKFALL COMPUTER SIMULATION

Rockfall is initiated by unbalanced forces as a result of gravity, weathering, erosion, excavation, fracture development, hydraulic pressure, plant or ice wedging, seismic or blasting vibration, or impact by moving objects. After initiation, the fate of rockfall depends on initial momentum, elevation, steepness and roughness of slope, slope material, and the shape and size of the falling rocks. The elevation and size determine potential energy and the shape, slope, and slope material determine the potential acceleration of rockfall.

The Colorado Rockfall Simulation Program (CRSP) version 4.0 (Jones et al. 2000), jointly developed by Colorado School of Mines, Colorado Department of Transportation, and Colorado Geological Survey, simulates rocks tumbling down a slope. The program is based on mathematical models, probability factors, and many rockfall experiments. CRSP can predict the statistical distribution of speed and bouncing height and is a guide and reference for recommending and designing rockfall mitigation. The model takes into account slope profile, rebound and friction characteristics of the slope, and rotational energy of the rocks. The program, together with its values for normal coefficient of restitution (R_n) and the tangential coefficient of frictional resistance (R_t), has been calibrated by many rockfall events here in Kauai. The model is one of the most widely used and is the recommended tool for the geologist and engineer in analyzing and mitigating rockfall hazards.

CRSP simulations are used to approximate the bouncing height, velocity, kinetic energy, and traveling distance of possible rockfalls. The simulation profiles (cross sections) are based on field measurements taken during investigation. The shape of each boulder is assumed spherical with a 4-foot (ft.) diameter, similar to the large boulders found on the slope. Because CRSP does not include the effect of trees, slope roughness was increased to simulate the effect of tree trunks in stopping falling rocks as dense trees exist at the project site. For each assumed slope profile and boulder, the program mathematically rolls the same boulder down the same slope profile one thousand times and each time it mathematically produces a new slope roughness resulting in a new traveled path by that boulder. It would then issue a percentage for the number of times the hypothetical boulder reaches the end of the run and the jumping height and speed of the boulder at each location of the profile.

Rockfall simulations were performed for five slope profiles on the mauka side of Kuhio Highways at Haena Park (Figure 1-1). Due to the high elevation and difficulty in access, the top slope profiles were obtained from Google Earth Pro. The bottom of the slope profiles were measured using a measuring tape and a clinometer.

Figure 2-1 shows the simulation results for profile P1 from the gate of the secondary parking lot to the mountain peak (Figure 1-1). A high rock cliff is about 140 feet away from the paved road of Kuhio

Highway, and a relatively flat catchment area exists between the cliff and the road (Figure 1-1 and Figure 2-1). Based on results of this mathematical simulation, about 3% rockfalls reach the road, with a maximum bouncing height of 0.4 foot at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P1 would entail Class B rockfall rating.

Figure 2-2 shows the simulation results for profile P2. Unlike profile P1, profile P2 has a long and steep talus slope leading to a high rock cliff (Figure 1-1 and Figure 2-1). About 63% of simulated rockfalls originated from the top of the mountain are anticipated to reach the road, with a maximum bouncing height of 9 feet at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P2 would entail Class A rockfall rating.

Figure 2-3 shows the simulation results for profile P3 at the start of the beaching parking lot (Figure 1-1). Profile P3 has a relatively flat catchment area and a steep talus slope before a high rock cliff (Figure 1-1 and Figure 2-3). About 4% of simulated rockfalls originated from the top of the mountain are anticipated to reach the road, with a maximum bouncing height of 1.6 feet at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P3 would entail Class B rockfall rating.

The Wet Cave (Waikanaloe Wet Cave, right next to the road) exists between profiles P2 and P3, in between locations of boulders B21 and B20 shown in Figure 1-1. Here high rock cliff is right next to the paved road. Most, if not all, rockfalls would reach the road. This rockfall section including the Wet Cave is considered Class A rockfall rating.

Figure 2-4 shows the simulation results for profile P4 at the start of the Kalalau trail (Figure 1-1). Profile P4 has a relatively flat catchment area and then a short steep talus slope before a ridge (Figure 1-1 and Figure 2-4). About 0.5% of simulated rockfalls originated from the top of the mountain reach the road, with little or no bouncing at the road position (See Appendix A for detailed simulation information). This rockfall section represented by profile P4 would entail Class B rockfall rating.

Figure 2-5 shows the simulation results for profile P5 starting from the most populated beach area (Figure 1-1). Profile P5 has some relatively flat catchment areas and a long talus slope before a high ridge (Figure 1-1 and Figure 2-5). Profile P5 crosses the Kalalau trail which helps to stop falling rocks due to its depression formed by erosion along the trail. No simulated rockfalls originated from the top of the mountain would reach the beach area (See Appendix A for detailed simulation information). Rockfalls started from the steep slope right next to the beach, however, could reach the beach area. This rockfall section represented by profile P5 would entail Class B rockfall rating.

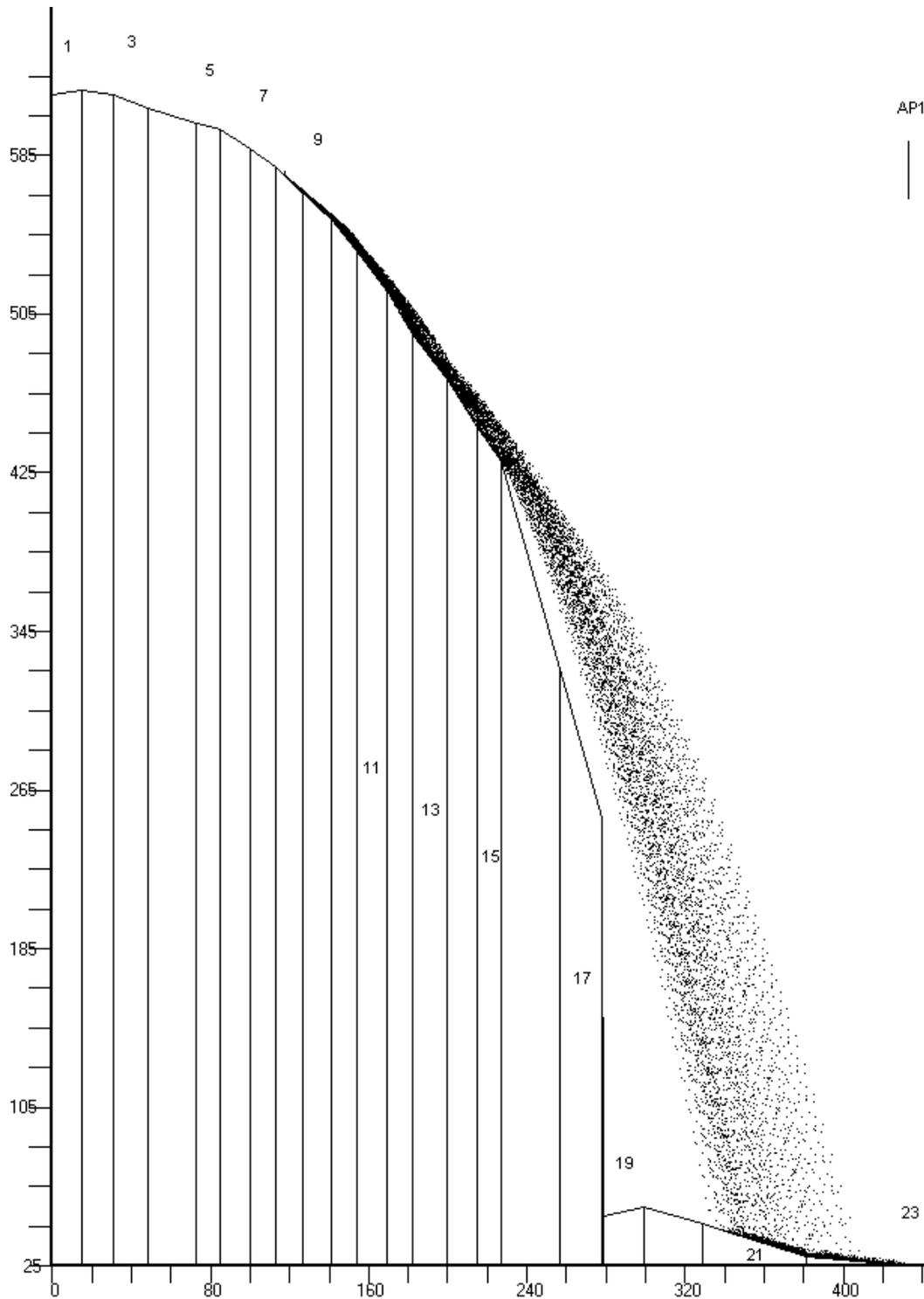


Figure 2-1: Rockfall simulation results for profile P1.

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 23) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. About 3% rockfalls reach the road, with a maximum bouncing height of 0.4 foot. See Appendix A for detailed simulation information.

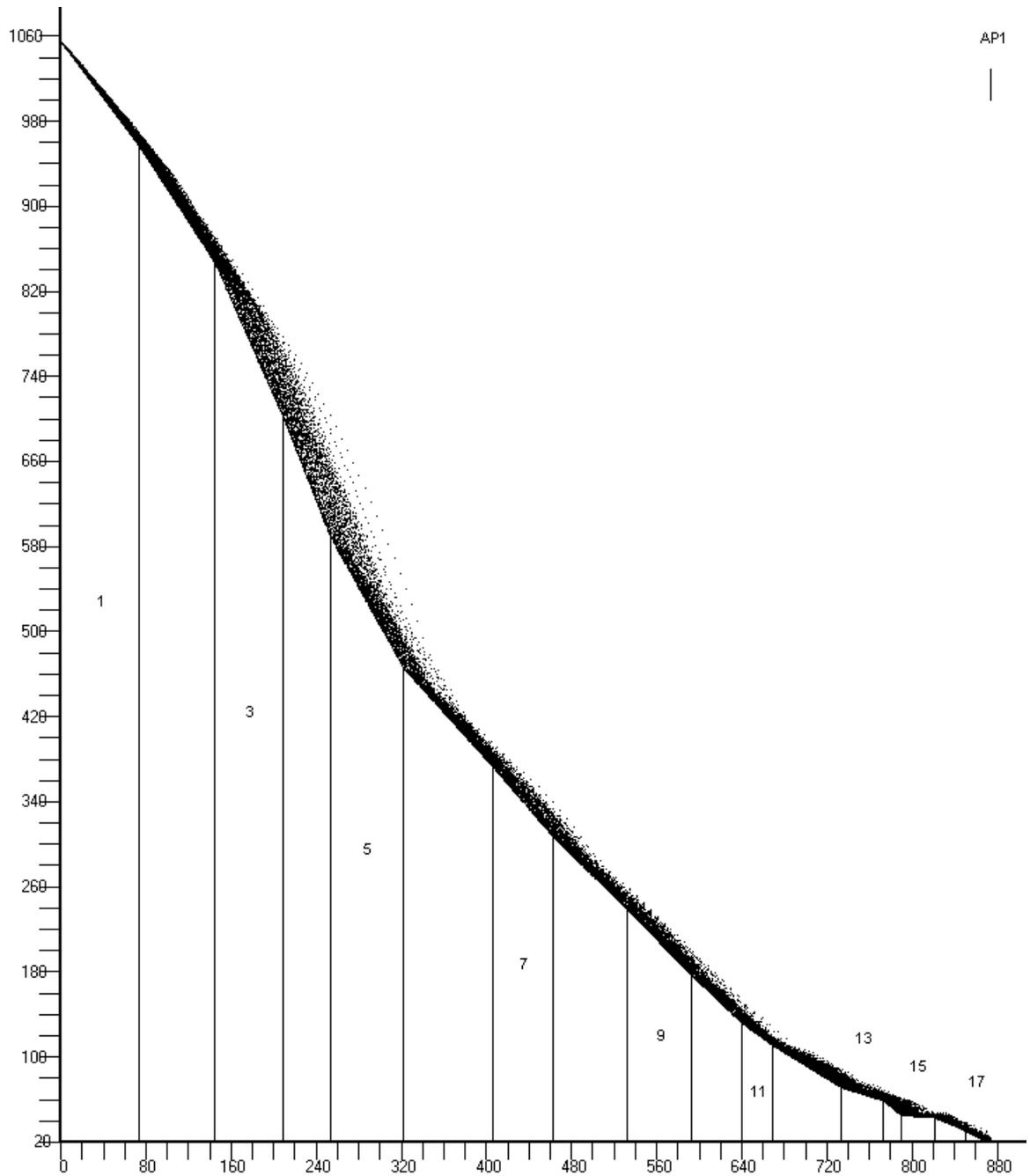


Figure 2-2: Rockfall simulation results for profile P2.

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 17) are slope section references. Upper slope was obtained from Google Earth Pro and lower slope profile was measured. About 63% rockfalls reach the road, with maximum bouncing height of 9 feet. See Appendix A for detailed simulation information.

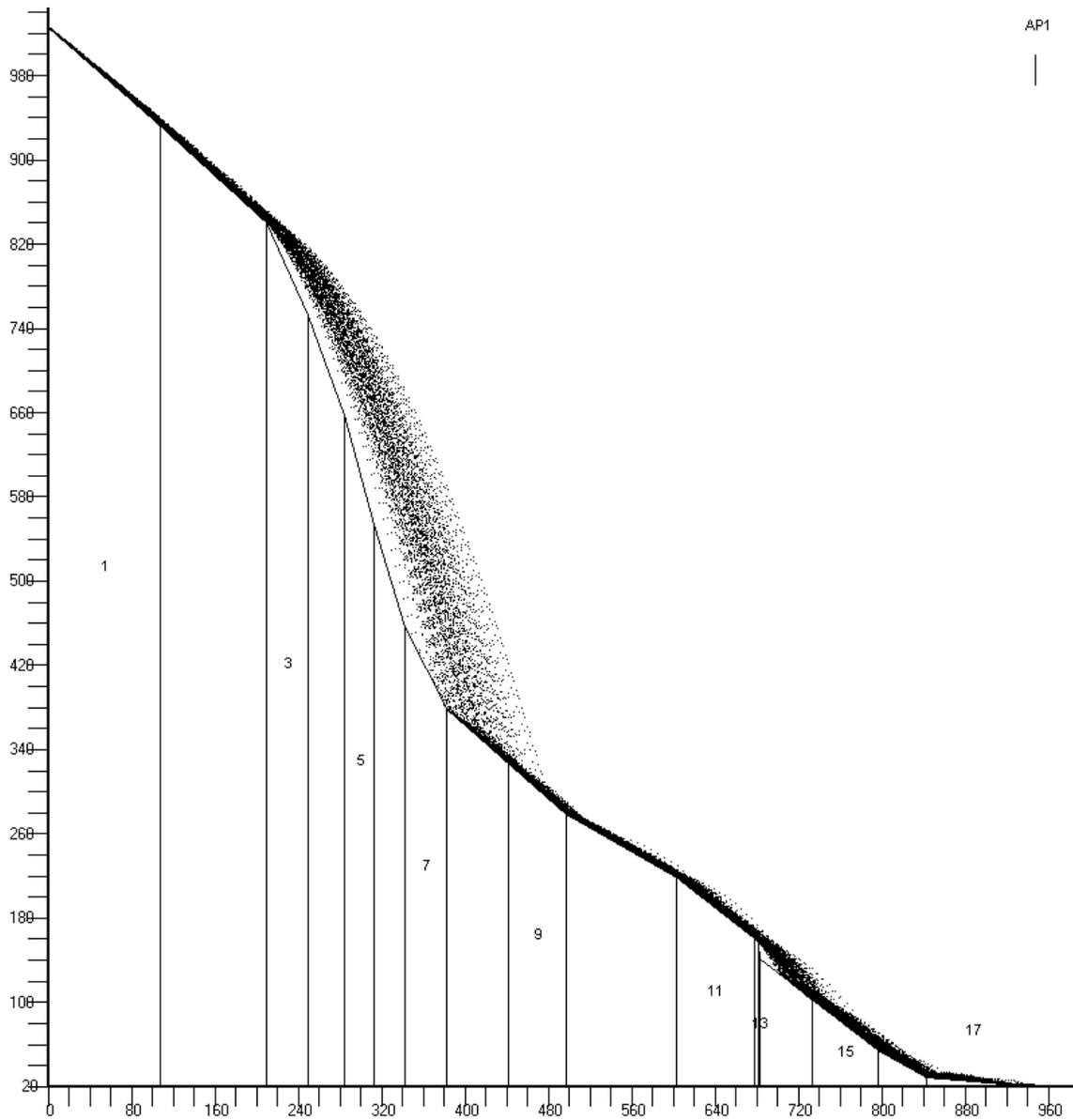


Figure 2-3: Rockfall simulation results for profile P3.

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 17) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. About 4% rockfalls reach the road, with maximum bouncing height of 1.6 feet. See Appendix A for detailed simulation information.

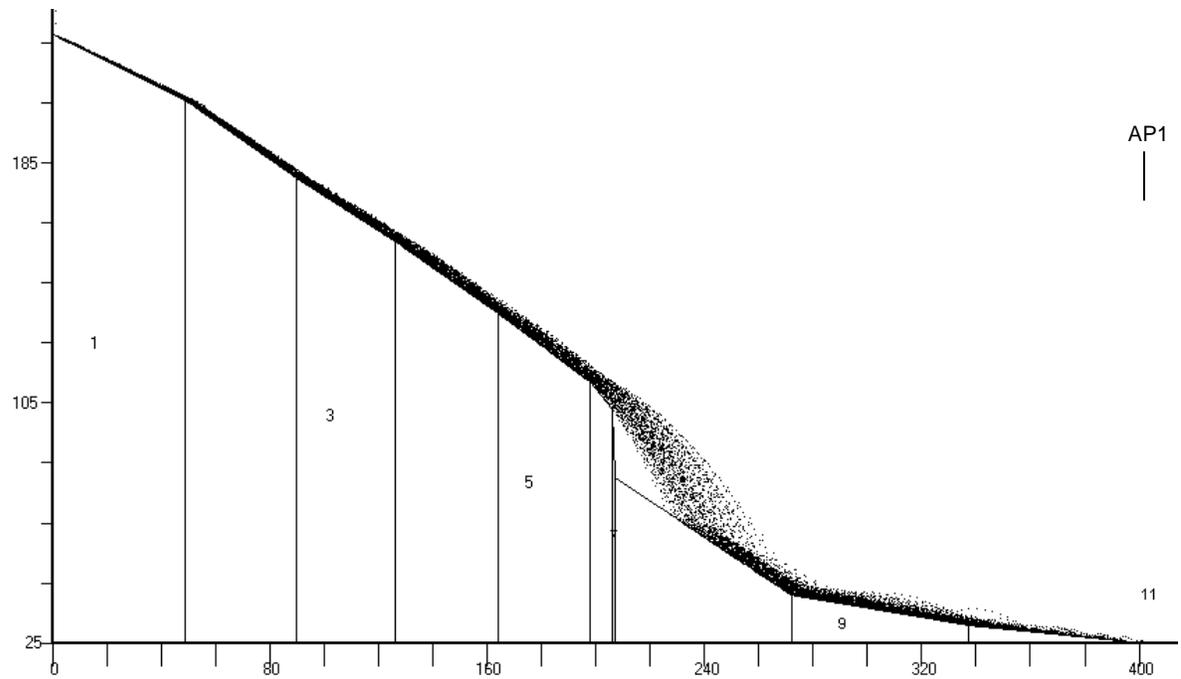


Figure 2-4: Rockfall simulation results for profile P4.

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP1 is analysis points at road position. The numbers (1, 3, 5, ..., 11) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. About 0.5% rockfalls reach the road, with maximum bouncing height of 0.0 foot. See Appendix A for detailed simulation information.

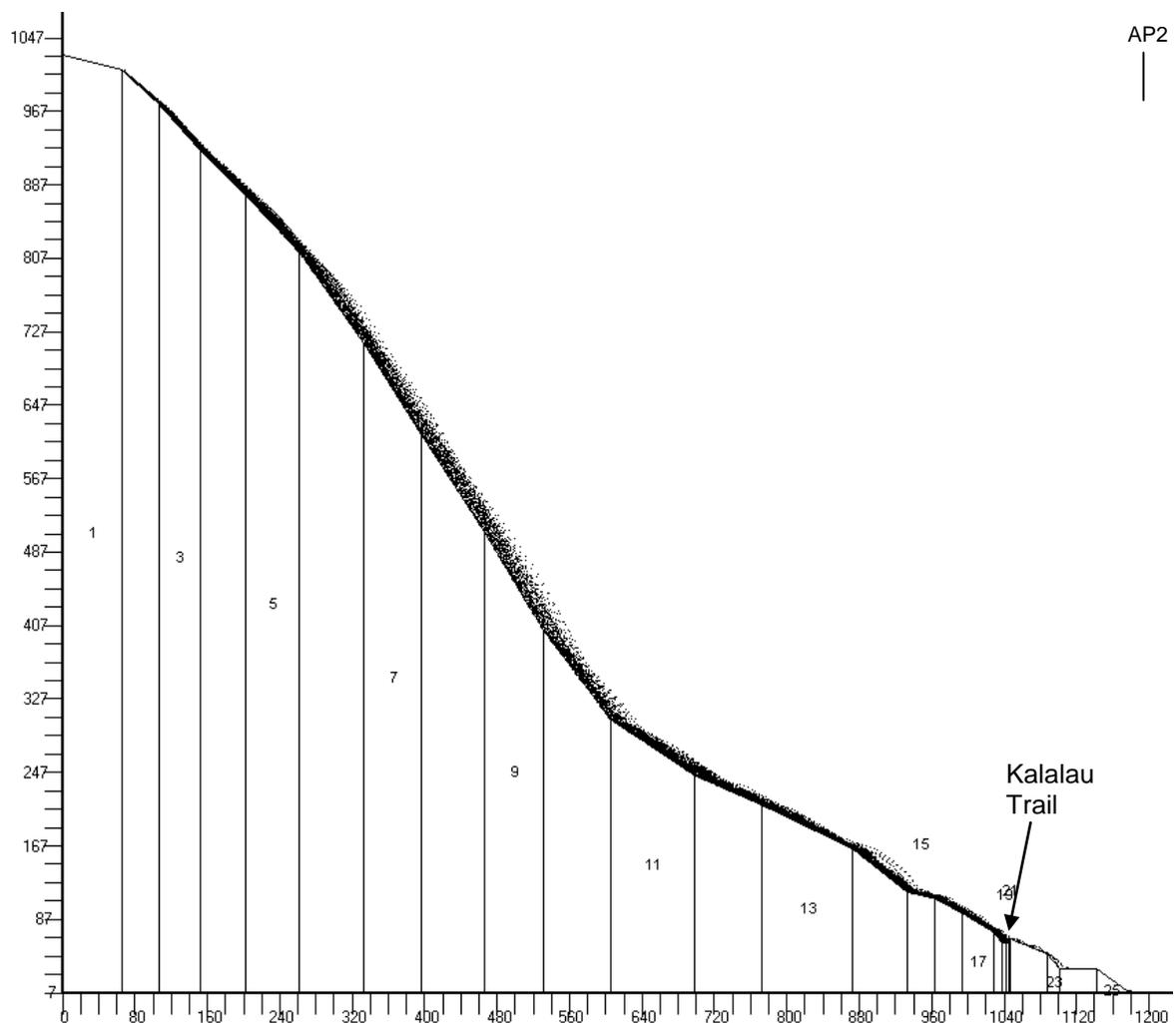


Figure 2-5: Rockfall simulation results for profile P5.

Vertical axis is elevation (foot) and horizontal axis is distance from rockfall source (foot). Each small dot represents the position of a boulder during rockfall. AP2 is analysis point at beach positions, respectively. The numbers (1, 3, 5, ..., 25) are slope section references. Upper slope profile was obtained from Google Earth Pro and lower slope profile was measured. No simulated rockfalls reach the beach position. See Appendix A for detailed simulation information.

2.6 ROCKFALL SITES AND POTENTIAL ROCKFALL HAZARDS AT HAENA PARK

Due to the time-consuming nature of rappelling and safety issues regarding high mountains and the requirement of this planning study, the high cliffs and high ridge tops were only observed from a distance where they could be viewed from nearby vantage points.

Three factors determine the hazard level of potential rockfall outcrops: how likely they are going to fall (chance of rockfall); once they fall, how likely they are going to hit the target to be protected (chance of hitting target); and how large their size or volume (rockfall size or volume) would be.

For chance of rockfall, the following four categories are considered:

- Category 1: Imminent potential for rockfall (could fall anytime). There are no visible signs of competent support and the rocks could fall any time. Observed rock characteristics include but not limited to: 1) loose boulders or completely

separated rocks lacking toe and interlocking support and sitting on planes dipping out of slope with dipping angles significantly greater than friction angles; 2) rounded loose boulders sitting on steep soil slope with little embedment and weakened soil support that is subjected to great potential for further erosion; 3) overhang with opened release joints without observed competent interlocking; 4) loose boulders or fractured rocks sitting in a position that is at or very close to toppling or losing balance; 5) failing key supporting stones.

- Category 2: Short term potential for rockfall. There are visible signs of support that will diminish relatively quickly with time (within several to a dozen years. Time scale is used symbolically and should not be understood or interpreted as actual time length) but nonetheless most likely prevents immediate rockfall at present. Loose boulders or fractured rocks have short term rockfall potential when having one or more of the following characters: 1) supported by soil or mixture with soil that is being subjected to rapid erosion; 2) supported by old, dying, or dead vegetation; 3) supported by interlocking that is unlocking due to continuously opening fractures; 4) weakening key supporting stones that show signs of stress like sliding and fracturing; 5) in the process of making small-scale adjustments through local rotating or sliding towards a position of eventual rockfall.
- Category 3: Medium term potential for rockfall. There are visible signs of stable support that prevent rockfall at present and diminish within medium length of time period (within dozens of years). The boulders or rock outcrops are currently in a stable position but are working their way to eventual rockfall due to stress, erosion, weathering, root wedging, hydraulic pressure, and other de-stabilizing forces.
- Category 4: Long term potential for rockfall. There are visible signs of solid support that will diminish within a long period of time (up to or more than a hundred years). De-stabilizing forces will take many years to develop new rockfall features.

Categories in between the above four categories are also used. For example, Category 1.5 simply indicates the chance of rockfall is between Category 1 and Category 2.

Representative rock outcrops, their sizes, locations, and categories are listed in Table 2-1 and their relative locations are plotted in Figure 1-1.

Photo 2-1 shows round boulder on steep slope at B1. Photo 2-2 shows highly fractured and weathered steep slope with many loose rocks at B3, with a recent rockfall source. Photo 2-3 shows an overhanging and standing boulder with large opened back fracture at B4. Photo 2-4 shows a completely overhanging boulder with steep back fracture dipping out of slope at B5. Photo 2-5 shows loose boulders on talus slope at B7. Photo 2-6 shows root wedging that enlarged fractures at B12. Photo 2-7 shows a recent fallen boulder at B14. Photo 2-8 shows recent fallen boulders with fresh impact marks on the trees. Photo 2-9 shows old impact marks on a tree and stopped boulders. Photo 2-10 shows a rock perched on tree branches at B17. Photo 2-11 shows a recent rockfall boulder, with fresh impact marks and tree barks on it, on steep slope with potential for further fall at B18. Photo 2-12 shows an overhanging boulder partly supported by rotten tree roots at B19. Photo 2-13 shows an overhang loose boulder on steep slope at B19. Photo 2-14 shows a loose boulder on steep slope at B20 above Kuhio Highway. Photo 2-15 shows rocks stopped by a tree just above Kuhio Highway at B21. Photo 2-16 shows recent rockfall boulders and fresh impact marks on trees at B21. Photo 2-17 shows recent rockfall boulders perched on tree roots and fresh impact marks on trees at B21. Photo 2-18 shows the source of the recent rockfall at B21. Photo 2-19 shows an overhanging fractured rock with potential for wedge failure at B21. Photo 2-20 shows fractured and overhanging rocks at B21. Photo 2-21 shows an opened columnar joint of a dike at B21. Photo 2-22 shows a major fracture separating a small ridge from the main rock slope at B21. Photo 2-23 shows overhanging and fractured rocks at B23. Photo 2-24 shows a protruding rock sitting on a steep fracture dipping out of slope at B25. Photo 2-25 shows an overhanging loose rock sitting on top of a ledge at B26. Photo 2-26 shows overhanging loose boulders on a steep talus slope just above a very popular beach area at B30. Photo 2-27. Overhanging loose boulders on a steep talus slope at B30.

Photo 2-28 shows an overhanging fractured rock on a high cliff face (photo taken from vantage point V1). Photo 2-29 shows an overhanging and fractured block on top of a high cliff face (photo taken from vantage point V2). Photo 2-30 shows a major fracture separating a large block on a high rock cliff (photo taken from vantage point V2). The block dropped a little distance as indicated by the shifts of major layers across the fracture. Photo 2-31 shows a recent rockfall source and a large overhanging rock with back fractures (photo taken from vantage point V2). Photo 2-32 shows an overhanging portion of a high cliff (photo taken from vantage point V3). Photo 2-33 shows loose boulders perched on a steep ridge (photo taken from vantage point V1). Photo 2-34 shows an overhanging large bolder on the very top of a high slope (photo taken from vantage point V5). Photo 2-35 shows the thick lava flow layer on the very top of the high slopes (photo taken from vantage point V5).

Table 2-1: Representative Identified Potential Rockfall Outcrops at Haena Park, Kauai.

Location	Category	Size	Number of rocks	Latitude (°)	Longitude (°)
B1	1.5	4 x 3 x 2.6	1	22.21842	-159.58562
B2	2.5	25 x 22 x 15	1	22.21852	-159.58552
B3	2.5	3 x 2 x 1.7	1	22.21840	-159.58553
B4	1.5	8 x 8 x 6	1	22.21845	-159.58558
B5	1	7 x 7 x 3.7	1	22.21943	-159.58398
B6	3	2 x 1 x 0.5	1	22.21970	-159.58347
B7	2.5	4.2 x 3 x 3	1	22.22028	-159.57973
B8	3	4 x 4 x 3.5	2	22.22015	-159.58233
B9	3	3.5 x 2.2 x 1.8	1	22.21998	-159.58228
B10	2.5	3 x 1.2 x 4	2	22.21955	-159.58238
B11	3	2.5 x 1.8 x 3.8	1	22.21963	-159.58252
B12	2	1.5 x 1.2 x 2	1	22.21980	-159.58258
	2.5	3.5 x 3 x 3	1		
B13	2.5	3 x 3.8 x 3	2	22.21918	-159.58270
B14	2	6 x 7 x 3.5	1	22.21923	-159.58258
B15	3	3 x 1.8 x 4	1	22.21925	-159.58195
B16	3	3.3 x 1.8 x 1.7	1	22.21942	-159.58287
B17	2	2 x 1.2 x 1.2	1	22.22030	-159.58118
B18	2	2.5 x 1.9 x 1.2	1	22.22032	-159.58107
	2	2 x 3 x 1.8	2		
	3	8 x 11 x 8	1		
B19	2.5	3 x 5 x 7	1	22.22040	-159.58118
B20	2	2 x 2 x 2	2	22.22047	-159.58090
B21	2	6 x 8 x 3	1	22.22047	-159.58058
	2.5	2 x 1.7 x 2	2		
	3	30 x 60 x 20	1		
B23	1.5	5 x 5 x 2	1	22.22067	-159.57982
B24	2	4 x 3.8 x 3.7	1	22.22060	-159.57977
B25	2	3 x 12 x 10	1	22.22050	-159.57975
B26	2	1.7 x 0.8 x 2	1	22.22002	-159.57975
B27	2.5	2.5 x 1.4 x 1.4	1	22.21942	-159.57990
B28	3	3 x 1.5 x 1	1	22.22035	-159.57825
B29	1.5	2 x 3 x 1	2	22.22027	-159.57790
B30	1	2 x 1.8 x 2	3	22.22028	-159.58343

Note: Size is length x height x depth; Latitude and Longitude are in NAD 83.

2.7 ROCKFALL RISK ESTIMATION FOR THE HAENA PARK SITE

The risk estimation of rockfalls and landslides involves the integration of their frequency and consequences. Because the United States has yet to develop a guideline for rockfall and landslide risk management, the guideline developed by the Australian Geomechanics Society (AGS) that has been used by many countries is used as a reference (AGS 2000).

For loss of life, the risk can be calculated from:

$$R_{(DI)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)}$$

Where $R_{(DI)}$ is the risk (annual probability of loss of life (death)); $P_{(H)}$ is the annual probability of the hazardous events (the landslides or rockfalls); $P_{(S:H)}$ is the probability of spatial impact by the hazard (e.g. probability of landslides impacting structures (locations) taking into account travel distance); $P_{(T:S)}$ is the temporal probability (e.g. probability of the structure being occupied); $V_{(D:T)}$ is the vulnerability (probability of loss of life of individuals given the impacts).

For existing slopes, the suggested tolerable risk for loss of life is 10^{-4} for persons most at risk and 10^{-5} for average persons; for new slopes, the suggested tolerable risk for loss of life is 10^{-5} for persons most at risk and 10^{-6} for average persons (AGS 2000).

For property, the risk can be calculated from:

$$R_{(Prop)} = P_{(H)} \times P_{(S:H)} \times V_{(Prop:S)} \times E$$

Where $R_{(Prop)}$ is the risk (annual loss of property value); $P_{(H)}$ is the annual probability of the hazardous event; $P_{(S:H)}$ is the probability of spatial impact by the hazard (i.e. of the landslide impacting the property, taking into account the travel distance) and for vehicles, for example, the temporal probability; $V_{(Prop:S)}$ is the vulnerability of the property to the spatial impact (proportion of property value lost); E is the element at risk (e.g. the value or net present value of the property).

A full risk analysis involves consideration of all landslide and rockfall hazards for the site and all the elements at risk. Unless extensive geotechnical testing and observations over a very long period are available, this risk calculation depends heavily on the estimator's experience and availability of data and is meant only as a first order approximation.

To estimate the rockfall risk or annual loss of life, we use $P_{(H)} = 0.5$ (one major rockfall every two years along the 3050 ft long rockfall section); $P_{(S:H)} = 14\% \times 15 \text{ ft.} / 3050 = 0.00069$, namely 14% rockfalls reach or pass the road (average of the five rockfall simulation profiles) and each rockfall impacts 15 ft width (car length) of the 3050 ft width; $P_{(T:S)} = 3050 \text{ ft} / 5280 \text{ ft per mile} / 15 \text{ mph} / 24 \text{ hour} \times 3859 \text{ vehicle per day} \times 2 \text{ persons each vehicle} = 12.38$, and $V_{(D:T)} = 0.3$ as vehicles are likely not to be buried by a rockfall (AGS 2000). Therefore the annual probability of loss of life at this site of the road is $0.5 \times 0.00069 \times 12.38 \times 0.3 = 1.3 \times 10^{-3}$, higher than the recommended tolerable level of 10^{-5} for general public. Rockfall mitigation is recommended for Haena Park to reduce rockfall risk to park users.



Photo 2-1. Round boulder on steep slope. At B1.



Photo 2-2. Highly fractured and weathered steep slope with many loose rocks. At B3. The foreground is a recent rockfall source.



Photo 2-3. An overhanging and standing boulder with large opened back fracture. At B4.



Photo 2-4. A completely overhanging boulder with steep back fracture dipping out of slope. At B5.



Photo 2-5. Loose boulders on talus slope. At B7.



Photo 2-6. Root wedging enlarged fractures. At B12.



Photo 2-7. A recent fallen boulder. At B14.



Photo 2-8. Recent fallen boulders. Notice the fresh impact marks on the trees.



Photo 2-9. Old impact marks on the tree and stopped boulders.



Photo 2-10. A rock perched on tree branches. At B17.



Photo 2-11. A recent rockfall boulder on steep slope with potential for further fall. Notice the fresh impact marks and tree barks on the boulder. At B18.



Photo 2-12. An overhanging boulder partly supported by rotten tree roots. At B19.



Photo 2-13. An overhang loose boulder on steep slope. At B19.



Photo 2-14. A loose boulder on steep slope. Notice Kuhio Highway down below. At B20.



Photo 2-15. Rocks stopped by a tree. Notice the traffic on Kuhio Highway below. At B21.



Photo 2-16. Recent rockfall boulders and fresh impact marks on trees (pointed by the arrows). Notice Kuhio Highway below. At B21.



Photo 2-17. Recent rockfall boulders perched on tree roots and fresh impact marks on trees (pointed by the arrows). Notice Kuhio Highway below. At B21.



Photo 2-18. The source (pointed by the arrow) of the recent rockfall. At B21.



Photo 2-19. An overhanging fractured rock (pointed by the arrow) with potential for wedge failure. Notice fractured rocks on the cliff face at left of the photo. At B21.



Photo 2-20. Fractured and overhanging rocks. At B21.

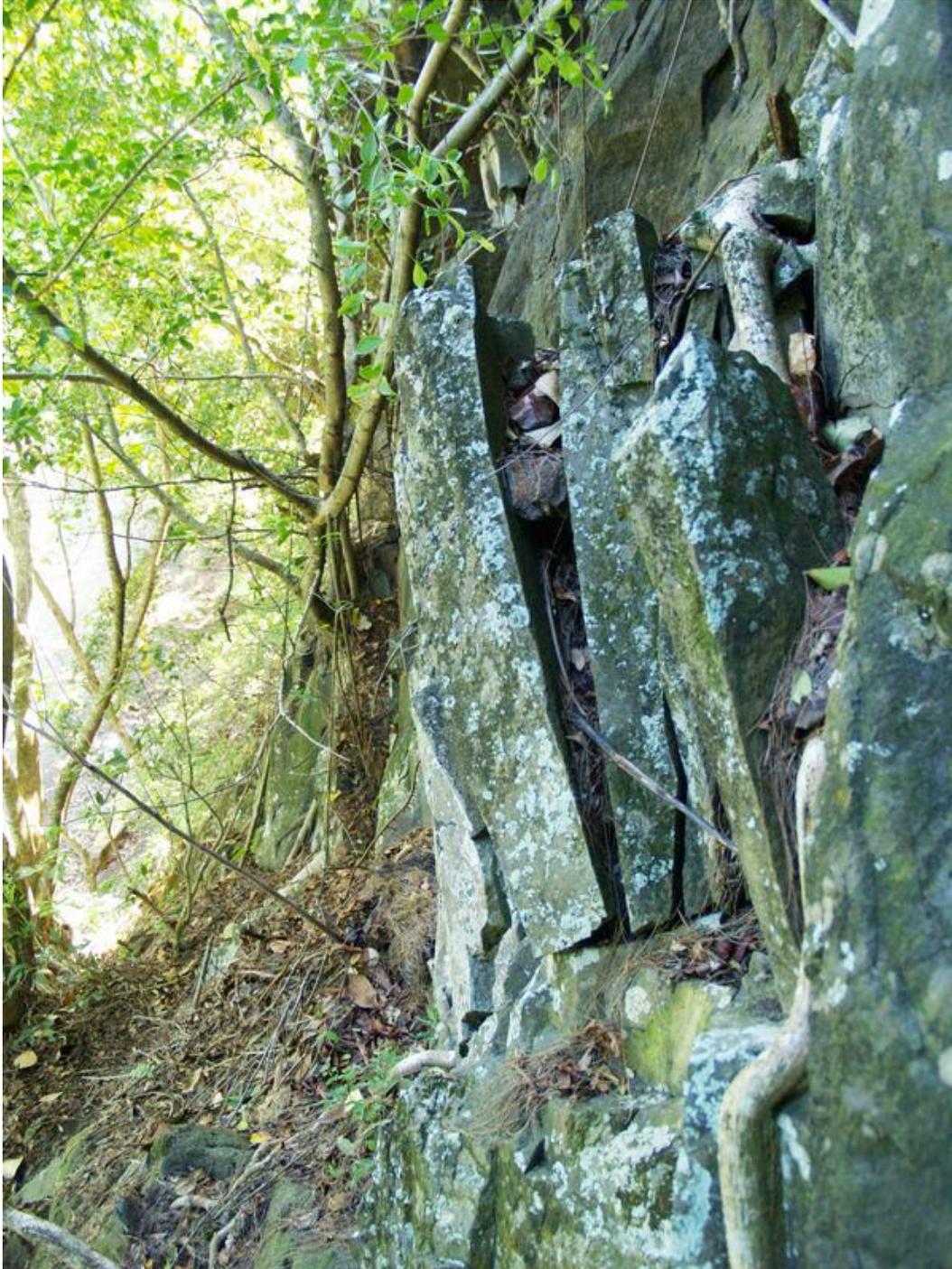


Photo 2-21. Opened columnar joint of a dike. Kuhio Highway is at the left of the photo. At B21.



Photo 2-22. A major fracture (pointed by the arrows) separates a small ridge (left of photo) from the main rock slope. At B21.



Photo 2-23. Overhanging and fractured rocks. At B23.



Photo 2-24. A protruding rock (pointed by the arrow) sitting on a steep fracture dipping out of slope. At B25.



Photo 2-25. An overhanging loose rock (pointed by the arrow) sitting on top of a ledge. At B26.



Photo 2-26. Overhanging loose boulders on a steep talus slope. The upper left corner of the photo is a very popular beach area. At B30.



Photo 2-27. Overhanging loose boulders on a steep talus slope. At B30.



Photo 2-28. An overhanging fractured rock (pointed by the arrows) on a high cliff face (photo taken from vantage point V1).



Photo 2-29. An overhanging and fractured block (indicated by the dashed lines) on top of a high cliff face (photo taken from vantage point V2).

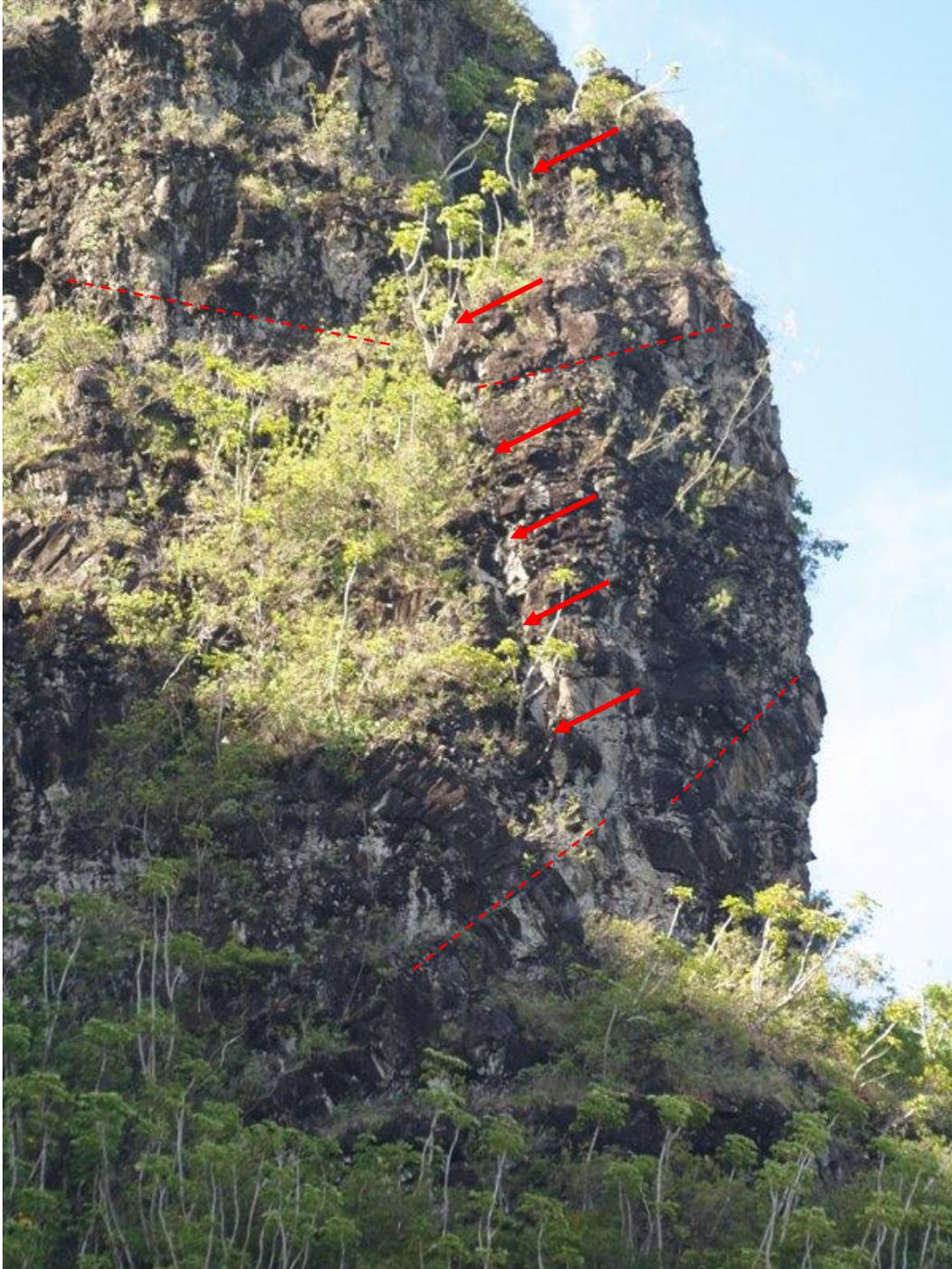


Photo 2-30. A major fracture (pointed by the arrows) separates a large block on a high rock cliff. The block dropped a little distance as indicated by the shifts of major layers across the fracture (the top dashed lines indicate a thick lava flow layer and the bottom dashed lines indicate a dike) (photo taken from vantage point V2).



Photo 2-31. A recent rockfall source (pointed by the arrows) and a large overhanging rock with back fractures (indicated by the dashed lines) (photo taken from vantage point V2).



Photo 2-32. An overhanging portion of a high cliff (photo taken from vantage point V3).



Photo 2-33. Loose boulders perched on a steep ridge (photo taken from vantage point V1).



Photo 2-34. An overhanging large boulder (pointed by the arrow) on the very top of a high slope (photo taken from vantage point V5).



Photo 2-35. The thick lava flow layer on the very top of the high slopes (photo taken from vantage point V5).

Section 3.0

Engineering Planning Study

3.0 ENGINEERING PLANNING STUDY

3.1 ROCKFALL ENGINEERING MITIGATION METHODS

This section provides typical narratives and schematic drawings for engineered rockfall mitigation solutions. These solutions are among the most widely used rockfall mitigation methods in the industry.

There are two general ways of approaching engineering mitigation solutions: permanent and temporary. Permanent mitigation solutions provide high level of protection against falling rocks for the entire site with the intent to remain effective for many years (the design life of the system used). The first six mitigation methods described below, from wire mesh drape system to retaining wall, are permanent design alternatives. Temporary design alternatives usually provide emergency or cost-effective rockfall hazard reduction, usually do not provide full hazard protection coverage of a rockfall site, and may need to be re-visited or repeated periodically as new rockfall features develop. The use of temporary methods must be based strictly on the results of a risk management process initiated by the owner of the project. Temporary methods are preferred by property owners when there is a need for emergency rockfall hazard reduction, permanent mitigation is cost prohibitive, or funding for permanent mitigation is not available. Scaling of rocks described below is a temporary rockfall mitigation method.

1. DESIGN ALTERNATIVE NO. 1- WIRE MESH DRAPE SYSTEM

Design Alternative No. 1 provides for the installation of wire mesh or ringnet drape system over entire slope that could send falling rocks to roadways or other protected structures. As shown in Figure 3-1, the draped wire mesh or ringnet should be anchored at the top of the slope and extend to the bottom. Falling debris are restrained behind the drape. Debris would be deposited into a small catchment area at the base.

This design alternative requires periodic inspection and maintenance. The mesh should be inspected for corrosion and damage from falling debris. Steel components may need to be repaired or replaced. Rockfall debris should be cleared from behind the mesh and from the catchment area.

The main benefit of this design alternative is that the mesh covering offers a high level of rockfall protection. This system can be installed in places where limited catchment area prevents the use of other systems like the rockfall impact fence and catchment ditch zone. This system is cost effective for small slopes with limited catchment area. The drawbacks of this design alternative are visual impact and the high initial construction cost.

Wire mesh drape system is not suitable for Haena Park: 1) it is cost-prohibitive at a cost of 206.5 million dollars (see Appendix B for cost estimate) and a construction time of 8 months, and 2) although vegetation would grow through mesh openings, portions of the mesh covering bare rocks may become visible creating an aesthetic drawback.

2. DESIGN ALTERNATIVE NO. 2- ANCHORED WIRE MESH SYSTEM

Design Alternative No. 2 provides for the installation of anchored wire mesh over the entire slope that could otherwise send falling rocks onto roadways or other protected structures. After cleaning, scaling and leveling, the terrain surface is covered by a high strength steel wire mesh and tensioned with pre-installed anchors typically spaced 8 to 10 feet apart throughout the coverage area, as shown in Figure 3-2. The anchors pull the mesh tightly against the slope. This system is designed to prevent rockfalls by restraining the loose material in place. If the slope has large scale landslide potential, the anchors can be designed to stabilize the slope.

This design alternative requires periodic inspection and some maintenance where required. As with all anchored wire mesh systems, the steel components must be inspected for signs of corrosion, fatigue, and damage. Parts may require repair or replacing if damaged.

The benefit of using this design alternative is that it stabilizes slope and restrains loose material in place. The wire mesh held tightly against the slope improves soil retention and vegetation growth for a natural green appearance making the wire mesh virtually invisible. The system can be integrated to accommodate trees and other existing slope features. Furthermore, this system requires no catchment zone, and therefore can be installed practically at any area where other mitigation systems are ineffective. The drawbacks of this alternative are high initial construction cost and that the area beneath the wire mesh becomes unusable.

Anchored wire mesh system is not suitable for Haena Park: 1) it is cost-prohibitive at a cost of 340.4 million dollars (see Appendix B for cost estimate) and a construction time of about 12 months, and 2) although vegetation grows through mesh openings, the mesh could become visible where covering rock outcrops. This may be unacceptable for a State park that is renowned for its natural beauty.

3. DESIGN ALTERNATIVE NO. 3- IMPACT FENCE SYSTEM

Impact fence system provides for the installation of a rockfall impact fence along the shoulder or toe of slope to intercept rolling rocks from upslope (see Figure 3-3). The fence provides blanket rockfall protection for large areas. The system can be designed to absorb various levels of energy and jumping heights produced from falling rocks for specific site conditions.

This design alternative requires periodic maintenance to repair the fence. Braking elements need to be checked and replaced, if necessary, after each major impact. Rocks embedded in the fence should be removed.

Large slopes can be mitigated with a single fence installed at the base thus making this design alternative beneficial. The main drawback is the catchment area required. Sites with launching features or little shoulder room may require widening or realignment to accommodate the fence. Additional drawbacks include periodic maintenance costs and some visual impact.

Impact fence system is suitable for most areas of Haena Park with a cost of 8.6 million dollars (see Appendix B for cost estimate) and a construction time of about 6 months. The impact fence will mostly be hidden from view by trees and other vegetation so its adverse aesthetic impact is limited.

4. DESIGN ALTERNATIVE NO. 4- COMBINATION IMPACT FENCE AND DRAPE OR ANCHORED WIRE MESH SYSTEM

This alternative is a combination of Design Alternative No. 2 and No. 3. It includes installation of a rockfall impact fence in strategic locations to intercept falling rocks and a draped or anchored wire mesh system over steep slopes that are right next to protected structures with no catchment zone in between for the installation of an impact fence (see Figure 3-4). The fence would provide blanket rockfall protection intercepting rolling rocks from upslope, and the anchored wire mesh system would inhibit rockfalls just above protected structures.

This system is most beneficial for areas with limited shoulder having high continuous natural slopes. The drawback is the higher construction cost and some visual impact.

Impact fence and anchored wire mesh system is suitable for Haena Park with a cost of 9.8 million dollars (see Appendix B for cost estimate) and construction time of about 9 months. The impact fence will mostly be hidden from view by trees and other vegetation so its adverse aesthetic impact

is limited. The anchored wire mesh system is mainly installed at the area around the Wet Cave where high steep cliffs are right next to roadway and popular visitor areas.

5. DESIGN ALTERNATIVE NO. 5- CATCHMENT DITCH

Design Alternative No. 5 provides for the construction of a catchment ditch along the shoulder, as shown by Figure 3-5. The ditch should be designed based on site conditions to provide adequate catchment zone. Roads with little shoulder width will require partial cutting of the slope or realignment of the road in order to accomplish the designed effects.

This design alternative requires low maintenance. The ditch should be cleared of rockfall debris periodically.

This design alternative is beneficial because large slopes can be mitigated with a single catchment ditch along the base. Also, the ditch improves drainage capacity. The drawback is associated with the large catchment zone area and rock excavation required. Additionally, existing utilities along the shoulder may require modification or relocation.

Catchment ditch is suitable for Haena Park with a cost of 6.8 million dollars (see Appendix B for cost estimate) and a construction time of about 8 months. An anchored wire mesh system is needed at the area around the Wet Cave where high steep cliffs are right next to roadway and popular visitor areas with no room for a catchment ditch. Impact fences may be needed in locations where a catchment ditch is not effective in intercepting falling rocks. The position and dimension of the catchment ditch should be verified by rockfall simulation at each location.

6. DESIGN ALTERNATIVE NO. 6- ROADWAY REALIGNMENT

Design alternative No. 6 provides for construction of a new realigned roadway parallel to the existing road where the existing roadway is too close to the mountain. The new roadway will be constructed on the makai side of the existing road using fill material and mechanically stabilized earth (MSE) walls as necessary. The existing road will be used as a rock catchment area. An impact protection fence will be installed in areas where the new road is still in close proximity to the rockfall path. See Figure 3-6. This design alternative requires some ground excavation and backfilling. With the roadway pushed away from the mountain side, the access to the caves could easily become limited for public safety and hazard control.

The construction cost to realign the roadway and installation of the necessary safety features is estimated at \$15.5 M (see Appendix B for cost estimate) with a construction time of about 12 months.

The benefits of this design alternative include low maintenance, longevity, and simplicity and effectiveness of design. The drawback is increased construction costs. This design alternative is very suitable for Haena Park.

7. DESIGN ALTERNATIVE NO. 7- ROCK SCALING (TEMPORARY FIX)

During scaling, rock outcrops that are ready to fall are removed from the slope by using hands, prying bars, and hydraulic jacks or airbags for large rocks. Scaling is most cost-effective when there are no structures to be protected at the base of the slope where the scaled rocks are allowed to run down the slope freely. The only significant structure at Haena Park is the paved road surface which, if damaged during scaling, can be easily repaired by patching the impact holes made by scaled rocks. Alternatively, metal plates or other road covers can be used to reduce damage to the paved road at additional cost.

After a thorough scaling, the rockfall hazard is generally maintained at a low level for quite a few years because the geological processes associated with natural production of rockfalls are generally slow requiring many years to generate a rock outcrop that is ready to fall. Exceptions, however, exist. For example, if a new water channel develops on a steep soft soil slope with embedded boulders, new rockfall hazards will be created after almost every surface runoff. The slopes at Haena Park consist of nearly horizontal lava flow layers with limited weathering and talus slopes with limited fine or soil material. The geological processes associated with natural production of rockfalls at Haena Park are reasonably slow.

The steep slopes around the Wet Cave are the most hazardous at Haena Park and should be scaled first. Profile P2, which is close to the Wet Cave, has the highest percentage (63%) of the potential rockfalls anticipated to reach the roadway should be scaled immediately following the Wet Cave. The other four simulated profiles have low percentage (less than 5%) of rockfalls reaching roadway or beach and should be scaled if additional funding is available. The cost of scaling is \$750,000 for two crews of three scalors each crew to work for 75 days (daily cost \$10,000) to scale the Wet Cave area and above, including profile P2, and the identified boulder sites (B1 to B30). Scaling of large rocks in other areas that have a reasonable chance of reaching roadway or beach or other structures is recommended if additional funding is available, with an estimated additional cost at 1.5 million dollars.

During rock scaling operation, it is highly recommended that the contractors' scope of work is directed and validated on site by geologists or engineers experienced in rock scaling.

7. OTHER MITIGATION METHODS

There are many other rockfall mitigation methods. Rock demolition, bolting, cable lashing, pedestal support, and local netting can be used independently or in combination with other mitigation methods. High-cost methods like constructing concrete canopy, or elevated roadways above rock fallout zones can also be used if specific conditions that warrant the high costs.

3.2 RECOMMENDED ROCKFALL MITIGATION DESIGN AT HAENA PARK

Mitigation design alternatives are based on factors such as public safety, construction cost, and sound engineering principles. The recommendations were provided to develop preliminary construction cost data used to establish project development and funding. The final remedial design may vary from the preliminary design based on other factors including detailed rockfall protection characteristics, land acquisitions, community needs, environmental issues, aesthetics, and local politics.

For permanent rockfall mitigation design, the combination of impact fence and anchored wire mesh system is recommended due to its easiness of construction, least disturbance to environment, and relatively low cost, with a cost of 9.8 million dollars and a construction period of eight months.

For temporary rockfall mitigation design, scaling is recommended due to its ease of construction, least disturbance to environment, and cost effectiveness in rockfall hazard reduction, with a cost of \$750,000 and a construction period of four months to scale the high hazard areas around the Wet Cave and profile P2 and the identified boulder sites. It should be noted that rock scaling is a temporary solution and should only be used to reduce rockfall potentials. For Rockfall preventions, any of the permanent mitigation methods should be considered. An additional 1.5 million dollars and a construction period of six months are needed to scale other areas. Only rocks that are likely to reach the roadway or other protected structures will be scaled.

3.3 SIMILAR ROCKFALL PROJECTS AND EXPERIENCED CONTRACTORS

A rockfall protection fence and roadway realignment method was used at Waimea Bay in June 2000 to protect Kamehameha Highway from potential rockfalls and at the Old Puunui Quarry site to protect residents from the upslope boulders. The special rockfall protection fence was designed and manufactured by GeoBrugg. Rockfall catchment ditch, rock demolition, bolting, and cable netting have been performed in various locations on Oahu including at Waimea Bay, at Makapuu during a major scaling and netting of the mountain slopes, and at Lalea of Hawaii Kai. The recently completed Kailua Road project used a combination of rockfall impact fence, both draped and anchored mesh systems, rockfall catchment ditch, rock scaling, rock bolting, local netting, and cable lashing. The latest major scaling operation performed in Hawaii was the scaling of 130 bunkers at Waikele. Tens of thousands of boulders, some of them over ten tons, were scaled from the slopes above the bunkers. A large number of boulders were scaled easily by hand, reflecting their high rockfall potential.

The following general contractors are among those who have been involved with rock scaling/demolition/bolting and/or rockfall fence/net/ditch installation in Hawaii:

- Prometheus Construction
- High Tech Rockfall Construction
- Janod Contractors
- Royal Contracting Co. Ltd.
- Kiewit Pacific Co.
- Good Fellow Brothers, Inc.

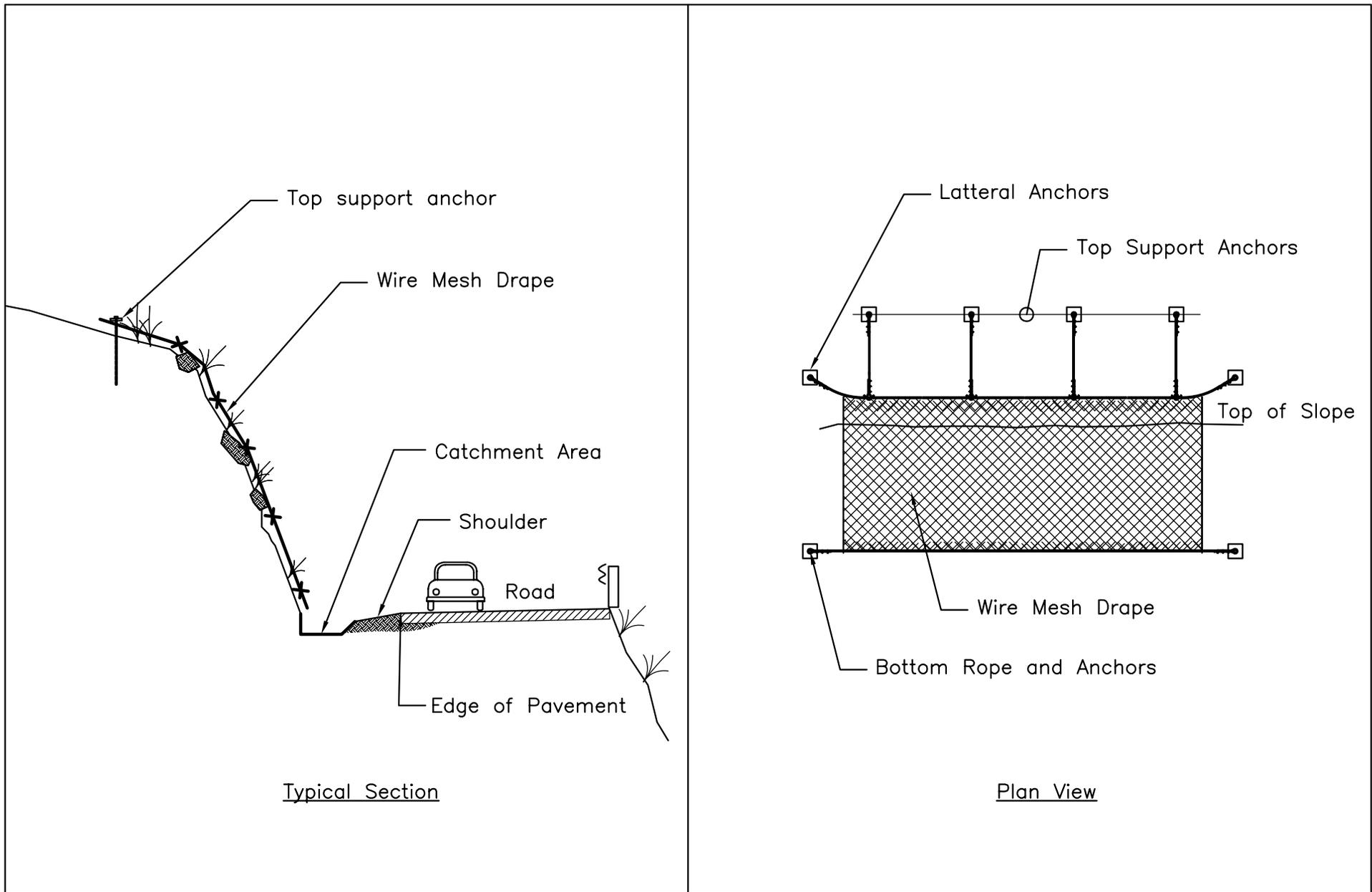


Figure 3-1
Design Alternative No. 1
Wire Mesh Drape System

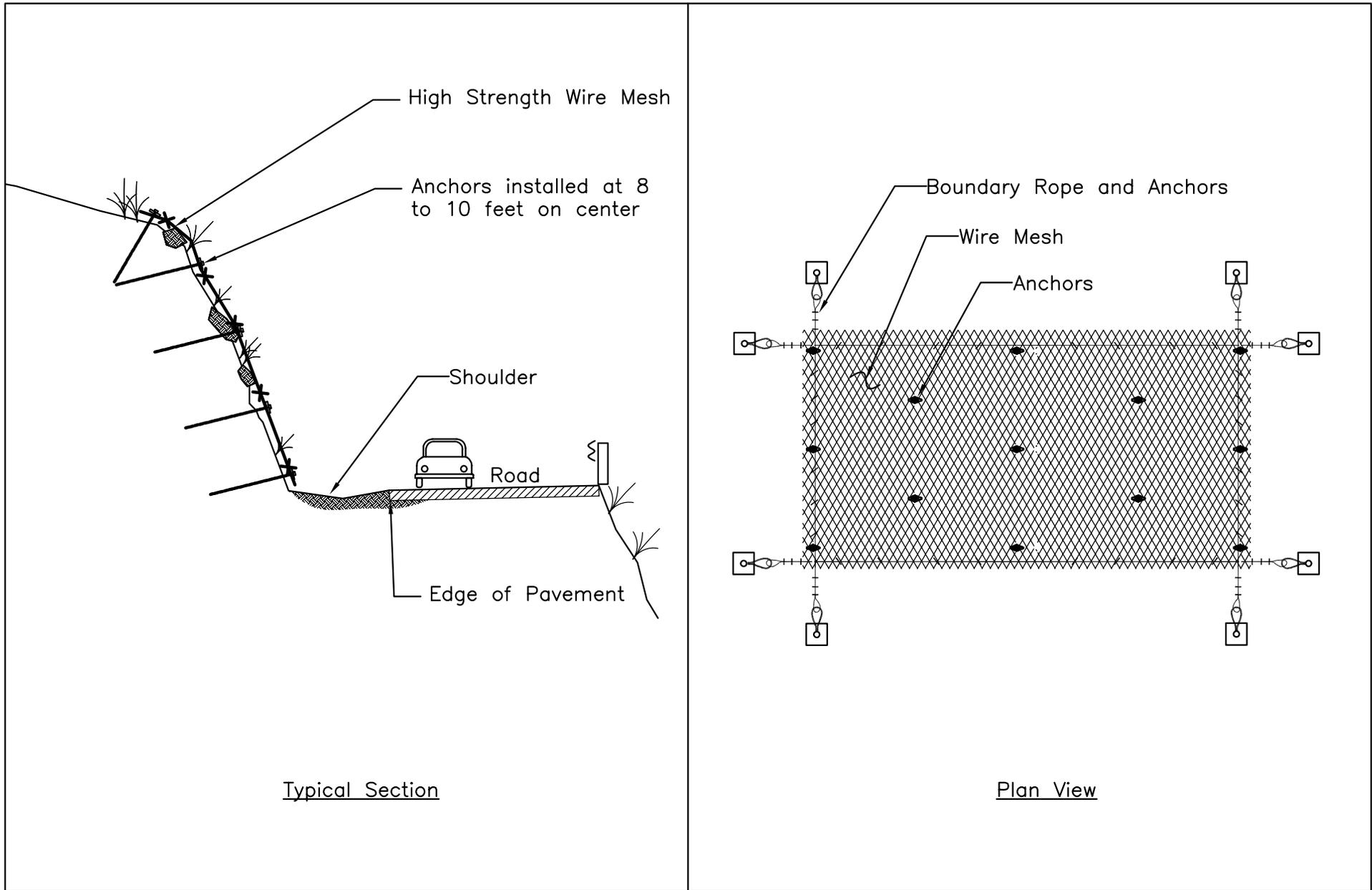


Figure 3-2
Design Alternative No. 2
Anchored Wire Mesh

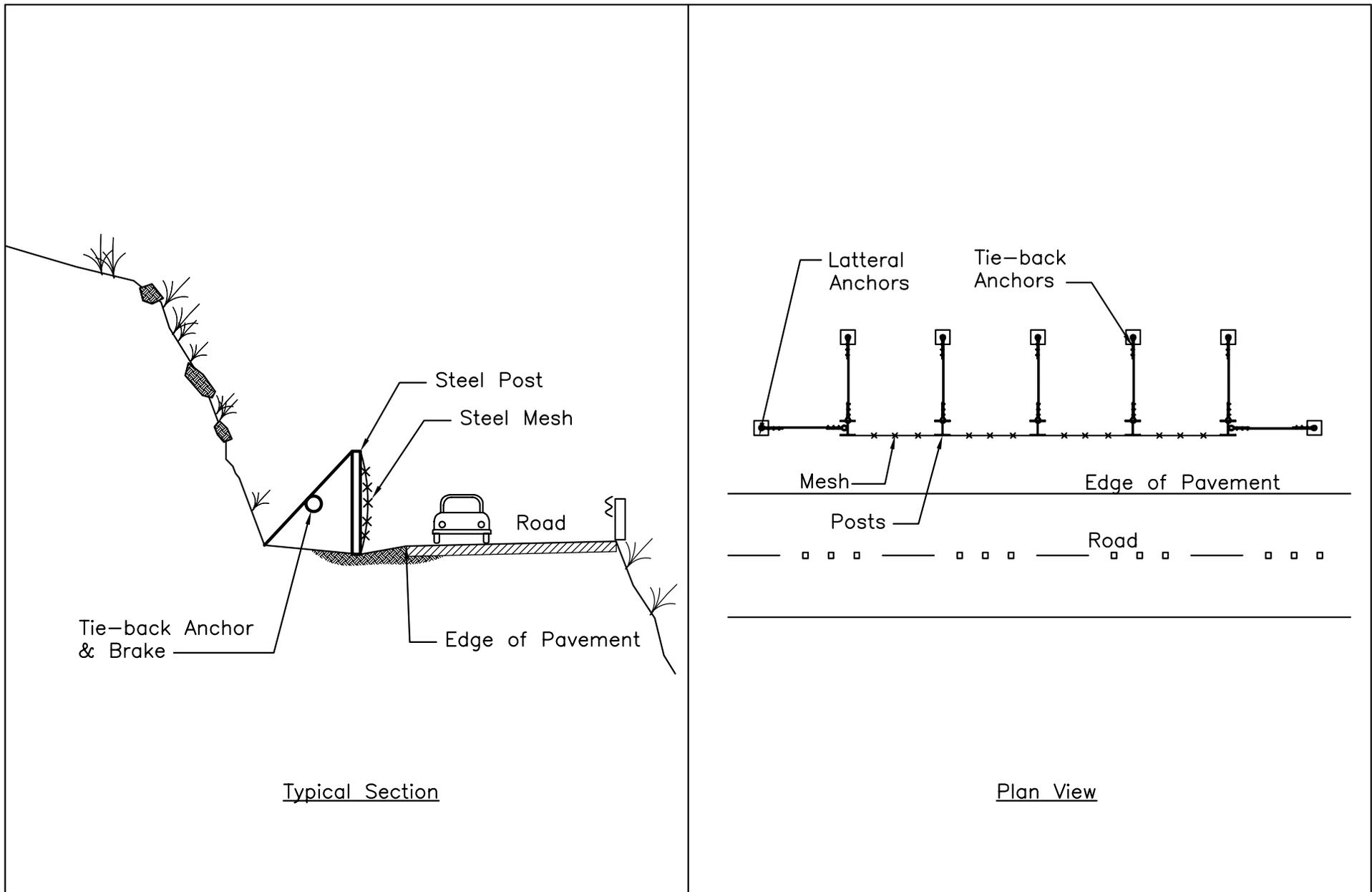


Figure 3-3
Design Alternative No. 3
Impact Fence System

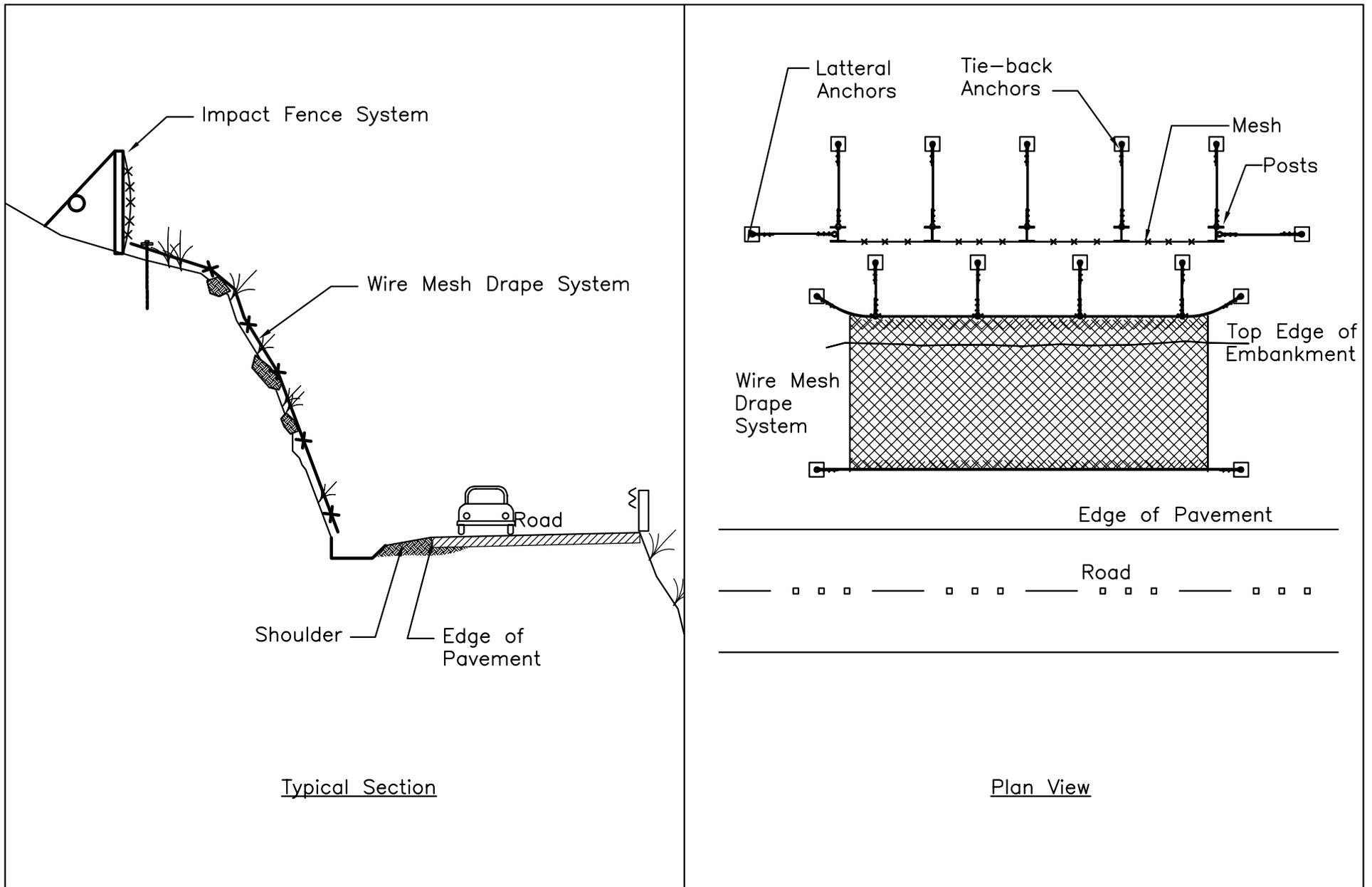


Figure 3-4
Design Alternative No. 4
Combination Impact Fence & Wire Mesh Drape

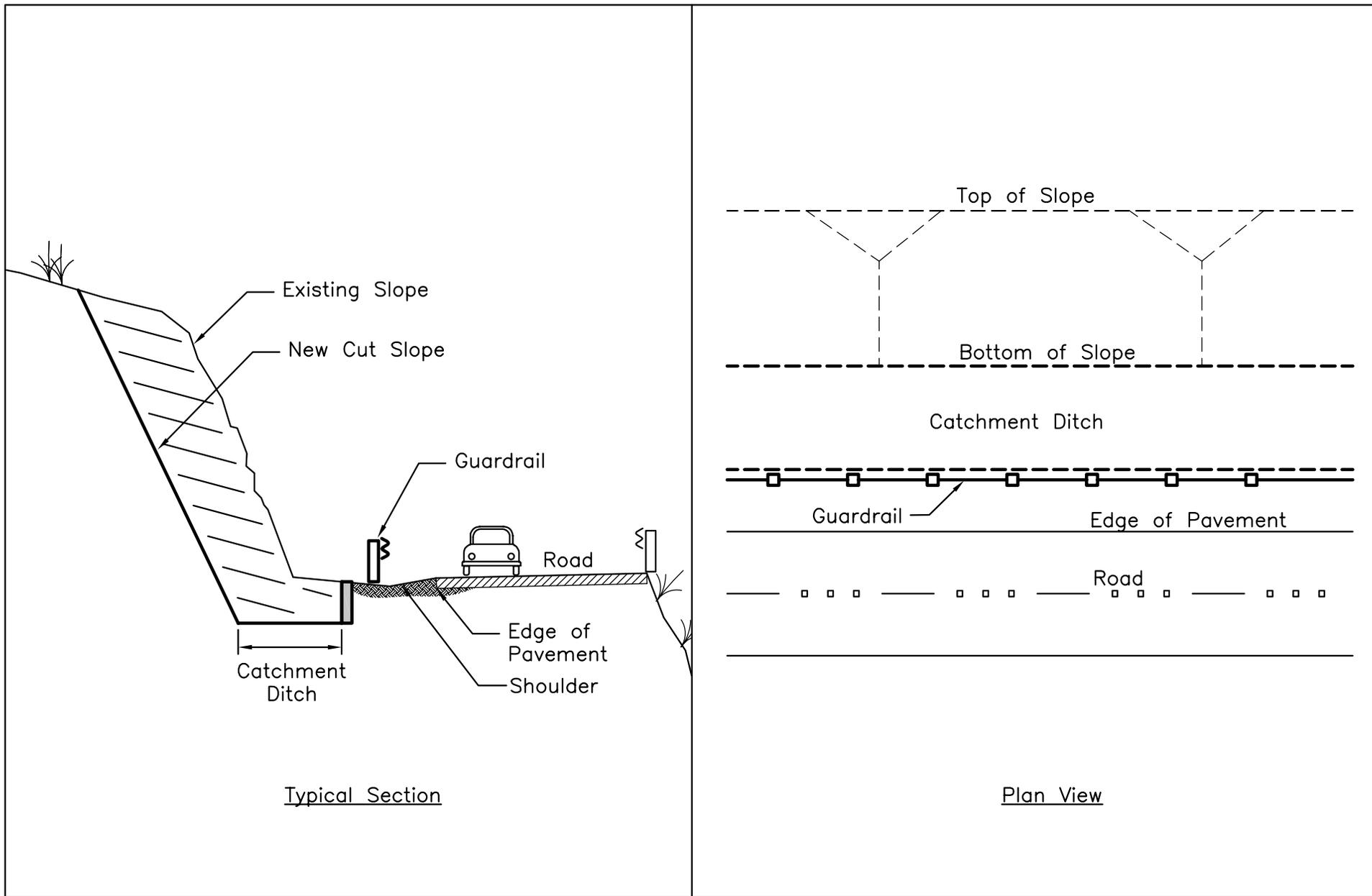


Figure 3-5
Design Alternative No. 5
Catchment Ditch

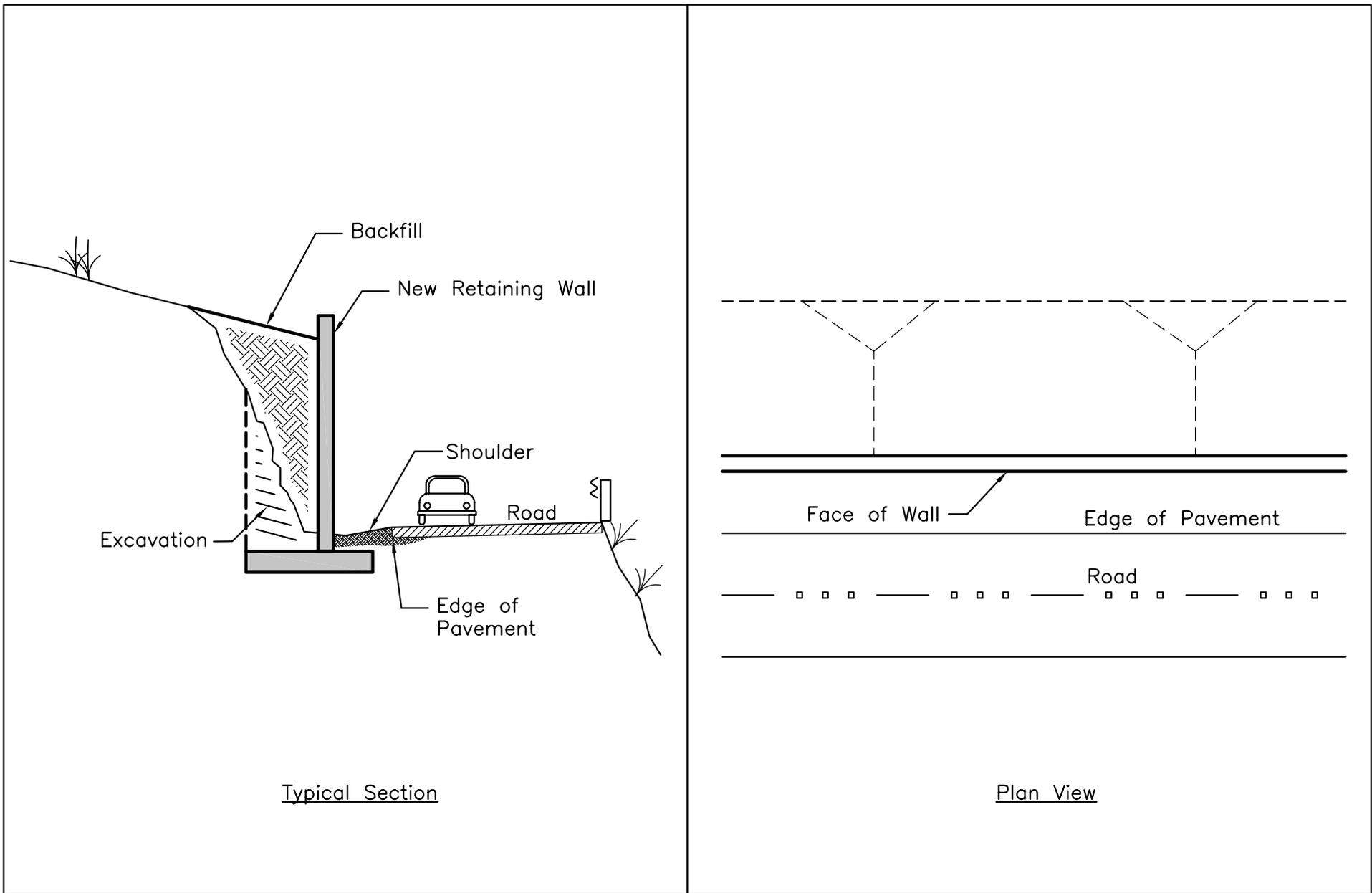


Figure 3-6
Design Alternative No. 6
Retaining Wall

4.0 REFERENCES

- Australian Geomechanics Society. 2000. *Landslide Risk Management Concepts and Guidelines*. Sub-committee on Landslide Risk Management. March.
- C. O. Brawner Engineering Ltd (Brawner). 1994. *Rockfall Hazard Mitigation Methods: Participant Workbook*. NIH Course #13219. Publication No. FHWA SA-93-085. Prepared for the U.S. Department of Transportation, Federal Highway Administration: National Highway Institute. March.
- Jones, C. L., J. D. Higgins, and R. D. Andrew. 2000. *Colorado Rockfall Simulation Program (version 4.0 for Windows)*. Colorado Department of Transportation.
- MacDonald, G. A., A. T. Abbott, and F. L. Peterson. 1983. *Volcanoes in the Sea, The Geology of Hawaii*. 2nd ed. Honolulu: Univ. of Hawaii Press.
- Pierson, L. A. and R. van Vickle. 1993. *Rockfall Hazard Rating System – Participants' Manual*. Prepared for the U.S. Department of Transportation, Federal Highway Administration: National Highway Institute. Publication No. FHWA SA-93-057. November.
- Stearns, H. T. 1985. *Geology of the State of Hawaii*. 2nd ed. Palo Alto, CA: Pacific Books.

Appendix A
Rockfall Simulation Data

Rockfall simulation input and output data for profile P1

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

Input File Specifications

Units of Measure: U.S.
 Total Number of Cells: 23
 Analysis Point 1 X-Coordinate: 433
 Analysis Point 2 X-Coordinate:
 Analysis Point 3 X-Coordinate:
 Initial Y-Top Starting Zone Coordinate: 575
 Initial Y-Base Starting Zone Coordinate: 575

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	616	15	618
2	.8	.8	.2	15	618	31	616
3	.8	.8	.2	31	616	48	609
4	.8	.8	.2	48	609	73	601
5	.8	.8	.2	73	601	85	598
6	.8	.8	.2	85	598	100	588
7	.8	.8	.2	100	588	113	579
8	.8	.8	.2	113	579	127	566
9	.8	.8	.2	127	566	141	553
10	.8	.8	.2	141	553	154	537
11	.8	.8	.2	154	537	169	517
12	.8	.8	.2	169	517	182	495
13	.8	.8	.2	182	495	200	472
14	.8	.8	.2	200	472	215	448
15	.8	.8	.2	215	448	227	431
16	.8	.8	.2	227	431	257	326
17	.8	.8	.2	257	326	278	251
18	1.5	.8	.2	278	251	279	50
19	1.5	.8	.2	279	50	299	55
20	1.5	.8	.2	299	55	329	46
21	1.5	.8	.2	329	46	381	30
22	1.5	.8	.2	381	30	433	25
23	1.5	.8	.2	433	25	434	25

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

Total Number of Rocks Simulated: 200
 Starting Velocity in X-Direction: 1 ft/sec
 Starting Velocity in Y-Direction: -1 ft/sec
 Starting Cell Number: 1

Ending Cell Number: 23
 Rock Density: 145 lb/ft³
 Rock Shape: Spherical
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

Analysis Point 1: X = 433, Y = 25

Total Rocks Passing Analysis Point: 7

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	11.79	16246	0.27
75%	14.67	25104	1.26
90%	17.27	33072	2.14
95%	18.83	37855	2.67
98%	20.57	43223	3.26

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 21.12	Maximum: .41	Maximum: 45403
Average: 11.79	Average: .29	Average: 16246
Minimum: 8.48	G. Mean: .27	Std. Dev.: 13119
Std. Dev.: 4.27	Std. Dev.: 1.45	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

Velocity Units: ft/sec Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	No rocks	past end of cell			
3	No rocks	past end of cell			
4	No rocks	past end of cell			
5	No rocks	past end of cell			
6	No rocks	past end of cell			
7	No rocks	past end of cell			
8	22	18	1.42	1	0
9	32	27	2.01	3	0
10	43	37	3.44	6	2

11	55	44	4.1	8	3
12	63	54	5.08	14	6
13	73	54	7.3	11	3
14	80	62	7.13	17	7
15	81	65	7.35	19	7
16	107	87	9.6	81	59
17	126	104	10.93	126	84
18	127	105	10.99	325	282
19	145	121	12.19	286	219
20	173	146	13.94	229	124
21	173	55	64.11	94	11
22	21	12	4.27	0	0
23	16	10	3.59	1	0

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G185 m.bmp

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	5

340 To 350 ft	11
350 To 360 ft	14
360 To 370 ft	16
370 To 380 ft	12
380 To 390 ft	37
390 To 400 ft	38
400 To 410 ft	29
410 To 420 ft	20
420 To 430 ft	11
430 To 434 ft	0

Rockfall simulation input and output data for profile P2

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

Input File Specifications

Units of Measure: U.S.
 Total Number of Cells: 18
 Analysis Point 1 X-Coordinate: 874
 Analysis Point 2 X-Coordinate:
 Analysis Point 3 X-Coordinate:
 Initial Y-Top Starting Zone Coordinate: 1055
 Initial Y-Base Starting Zone Coordinate: 1055

Remarks:

Cell Data

Cell No.	S.R.	Tang.	C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	1055	74	957	
2	.8	.8	.2	74	957	144	848	
3	.8	.8	.2	144	848	209	702	
4	.8	.8	.2	209	702	253	590	
5	.8	.8	.2	253	590	322	466	
6	.8	.8	.2	322	466	406	373	
7	.8	.8	.2	406	373	462	308	
8	.8	.8	.2	462	308	532	239	
9	.8	.8	.2	532	239	593	177	
10	.8	.8	.2	593	177	640	132	
11	.8	.8	.2	640	132	669	111	
12	1.5	.8	.2	669	111	734	71	
13	1.5	.8	.2	734	71	773	59	
14	1.5	.8	.2	773	59	790	45	
15	1.5	.8	.2	790	45	821	43	
16	1.5	.8	.2	821	43	851	31	
17	1.5	.8	.2	851	31	870	20	
18	1.5	.8	.2	870	20	874	20	

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

Total Number of Rocks Simulated: 200
 Starting Velocity in X-Direction: 1 ft/sec
 Starting Velocity in Y-Direction: -1 ft/sec
 Starting Cell Number: 1
 Ending Cell Number: 18
 Rock Density: 145 lb/ft³
 Rock Shape: Spherical
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

Analysis Point 1: X = 874, Y = 20

Total Rocks Passing Analysis Point: 127

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	18.55	51397	0.33
75%	27.36	101360	4.93
90%	35.28	146299	9.08
95%	40.04	173278	11.56
98%	45.38	203558	14.35

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 67.31	Maximum: 8.91	Maximum: 450329
Average: 18.55	Average: .9	Average: 51397
Minimum: 2.87	G. Mean: .33	Std. Dev.: 73997
Std. Dev.: 13.05	Std. Dev.: 6.82	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

Velocity Units: ft/sec Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	68	55	5.4	12	4
2	102	77	11.34	25	9
3	135	107	17.08	75	27
4	155	121	20.59	113	33
5	167	103	23.54	80	15
6	133	81	14.94	22	7
7	123	87	14.21	32	8
8	128	79	13.68	22	6
9	113	83	13.96	23	6
10	118	79	12.81	22	6
11	117	71	13.02	18	3
12	92	59	11.53	17	6
13	73	40	11.33	10	2
14	76	46	10.7	17	7
15	62	23	12.17	4	1

16	63	23	12.29	7	1
17	66	27	11.47	11	1
18	67	19	13.05	9	0

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G187.bmp

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 350 ft	0
350 To 360 ft	0
360 To 370 ft	0
370 To 380 ft	0
380 To 390 ft	0
390 To 400 ft	0
400 To 410 ft	0
410 To 420 ft	0
420 To 430 ft	0
430 To 440 ft	0

440 To 450 ft	0
450 To 460 ft	0
460 To 470 ft	0
470 To 480 ft	0
480 To 490 ft	0
490 To 500 ft	0
500 To 510 ft	0
510 To 520 ft	0
520 To 530 ft	0
530 To 540 ft	0
540 To 550 ft	0
550 To 560 ft	0
560 To 570 ft	0
570 To 580 ft	0
580 To 590 ft	0
590 To 600 ft	0
600 To 610 ft	0
610 To 620 ft	0
620 To 630 ft	0
630 To 640 ft	0
640 To 650 ft	0
650 To 660 ft	0
660 To 670 ft	0
670 To 680 ft	0
680 To 690 ft	0
690 To 700 ft	0
700 To 710 ft	0
710 To 720 ft	0
720 To 730 ft	0
730 To 740 ft	0
740 To 750 ft	0
750 To 760 ft	0
760 To 770 ft	0
770 To 780 ft	0
780 To 790 ft	0
790 To 800 ft	2
800 To 810 ft	22
810 To 820 ft	28
820 To 830 ft	5
830 To 840 ft	5
840 To 850 ft	2
850 To 860 ft	0
860 To 870 ft	0
870 To 874 ft	9

Rockfall simulation input and output data for profile P3

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

Input File Specifications

Units of Measure: U.S.
 Total Number of Cells: 18
 Analysis Point 1 X-Coordinate: 948
 Analysis Point 2 X-Coordinate:
 Analysis Point 3 X-Coordinate:
 Initial Y-Top Starting Zone Coordinate: 1026
 Initial Y-Base Starting Zone Coordinate: 1026

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	1026	107	933
2	.8	.8	.2	107	933	209	841
3	.8	.8	.2	209	841	249	752
4	.8	.8	.2	249	752	284	657
5	.8	.8	.2	284	657	313	554
6	.8	.8	.2	313	554	342	457
7	.8	.8	.2	342	457	382	379
8	.8	.8	.2	382	379	442	327
9	.8	.8	.2	442	327	497	279
10	.8	.8	.2	497	279	603	219
11	.8	.8	.2	603	219	678	161
12	.8	.8	.2	678	161	682	157
13	1.5	.8	.2	682	157	683	142
14	1.5	.8	.2	683	142	733	103
15	1.5	.8	.2	733	103	797	55
16	1.5	.8	.2	797	55	843	29
17	1.5	.8	.2	843	29	933	21
18	1.5	.8	.2	933	21	948	20

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

Total Number of Rocks Simulated: 200
 Starting Velocity in X-Direction: 1 ft/sec
 Starting Velocity in Y-Direction: -1 ft/sec
 Starting Cell Number: 1
 Ending Cell Number: 18
 Rock Density: 145 lb/ft³
 Rock Shape: Spherical
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

Analysis Point 1: X = 948, Y = 20

Total Rocks Passing Analysis Point: 8

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	18.14	37200	0.31
75%	21.32	49063	7.55
90%	24.19	59732	14.06
95%	25.9	66137	17.97
98%	27.83	73326	22.36

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 25.35	Maximum: 1.63	Maximum: 66587
Average: 18.14	Average: .69	Average: 37200
Minimum: 10.45	G. Mean: .31	Std. Dev.: 17568
Std. Dev.: 4.71	Std. Dev.: 10.72	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

Velocity Units: ft/sec Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	60	49	4.59	8	2
2	78	62	6.9	12	4
3	102	83	8.36	65	46
4	125	104	9.32	121	80
5	144	122	10.12	181	118
6	167	141	10.97	224	138
7	190	161	22.91	213	90
8	194	71	49.02	95	8
9	85	57	7.71	12	3
10	78	53	7	11	2
11	82	61	7.98	16	3
12	84	62	8	15	4
13	84	62	8.04	29	18
14	98	64	18.09	29	6
15	99	52	11.49	16	5

16	71	44	10.15	13	3
17	30	17	8.13	2	0
18	25	18	4.71	2	0

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G190.dat

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 350 ft	0
350 To 360 ft	0
360 To 370 ft	0
370 To 380 ft	0
380 To 390 ft	0
390 To 400 ft	0
400 To 410 ft	0
410 To 420 ft	0
420 To 430 ft	0
430 To 440 ft	0

440 To 450 ft	0
450 To 460 ft	0
460 To 470 ft	0
470 To 480 ft	0
480 To 490 ft	0
490 To 500 ft	0
500 To 510 ft	0
510 To 520 ft	0
520 To 530 ft	0
530 To 540 ft	0
540 To 550 ft	0
550 To 560 ft	0
560 To 570 ft	0
570 To 580 ft	0
580 To 590 ft	0
590 To 600 ft	0
600 To 610 ft	0
610 To 620 ft	0
620 To 630 ft	0
630 To 640 ft	0
640 To 650 ft	0
650 To 660 ft	0
660 To 670 ft	0
670 To 680 ft	0
680 To 690 ft	0
690 To 700 ft	0
700 To 710 ft	0
710 To 720 ft	0
720 To 730 ft	0
730 To 740 ft	0
740 To 750 ft	0
750 To 760 ft	0
760 To 770 ft	0
770 To 780 ft	0
780 To 790 ft	0
790 To 800 ft	0
800 To 810 ft	0
810 To 820 ft	0
820 To 830 ft	0
830 To 840 ft	0
840 To 850 ft	0
850 To 860 ft	3
860 To 870 ft	14
870 To 880 ft	31
880 To 890 ft	28
890 To 900 ft	25
900 To 910 ft	31
910 To 920 ft	31
920 To 930 ft	17
930 To 940 ft	8
940 To 948 ft	4

Rockfall simulation input and output data for profile P4

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

Input File Specifications

Units of Measure: U.S.
 Total Number of Cells: 11
 Analysis Point 1 X-Coordinate: 403
 Analysis Point 2 X-Coordinate:
 Analysis Point 3 X-Coordinate:
 Initial Y-Top Starting Zone Coordinate: 258
 Initial Y-Base Starting Zone Coordinate: 258

Remarks:

Cell Data

Cell No.	S.R.	Tang.	C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	228	49	206	
2	.8	.8	.2	49	206	90	180	
3	.8	.8	.2	90	180	126	159	
4	.8	.8	.2	126	159	164	135	
5	.8	.8	.2	164	135	198	112	
6	.8	.8	.2	198	112	206	103	
7	1.5	.8	.2	206	103	207	80	
8	1.5	.8	.2	207	80	272	41	
9	1.5	.8	.2	272	41	337	31	
10	1.5	.8	.2	337	31	403	25	
11	.8	.8	.2	403	25	404	25	

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

Total Number of Rocks Simulated: 200
 Starting Velocity in X-Direction: 1 ft/sec
 Starting Velocity in Y-Direction: -1 ft/sec
 Starting Cell Number: 1
 Ending Cell Number: 11
 Rock Density: 145 lb/ft³
 Rock Shape: Spherical
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

Analysis Point 1: X = 403, Y = 25

Total Rocks Passing Analysis Point: 1

Cumulative Probability	Velocity (ft/sec)	Energy (ft-lb)	Bounce Ht. (ft)
50%	6.63	4516	0.02
75%	6.63	4516	0.69
90%	6.63	4516	1.3
95%	6.63	4516	1.66
98%	6.63	4516	2.07

Velocity (ft/sec)	Bounce Height (ft)	Kinetic Energy (ft-lb)
Maximum: 6.63	Maximum: .02	Maximum: 4516
Average: 6.63	Average: .02	Average: 4516
Minimum: 6.63	G. Mean: .02	Std. Dev.: 0
Std. Dev.: 0	Std. Dev.: 1	

Remarks:

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

Velocity Units: ft/sec Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	26	21	2.04	1	0
2	39	32	2.77	3	1
3	44	36	3.44	4	1
4	52	42	4.09	5	1
5	59	46	4.73	6	2
6	63	50	5.26	10	4
7	64	50	5.33	32	27
8	80	38	9.18	9	2
9	33	17	7.16	5	0
10	7	7	0	0	0
11	5	5	0	0	0

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G193.dat

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0

30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	4
290 To 300 ft	16
300 To 310 ft	25
310 To 320 ft	26
320 To 330 ft	26
330 To 340 ft	25
340 To 350 ft	20
350 To 360 ft	26
360 To 370 ft	12
370 To 380 ft	12
380 To 390 ft	5
390 To 400 ft	2
400 To 404 ft	0

Rockfall simulation input and output data for profile P5

CRSP Input File -L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Input File Specifications

Units of Measure: U.S.
 Total Number of Cells: 26
 Analysis Point 1 X-Coordinate: 1155
 Analysis Point 2 X-Coordinate: 1196
 Analysis Point 3 X-Coordinate:
 Initial Y-Top Starting Zone Coordinate: 1010
 Initial Y-Base Starting Zone Coordinate: 1010

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	.8	.8	.2	0	1029	66	1012
2	.8	.8	.2	66	1012	106	976
3	.8	.8	.2	106	976	152	925
4	.8	.8	.2	152	925	203	876
5	.8	.8	.2	203	876	261	814
6	.8	.8	.2	261	814	333	715
7	.8	.8	.2	333	715	397	615
8	.8	.8	.2	397	615	466	509
9	.8	.8	.2	466	509	531	402
10	.8	.8	.2	531	402	605	305
11	1.5	.8	.2	605	305	698	244
12	1.5	.8	.2	698	244	772	212
13	1.5	.8	.2	772	212	873	164
14	1.5	.8	.2	873	164	933	117
15	1.5	.8	.2	933	117	963	110
16	1.5	.8	.2	963	110	994	94
17	1.5	.8	.2	994	94	1029	73
18	1.5	.8	.2	1029	73	1038	62
19	1.5	.8	.2	1038	62	1043	62
20	1.5	.8	.2	1043	62	1046	66
21	1.5	.8	.2	1046	66	1047	66
22	1.5	.8	.2	1047	66	1088	49
23	1.5	.8	.2	1088	49	1102	33
24	1.5	.8	.2	1102	33	1142	33
25	1.5	.8	.2	1142	33	1176	10
26	1.5	.8	.2	1176	10	1196	7

CRSP Simulation Specifications: Used with L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Total Number of Rocks Simulated: 100

Starting Velocity in X-Direction: 1 ft/sec
 Starting Velocity in Y-Direction: -1 ft/sec
 Starting Cell Number: 1
 Ending Cell Number: 26
 Rock Density: 165 lb/ft³
 Rock Shape: Spherical
 Diameter: 4 ft

CRSP Analysis Point 1 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Analysis Point 1: X = 1155, Y = 24

NO ROCKS PAST ANALYSIS POINT 1

CRSP Analysis Point 2 Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Analysis Point 2: X = 1196, Y = 7

NO ROCKS PAST ANALYSIS POINT 2

CRSP Data Collected at End of Each Cell - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

Velocity Units: ft/sec Bounce Height Units: ft

Cell # Max. Vel. Avg. Vel. S.D. Vel. Max. Bounce Ht. Avg. Bounce Ht.

1	No rocks	past end of cell			
2	38	32	2.75	4	1
3	62	51	4.97	9	2
4	71	58	6.84	11	3
5	86	68	9.36	14	5
6	105	84	10.88	34	10
7	124	92	15.2	39	11
8	140	100	15.31	37	14
9	151	106	19.99	50	14
10	146	91	17.19	32	9
11	89	54	14.32	17	5
12	70	39	11.47	10	2
13	55	31	10.05	8	1

14	75	42	10.43	19	3
15	43	21	8.6	4	1
16	46	25	8.13	8	1
17	47	28	6.7	6	2
18	54	35	6.43	12	5
19	51	24	13.96	9	1
20	37	34	0	2	1
21	38	35	0	1	0
22	34	25	0	2	0
23	44	35	0	7	4
24	No rocks	past end of cell			
25	No rocks	past end of cell			
26	No rocks	past end of cell			

CRSP Rocks Stopped Data - L:\work\Infra\Rockfall Projects\Haena Park\CRSP\G194m.bmp

X Interval	Rocks Stopped
0 To 10 ft	0
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0

340 To 350 ft	0
350 To 360 ft	0
360 To 370 ft	0
370 To 380 ft	0
380 To 390 ft	0
390 To 400 ft	0
400 To 410 ft	0
410 To 420 ft	0
420 To 430 ft	0
430 To 440 ft	0
440 To 450 ft	0
450 To 460 ft	0
460 To 470 ft	0
470 To 480 ft	0
480 To 490 ft	0
490 To 500 ft	0
500 To 510 ft	0
510 To 520 ft	0
520 To 530 ft	0
530 To 540 ft	0
540 To 550 ft	0
550 To 560 ft	0
560 To 570 ft	0
570 To 580 ft	0
580 To 590 ft	0
590 To 600 ft	0
600 To 610 ft	0
610 To 620 ft	0
620 To 630 ft	0
630 To 640 ft	0
640 To 650 ft	0
650 To 660 ft	0
660 To 670 ft	0
670 To 680 ft	0
680 To 690 ft	0
690 To 700 ft	0
700 To 710 ft	0
710 To 720 ft	0
720 To 730 ft	0
730 To 740 ft	0
740 To 750 ft	0
750 To 760 ft	0
760 To 770 ft	0
770 To 780 ft	0
780 To 790 ft	0
790 To 800 ft	0
800 To 810 ft	0
810 To 820 ft	0
820 To 830 ft	0
830 To 840 ft	0
840 To 850 ft	0
850 To 860 ft	0
860 To 870 ft	0
870 To 880 ft	0
880 To 890 ft	0

890 To 900 ft	0
900 To 910 ft	0
910 To 920 ft	0
920 To 930 ft	0
930 To 940 ft	0
940 To 950 ft	0
950 To 960 ft	5
960 To 970 ft	2
970 To 980 ft	0
980 To 990 ft	0
990 To 1000 ft	0
1000 To 1010 ft	0
1010 To 1020 ft	0
1020 To 1030 ft	0
1030 To 1040 ft	5
1040 To 1050 ft	85
1050 To 1060 ft	0
1060 To 1070 ft	0
1070 To 1080 ft	0
1080 To 1090 ft	0
1090 To 1100 ft	0
1100 To 1110 ft	0
1110 To 1120 ft	2
1120 To 1130 ft	1
1130 To 1140 ft	0
1140 To 1150 ft	0
1150 To 1160 ft	0
1160 To 1170 ft	0
1170 To 1180 ft	0
1180 To 1190 ft	0
1190 To 1196 ft	0

Appendix B Cost Estimates

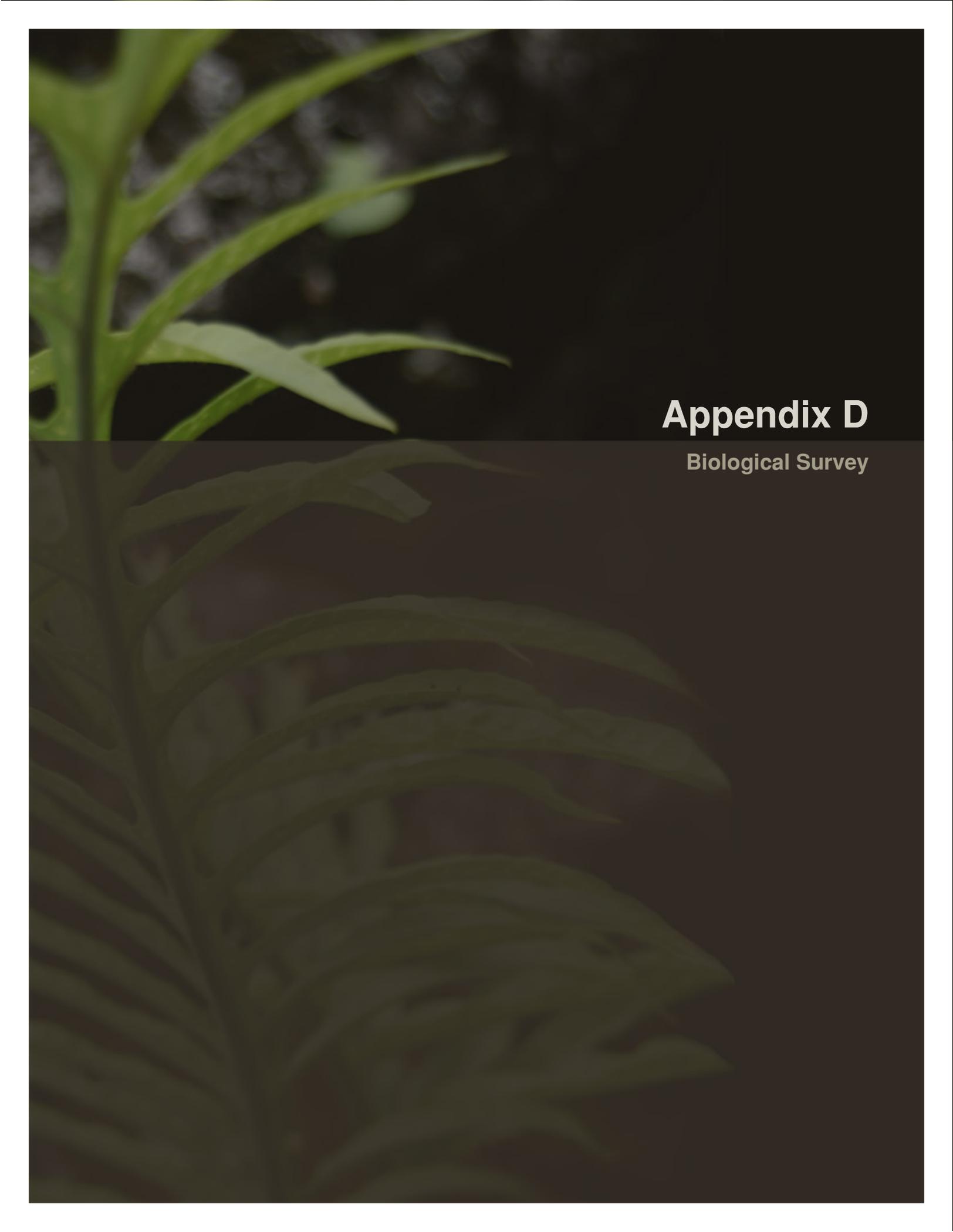
Preliminary Cost Estimate					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 2 Anchored Wire Mesh System		
Length:	3050 FT	Covered Area:	4843760	SF	
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000		100,000
General clear and grub	SF	4843760	2.0		9,687,520
Rock Scaling (2 Crews of 3)	HRS	40	1,100		44,000
Rock Demolition	DAYS	5	6,000		30,000
Draped Mesh System	SF	4843760	48		232,500,488
Traffic Control	HRS	830	105		87,150
Signage	LS	1	10,000		10,000
On Site Disposal of Debris	CY	1020	5		5,100
Erosion Control/Hydromulching	SF	4843760	0.8		3,875,008
Subtotal					246,339,267
Contingencies (@ 10%)					24,633,927
O & P (@ 20%)					49,267,853
Hawaii Tax (@ 4.712%)					15,089,758
Bonding (@ 1.5%)					5,029,962
Total Construction Cost					\$ 340,360,767
				Rounded	\$ 340,360,000

Preliminary Cost Estimate					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 3 Impact Fence System		
Length:	3050 FT	Covered Area:	4843760	SF	
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000	100,000	
General clear and grub	SF	61000	2.0	122,000	
Rock Scaling (2 Crews of 3)	HRS	200	1,100	220,000	
Rock Demolition	DAYS	20	6,000	120,000	
Rockfall Impact Fence	LF	3050	1,800	5,490,000	
Traffic Control	HRS	830	105	87,150	
Signage	LS	1	10,000	10,000	
On Site Disposal of Debris	CY	1020	5	5,100	
Erosion Control/Hydromulching	SF	61000	0.8	48,800	
Subtotal				6,203,050	
Contingencies (@ 10%)				620,305	
O & P (@ 20%)				1,240,610	
Hawaii Tax (@ 4.712%)				379,974	
Bonding (@ 1.5%)				126,659	
Total Construction Cost				\$ 8,570,598	
				Rounded	\$ 8,570,000

Preliminary Cost Estimate					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 4		
Impact Fence and anchored Wire Mesh System					
Length:	3050 FT	Covered Area:	4843760	SF	
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000	100,000	
General clear and grub	SF	61000	2.0	122,000	
Rock Scaling (2 Crews of 3)	HRS	200	1,100	220,000	
Rock Demolition	DAYS	20	6,000	120,000	
Rockfall Impact Fence	LF	3050	1,800	5,490,000	
Anchored Mesh System	SF	18300	48	878,400	
Traffic Control	HRS	830	105	87,150	
Signage	LS	1	10,000	10,000	
On Site Disposal of Debris	CY	1020	5	5,100	
Erosion Control/Hydromulching	SF	61000	0.8	48,800	
Subtotal					7,081,450
Contingencies (@ 10%)					708,145
O & P (@ 20%)					1,416,290
Hawaii Tax (@ 4.712%)					433,781
Bonding (@ 1.5%)					144,595
Total Construction Cost					\$ 9,784,261
				Rounded	\$ 9,780,000

Preliminary Cost Estimate					
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 5 Catchment Ditch		
Length:	3050 FT	Covered Area:	4843760	SF	
Item	Quantity		Engineer's Estimate		
	Unit	Qty	\$/U	Total	
Mobilization/ De-mobilization	LS	1	100000	100,000	
General clear and grub	SF	61000	2.0	122,000	
Rock Scaling (2 Crews of 3)	HRS	40	1,100	44,000	
Rock Demolition	DAYS	5	6,000	30,000	
Excavation	CY	11861	200	2,372,222	
Concrete Retaining Wall	CY	791	1,500	1,186,111	
Anchored Mesh System	SF	18300	48	878,400	
Traffic Control	HRS	830	105	87,150	
Signage	LS	1	10,000	10,000	
On Site Disposal of Debris	CY	1020	5	5,100	
Erosion Control/Hydromulching	SF	61000	0.8	48,800	
Subtotal				4,883,783	
Contingencies (@ 10%)				488,378	
O & P (@ 20%)				976,757	
Hawaii Tax (@ 4.712%)				299,161	
Bonding (@ 1.5%)				99,721	
Total Construction Cost				\$ 6,747,801	
			Rounded	\$ 6,750,000	

Preliminary Cost Estimate				
Project: Haena Park Rockfall Hazard Assessment			Alternative Design: No. 6 Realign Roadway	
Length:	3050 FT	Covered Area	4843760	SF
Item	Quantity		Engineer's Estimate	
	Unit	Qty	\$/U	Total
Mobilization/ De-mobilization	LS	1	250000	250,000
General clear and grub	SF	100000	2.0	200,000
Rock Scaling (2 Crews of 3)	HRS	500	1,100	550,000
Roadway Realignment	LF	1200	6,000	7,200,000
Rockfall Impact Fence	LF	1500	1,800	2,700,000
Traffic Control	HRS	2050	105	215,250
Signage	LS	1	10,000	10,000
On Site Disposal of Debris	LS	1	40,000	40,000
Erosion Control/Hydromulching	SF	61000	0.8	48,800
Subtotal				11,214,050
Contingencies (@ 10%)				1,121,405
O & P (@ 20%)				2,242,810
Hawaii Tax (@ 4.712%)				686,928
Bonding (@ 1.5%)				228,978
Total Construction Cost				\$ 15,494,171
			Rounded	\$ 15,490,000



Appendix D

Biological Survey

***Biological Survey
Hā'ena State Park
Island of Kaua'i***

**By Ron Terry, Ph.D. and Patrick Hart, Ph.D.
Geometrician Associates, LLC
February 2009**

1. INTRODUCTION

This report describes the results of a biological survey of approximately 64 acres within the boundaries of Hā'ena State Park on the Island of Kaua'i (Figs. 1-2). The objectives of the survey were to provide:

- A one-time physical survey of the flora and fauna of the 64-acre Ha'ena State Park (including the portion of Limahuli Stream below Kūhio Highway) documenting all plants, birds, reptiles, amphibians, mammals, freshwater fish, and marine reptiles or mammals fauna observed on the beach strand, with a complete species list. The survey was not intended to include invertebrates or marine flora, or marine fauna other than those listed above.
- A review of previous surveys or articles related to the flora, fauna, and habitats of Ha'ena State Park and Limahuli Stream.
- A comprehensive report of survey results, observations, and findings pertaining to the areas and biota specified above, with narrative describing each major plant community, stream habitats, sensitive habitats, unusual or significant species, occurrences, and the value of the area for conservation of native biota.
- A discussion of potential effects from increased recreation activities on wildland resources including invasive species, soil erosion, native plant and animal populations, endangered species, native plant communities, and sensitive habitats.
- A GIS map of existing plant communities, significant species occurrences, and demarcated cultivated and wetland areas.

The area was surveyed on foot by biologists Ron Terry and Pat Hart on January 17-19, 2009. This survey also relies heavily on the botanical report conducted by Bishop Museum botanist Kenneth M. Nagata in 1991 as part of earlier planning efforts at Hā'ena State Park.

The project site is located on the north coast of Kaua'i in the district of Hanalei. It is bordered by Limahuli Stream on the east, the *pali* (cliff) separating Hā'ena and Hanakapi'ai on the south and the ocean on the north and west. The elevation ranges from sea level to approximately 200 feet above sea level on the *pali*. The property is mostly fairly flat, with substantial slopes restricted to the mauka side of Kūhio Highway, where talus slopes eventually give way to *pali*. The biologists walked irregular but densely spaced transects in order to get a full picture of the vegetation on the site. Although vegetation was dense, the limited size of Ha'ena State Park and numerous orientation features allowed the area to be reasonably fully covered and surveyed. Several looping excursions into the cliffs above the property were made where safety permitted. As the property boundary on the *pali* side was not known and it was not safe to survey in most areas of the cliffs, some areas

Figure 1
Project Location USGS Map

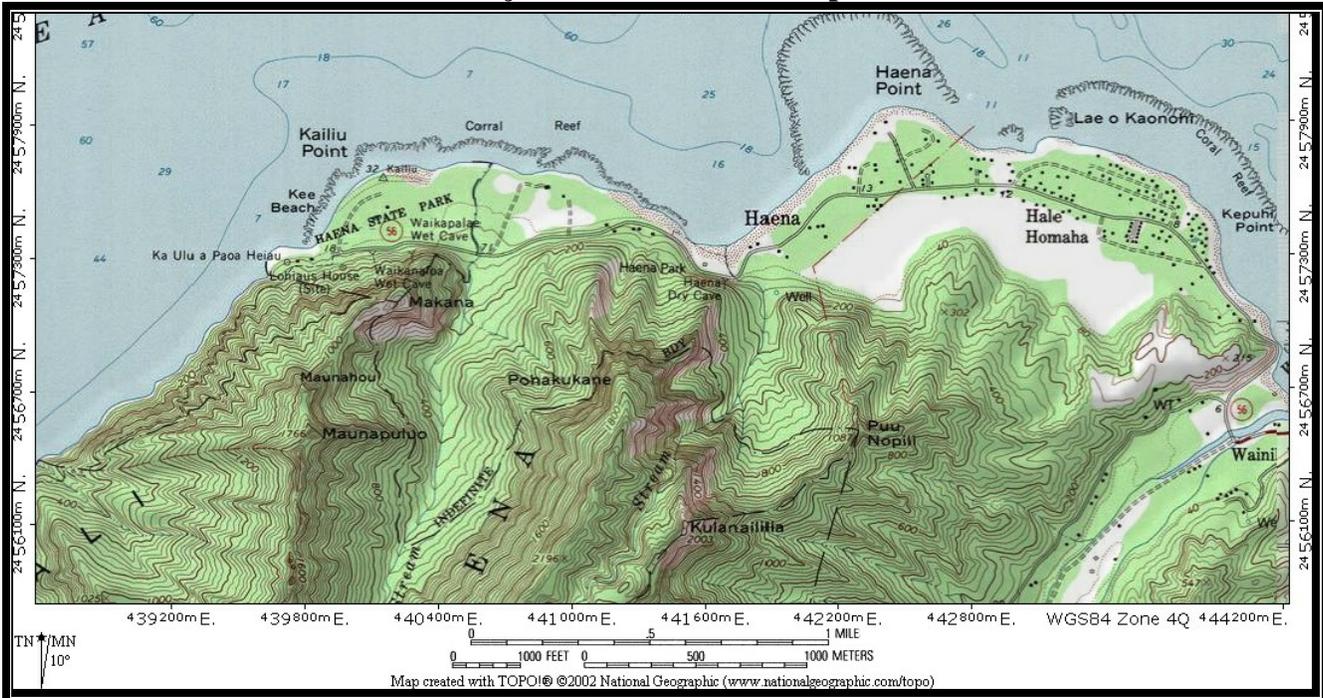
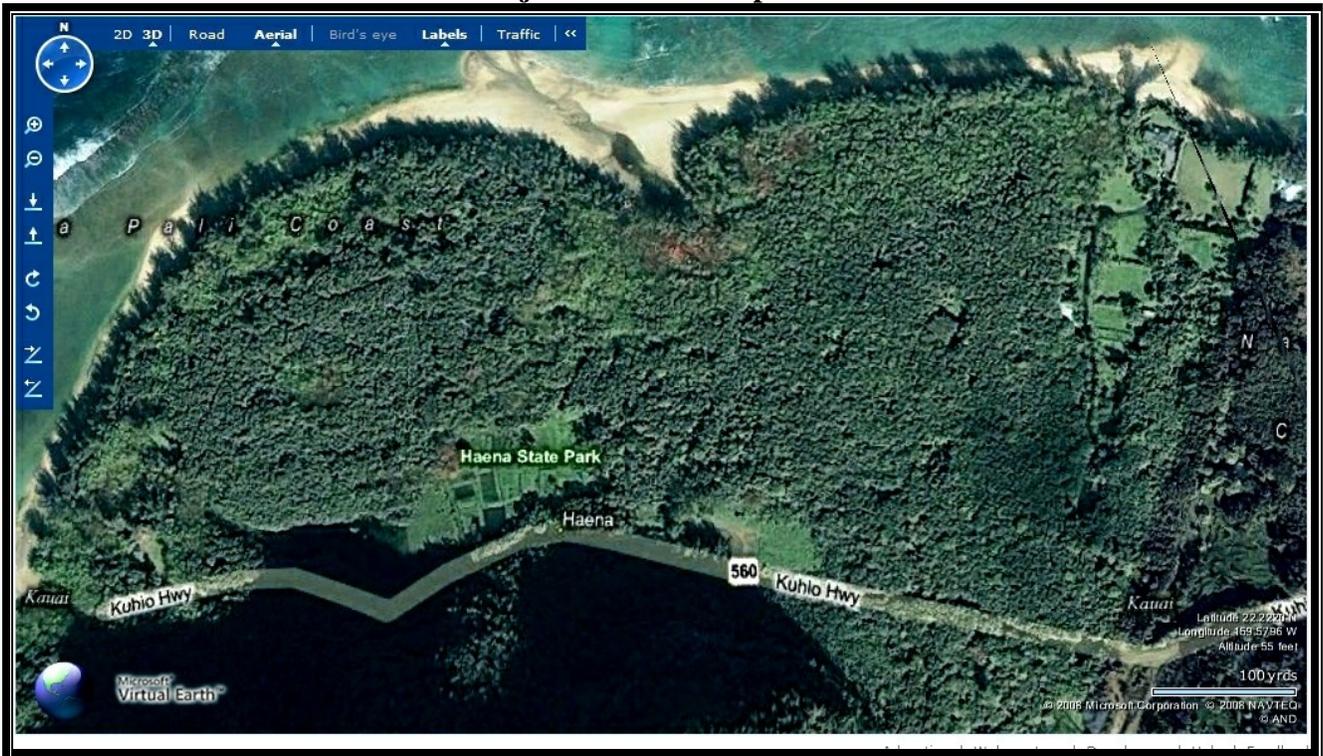


Figure 2
Project Location Airphoto



within the boundaries of the park were likely not surveyed. Plant species were identified in the field and, as necessary, collected and keyed out in the laboratory. Special attention was given to the possible presence of any federally (USFWS 2009) listed threatened or endangered plant species. Bird, reptile, amphibian and fish species were identified by sight and/or sound. In this report, on the first instance of the mention of a species, the common and scientific names are both given. Thereafter, only the common name is used, with occasional repetitions of the scientific name for clarity.

Limitations

No biological survey of areas such as this can claim to have detected every species present. Some plant species are cryptic in juvenile or even mature stages of their life cycle. Dry conditions can render almost undetectable plants that extended rainfall may later invigorate and make obvious. Thick brush can obscure even large, healthy specimens. Only a fraction of birds that might be present in an area over the course of a year will be detected during a survey because of season, time of day, or other factors. Reptiles and amphibians can also be cryptic and may not be in evidence despite a thorough survey. Marine species that make only occasional use of the site may not be present on the days of the survey. The findings of this survey must therefore be interpreted with proper caution; in particular, there is no warranty as to the absence of any particular species. Furthermore, during the time of the survey, access was not possible into the Allerton Estate heiau area, and the general descriptions provided herein are based on previous work, with no attempt to list the species that might be present there. As this area has been completely cultivated, it is unlikely that any significant native species were omitted.

2. FLORA AND VEGETATION

Vegetational Influences

The geologic substrate in this area is alluvial beach and dune sand on the flats, behind which is the *pali*, which is formed from lavas of the Napali member of the Waimea Canyon Basalt formation (MacDonald et al 1986; UH-Hilo 1998). A distinct volcanic dike is visible making a vertical scar on the *pali*, evidence that the Hā'ena area is on a rift zone of the volcano that formed the island. Elevation varies from sea level to 200 feet above sea level. Annual rainfall in this area of Kaua'i is about 40 inches, according to the *Atlas of Hawai'i*, 3rd ed.

Given the rainfall, elevation, geologic substrate, and existing vegetation, prior to human disturbance, the general area probably supported a Coastal Mesic Forest dominated by hala (*Pandanus odoratissimus*) and 'ohi'a lehua (*Metrosideros polymorpha*) (Gagne and Cuddihy 1990). Nagata (1991) believed that alahe'e (*Psydrax odorata*), papala-kepau (*Pisonia* spp.), and hau (*Hibiscus tiliaceus*) may also have been prominent components. The herb layer was likely made up of various ferns and herbs that are still present as elements of today's vegetation.

This broad vegetation type was a matrix in which local conditions produced variants. Most obvious is the strand community on the shoreline, which today is represented mostly by pohuehue (*Ipomoea pes-caprae*) and naupaka (*Scaevola taccada*). This community probably contained a wide diversity of species such as nanea (*Vigna marina*), pohinahina (*Vitex rotundifolia*), nehe (*Lipochaeta integrifolia*), akiaki grass (*Sporobolus virginicus*) and pa'u-o-Hi'iaka (*Jacquemontia ovalifolia*). Native trees such as hau, hala, milo (*Thespesia populnea*) and kou (*Cordia subcordata*) were also

probably present. This strand community was probably much wider than today and extended back into the dunes. It is also possible that marsh ecosystems dominated by sedges such as *Cyperus javanicus* and *C. polystachyos* were also present.

Centuries of disturbance by agricultural and settlement completely changed the vegetation. The forests were cleared and the natural hydrology rearranged to support terraced wet taro (*Colocasia esculenta*) agriculture, with diverse gardens of a variety of Polynesian crops including breadfruit (*Artocarpus altilis*), ti (*Cordyline fruticosa*) sugarcane (*Saccharum officinarum*), ‘ohi‘a ai (*Syzygium malaccense*) and many others. Useful native plants such hala and hau were allowed to flourish in appropriate environments. In the 19th century, Western crops such as mango (*Mangifera indica*), various types of citrus (*Citrus* spp.), papaya (*Carica papaya*) and guava were added to the agricultural mix.

The area now within Hā’ena State Park experienced a gradual abandonment later in the 19th and early 20th century, and parts of it were incorporated in various estates, an informal countercultural camping area, and then a State Park. Over time, some of the existing species disappeared, others simply persisted in place (e.g., breadfruit), and others became feral (e.g., guava). New, aggressive invasive species such as Java plum (*Syzygium cumini*) began to become dominant.

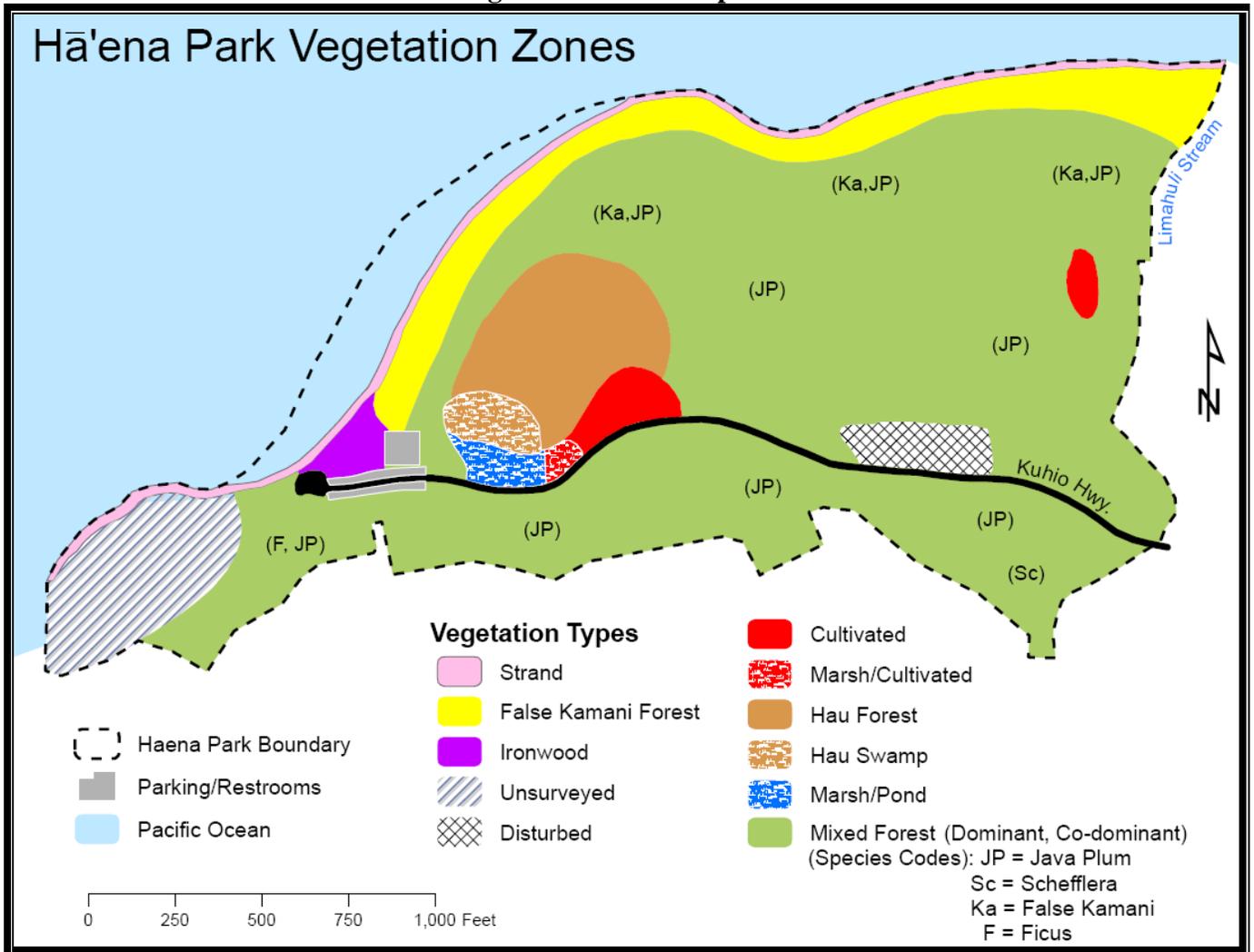
Ripperton and Hosaka described the vegetation of the general region in 1942 as shrubs and closed forest (Zone D, low phase) dominated largely by guava (*Psidium guajava*). Other characteristic species in this zone included sensitive plant (*Mimosa pudica*), Spanish clover (*Desmodium incanum*), ni‘ani‘au fern (*Nephrolepis exaltata hawaiiensis*) and such grasses as Hilo grass (*Paspalum conjugatum*), carpet grass (*Axonopus compressus*) and basket grass (*Oplismenus hirtellus*). ‘Ohi‘a lehua, most common in the upper portions of this zone, extended down to sea level in certain areas. Hala and kukui (*Aleurites moluccana*) are abundant in certain localities.

By the time of the 1991 Nagata survey, the vegetation was very similar to what it is today, with exceptions that are noted below in the section entitled “Vegetation Change.” Our strong presumptions beginning the survey were that few if any rare, threatened or endangered species would be expected. Nevertheless, favorable micro-habitats such as rock outcrops and the *pali* mauka of Kūhio Highway might harbor more natives and thus merited as close an inspection as safely feasible. In general, the altered vegetation represents a degradation of habitat for native animal species, but environments such as the strand, Limahuli Stream, and the *pali* might offer good if not pristine habitat.

Current Vegetation

A number of basic vegetation types, all heavily influenced by human activity, are present at Hā’ena State Park (Figure 3). These vegetation types are not true “communities” because they have not co-evolved. Instead, they are haphazard collections of a few hardy natives, remnant cultivated plants, and various alien plants that are constantly in flux. Very little of the vegetation is in even temporary equilibrium, and both species composition and vegetational structure appear to be constantly changing. Figure 3 is therefore presented with the caution that it is an approximate snapshot of an area that has undergone drastic change and will continue to do so, whether or not the future brings purposeful human intervention. The map is diagrammatic and the boundaries between zones are approximate. The eleven zones are described below.

Figure 3
Vegetation Zones Map



Source: Fieldwork by R. Terry and P. Hart, January 2009

Strand Zone

The strand, here defined as the zone seaward of the tree line, is poorly developed (Figures 3 and 4). When present it consists mostly of the indigenous pohuehue (*Ipomoea pes-caprae*), the possibly indigenous grass kukaipua'a (*Digitaria setigera*), and seedlings of such alien trees as ironwood (*Casuarina equisetifolia*), tree heliotrope (*Tournefortia argentea*) and false kamani (*Terminalia catappa*). Few other species are found in this community. Beach naupaka (*Scaevola taccada*), generally regarded as a typical strand species, occurs uncommonly. As discussed above, a typical healthy strand ecosystem in a climatic and geological setting such as this would be much more diverse. The density of ironwood and particularly false kamani shading out the strand from the land side and heavy wave action scouring strand vegetation away from the ocean side has depauperized the strand. The section below on management recommendations values discusses opportunities for restoration of this area.

Figure 4
Strand Zone Vegetation



False Kamani Forest Zone

This zone dominates the areas a variable distance of 75 to 150 feet mauka of the strand and consists of false kamani trees 30 to 40 feet tall, with a few remnant ironwoods and the occasional emergent Java plum (Figures 3 and 5). The canopy cover is typically closed and the resulting dense shade precludes the development of any significant ground cover. The shrub and herb layers, when present, consist mostly of false kamani seedlings. According to the 1991 Nagata report, ironwood was once co-dominant here. Although the fringe of the strand exhibits a row of ironwoods, most of the old ironwood trees have died (many stumps and treefalls are present), perhaps as result of damage from Hurricane Iniki, and false kamani has taken over. The False Kamani Forest grades into a variant of the Mixed Forest zone that is dominated by Java plum and false kamani.

Ironwood Zone

There is only a small remnant of area outside the strand fringe that is truly dominated or co-dominated by ironwood (Figures 3 and 6). In this area the understory consists of a thick carpet of ironwood “needles” and a poorly developed shrub and herb layer of wedelia (*Wedelia trilobata*) and pothos (*Epipremnum pinnatum*). This is found near the end of the road, lifeguard stand and new restroom, and may be the result of managing the forest here. According to a posted sign at the park, this area is being restored with native species.

Figure 5
False Kamani Zone Vegetation



Figure 6
Ironwood Zone Vegetation



Mixed Forest Zone

The Mixed Forest zone is the largest vegetation zone in the park. This zone consists of most of the areas classified by Nagata (1991) as either Java Plum Forest or Mixed Forest (Figures 3 and 7). In our classification, these two zones have been lumped, but the vegetation zone map (Figure 3) includes a number of point symbols indicating which species are dominant or co-dominant. These two zones have been combined because the characteristics that apparently distinguished them in 1991 do not appear today to be nearly as distinct. Areas that had once been dominated almost completely by Java plum now host a number of other species, including false kamani, hau, Chinese banyan (*Ficus microcarpa*), octopus tree (*Schefflera actinophylla*), kukui, African tulip (*Spathodea campanulata*), guava, waiawi (*Psidium cattleianum*), Christmas berry (*Schinus terebinthifolius*), cinnamon (*Cinnamomum zeylanicum*) and Madagascar olive (*Noronhia emarginata*). There are still limited areas in which Java plum is completely dominant, and the forest matches the description given by Nagata:

Typically the forest consists of Java plum trees at least 30 feet tall with 50-100% canopy cover. In some areas false kamani is co-dominant in the upper canopy and occasionally forms a secondary canopy as well. The density and composition of the understory varies considerably. In some areas the understory is open with a sparse shrub layer of Java plum saplings and a well-developed herb layer of awapuhi [note: in 2009 this species was not observed] ...laua'e...basketgrass, or pothos. In other areas the understory is dense and consists of a well-developed shrub layer of mostly Java plum saplings and guava. In certain areas the indigenous...*Nephrolepis exaltata* is the dominant species in the herb layer.

The Mixed Forest, as the name implies, is highly variable. As noted in Nagata (1991), there are many small sunny patches in which shrubs such as guava and sourbush (*Pluchea symphytifolia*) replace Java plum and other trees and the understory consists of Hilo grass (*Paspalum conjugatum*), laua'e (*Phymatosorus grossus*), honohono (*Commelina diffusa*), and Job's tears (*Coix lachryma-jobi*), among others. Two native trees, hau and hala, appear to be holding their own. Vines such as morning glory (*Ipomoea indica*) and water lemon (*Passiflora laurifolia*) are still present, but moon flower (*Ipomoea alba*), noted as present by Nagata, was not observed.

In the Mixed Forest mauka of Kūhio Highway, the soils are better drained than the flats and the landscape is covered with talus from the *pali*. Christmas berry is more abundant along the talus mauka of Kūhio Highway. The ground cover here is dominated by basketgrass, pothos, and several ferns. In shady, steep areas there a few of the indigenous 'ala'alawainui (*Peperomia leptostachya*), and the endemic ko'oko'olau (*Bidens forbesii*) and akoko (*Chamaesyce celastroides* var. *lorifolia*) are present in sunny patches.

As detailed by Nagata (1991), the Mixed Forest (and indeed the entire park) contains numerous ornamental species that are either remnant and in decline or are invasive and spreading. Firmly established species that are remnants of old plantings include Turk's cap, solitaire palm (*Ptychosperma elegans*), small shell ginger (*Alpinia mutica*), red ginger (*A. purpurata*), shell ginger (*Zingiber zerumbet*), spiral flag (*Costus speciosus*), and five fingers (*Syngonium auritum*).

Figure 7
Mixed Forest Zone Vegetation



Cultivated Areas Zone

Nagata (1991) called three portions of the project site Cultivated Areas: the Allerton Estate, including Ka Ulu a Paoa Heiau and Lohi'au's Hula Platform (the numerous no-trespassing signs and a lack of arranged access prevented us from surveying this area in 2009); a small cabin within the Mixed Forest near Limahuli Stream (which is no longer actively cultivated and which the forest is steadily overtaking); and an informal, overflow parking area along Kūhio Highway. In this survey, we reclassified the overflow parking area as Disturbed Vegetation but added the taro farming area in the center of the park (Figures 3 and 8) near the wetlands as a third cultivated area. The Cultivated Area zone is a miscellaneous category that completely lacks any vegetation community characteristics. A large number of species are present. Although not surveyed by us in 2009, Nagata found the Allerton Estate to have a great number of ornamental and food species, many of which are presumably still present. Nagata described the vegetation here thus:

The Allerton Estate, Ka Ulu a Paoa Heiau and Lohi'au's Hula Platform...contain the majority of the species. The lawns consist of a mixture of Nib grass, goosegrass (*Eleusine indica*), kyllinga (*Cyperus kyllinga*), Asiatic pennywort (*Centella asiatica*), synedrella (*Synedrella nodiflora*) and *Hemigraphis repens*. Among the numerous ornamentals are hybrid roses (*Rosa* x), colored ti (*Cordyline* x), allamanda (*Allamanda cathartica*), crape myrtle (*Lagerstroemia indica*) and oleander (*Nerium oleander*). Several such as pothos, taro vine, mango, king palm (*Archontophoenix alexandrae*) and tithonia (*Tithonia diversifolia*) have become naturalized and are spreading into the adjacent Mixed Forest.

As in the Nagata survey, a number of food plants and ornamentals are still found around the cabin near Limahuli Stream. Notable are *Citrus* spp., Otaheiti apple or vi (*Spondias dulcis*), coconuts (*Cocos nucifera*), small shell ginger, spiral flag, hybrid roses, common heliconia (*Heliconia humilis*), and banana (*Musa x paradisiaca*).

In addition to taro, the taro farming area includes in its vegetation a number of weeds typical of farms, similar to those listed below for the overflow parking area. Towards the pond end of the cultivated area, plants tolerant of saturated soils such as honohono and Job's tear's begin to predominate.

Disturbed Vegetation Zone

Nagata's "cultivated" area near Kūhio Highway continues to be used as an overflow parking area. Here, a large variety of weeds are present, including goosegrass (*Eleusine indica*), wedelia, finger grass (*Chloris* spp.), partridge pea (*Chamaecrista nictitans*), *Desmodium* spp., sensitive plant, Jamaican vervain (*Stachytarpheta jamaicensis*), and plantain (*Plantago* spp.). Koa haole (*Leucaena leucocephala*) and Guinea grass (*Panicum maximum*) are common at the periphery.

Figure 8
Cultivated Area Zone Vegetation



Figure 9
View of Pond, Marsh and Swamp



Marsh/Pond and Marsh/Cultivated Zones

One area classified by Nagata (1991) as “Grassland” appears to have changed markedly. The area roughly delineated in his 1991 map is now occupied by a combination of small areas that we have designated Cultivated Area (the taro farm discussed above), Marshland/Pond, and a transitional vegetation type called Marshland/Cultivated. In 1991, according to Nagata:

The Grassland occupies a series of low-lying taro terraces which is irrigated by a single auwai and although the substrate was dry during the time of the survey it probably becomes rather marshy during the wet season.

There were no permanent areas of standing water noted in the 1991 report. In January of 2009, after a month of heavy rains, a pond and marshy wetlands occupying perhaps an acre were apparent (Figures 3 and 9). Native Koloa or Hawaiian Ducks (*Anas wyvilliana*) were utilizing the ponds daily, and the singing of bullfrogs (*Rana catesbeiana*) was evident. Fringing the ponds were wetlands marshes, which extended back east towards the cultivated area. Several soil pits dug during the survey revealed the presence of mucky, sulfidic soils indicating frequent saturation and reducing conditions, meaning that the inundated condition is not unusual. The eastern edge of the marsh can be, and probably is at times, cultivated for taro, and is thus distinguished as its own, transitional Marsh/Cultivated Zone, grading into the taro farm in the Cultivated Area. Additional investigation is required to delineate the boundaries of the wetlands per definitions of Section 404 of the Clean Water Act (U.S. Department of the Army 1987), but the soil, hydrological, and vegetation indicators all appear to be present at least in the core area around the pond.

Species present in the marshy area included Job’s tears, honohono, ‘ape (*Alocasia macrorrhiza*), Hilo grass (*Paspalum conjugatum*) and California grass (*Urochloa mutica*), among others.

Hau Swamp and Hau Forest Zones

The marsh wetlands are bordered on the shoreline side by the Hau Swamp zone (Figures 3 and 9). This closed canopy, low-lying area is almost 100 percent tangled hau branches. Further investigation of inundation and soil conditions would be required to determine if this zone qualifies as a jurisdictional wetlands under Section 404 of the Clean Water Act and to delineate the wetlands boundaries, but initial indications are that it should be so classified. As the terrain steps up in elevation slightly, the Hau Swamp grades into the Hau Forest and Mixed Forest zones.

Other Areas

Not classified within their own zones are the *pali* (the extent to which the *pali* lies within the park was not known during our survey) and miscellaneous areas such as the restroom, roadsides and parking areas. The vegetation of the latter types is typical of the weeds found in the Cultivated and Disturbed zones. A portion of the park appears to include the *pali*. One ascent of the *pali* near the former Lohiau’s House was made, but it was mostly surveyed with binoculars during a number of excursions to the base and from the road. Similar to Nagata’s 1991 observations, the vegetation along the cliff face consist mostly of scrub ironwood, Java plum, Christmas berry, waiawi, octopus tree, with a shrub and herb layer of Jamaican vervain, Pluchea, air plant (*Kalanchoe pinnata*), and scarlet orchid (*Epidendrum x obrienianum*). This area included the highest density of native plants, including ahinahina, ko’oko’olau, akoko, ‘ala’alawainui, moa, ‘ohi’a lehua, and the sedge *Carex meyenii*.

Flora

Appendix 1 contains a full list of plant species found at the park, which is not included in the main body of this report because of its length. We recorded a total of 117 flowering plants and 9 ferns or fern allies. Most of the plant species found were alien; 15 were indigenous and six were Hawai‘i endemics. The remaining plants are alien, including several species considered invasive. No listed or proposed threatened or endangered plant species (USFWS 2009) were found.

The Nagata survey, which accessed the Allerton Estate and probably recorded there a number of alien species not found anywhere in our 2009 survey, found a total of 218 flowering plants and 9 ferns or fern allies.

Significant Species

Native Species

As was true when Nagata surveyed the park in 1991, native species are of minor importance in the floristic composition. They comprise approximately 17 percent of the total number of species but account for very little of the total cover and are not abundant except in restricted areas near the cliff, on the strand, and in the hau forest and swamp. None are classified as threatened or endangered or considered rare. Most are common throughout the major Hawaiian Islands. Two of the six endemics are restricted to Kaua‘i: *Bidens forbesii* is a common lowland species on the north shore and *Artemisia kauaiensis* is found throughout the sea cliffs of Kaua‘i.

Most of the native species are widely scattered in small numbers. Of the 15 native species, only Koali (morning glory) and the ni‘ani‘au fern are widely common, with hala and hau scattered but locally abundant. Pohuehue is considered abundant in the Strand zone. Except in the *pali* area, all of the endemic species are uncommon in the park.

Species of Cultural Significance

Ten species of early Polynesian introduction are found in the surveyed area: mountain apple, sugar cane, banana, noni, ti, coconut, breadfruit, ‘ape, taro, and kukui. Of these, all but breadfruit, which is only sparingly naturalized but persists after cultivation, have spread in various vegetation types throughout Hawai‘i. Although all are culturally significant, their distribution in the project site cannot easily be correlated with historical Hawaiian land uses in the park, as Nagata pointed out in 1991. Most of the species are found in small numbers in the Mixed Forest both within and outside the system of taro lo‘i. Many of the plants are growing inside the terraces indicating naturalization after the abandonment of the terraces. Nagata found that ti was the only Polynesian alien species recorded from Ka Ulu a Paoa Heiau and Lohi‘aus Hula Platform. The planting of ti in sites of such religious and cultural significance can be considered traditional but it was not known whether they resulted from ancient, or more modern, plantings. Several large specimens of kukui and breadfruit are present in the site, indicating rather old plantings. In general, the distributions of these Polynesian plants do not appear to be useful in interpretation of traditional land use.

Invasive Species

The Hawai'i-Pacific Weed Risk Assessment (HP-WRA) is a research project by scientists from the University of Hawai'i and the USDA Forest Service to identify plants that pose a high weed risk in Hawai'i and other Pacific Islands. (http://www.botany.hawaii.edu/faculty/daehler/wra/full_table.asp). The HP-WRA score is a prediction on how invasive a species will become, and does not attempt to balance the costs and benefits of introduced species in terms of potential economic, ecological, public health, medicinal, historic, community, cultural, tourism, and esthetic values. The HP-WRA ratings have no regulatory authority and the HP-WRA list is not an official State list of invasive plants.

In the status column of Appendix 1, species listed as posing a high weed risk are identified, either as species likely to be invasive (INV, which included 7 species) or already determined to be invasive (INV-H, which included 6 species) based on published information on the species' current impacts in Hawai'i. The species already determined to be invasive are strawberry guava (*Psidium cattleianum*), guava (*Psidium guajava*), octopus tree (*Schefflera actinophylla*), Christmas berry (*Schinus terebinthifolius*), Guinea grass (*Panicum maximum*), and Hilo grass (*Paspalum conjugatum*). Although not listed among the 13 species, Java plum (*Syzygium cumini*) should probably be considered highly invasive, and based on its rapid initial inroads into the forest in no more than 17 years, the Madagascar olive (*Noronhia emarginata*), which is currently on the HP-WRA list as a species to evaluate, may soon merit classification as invasive in Hawai'i. With the exception of Madagascar olive (which we observed scattered in other locations along the North Shore of Kaua'i), the other invasive plants are long established. We did not observe any indication that they are notably expanding their range or densities or pose a threat to adjacent, uninfested areas.

Vegetational Change

The vegetation of Hā'ena State Park has been undergoing disturbance and transformation since human settlement over a millennium ago. As Nagata pointed out in 1991, major alteration began with the construction of the terrace system. Some areas may have been left intact but eventually the native forests were probably transformed utterly by centuries of use. Human use since the early 19th century has also been periodically intensive, as evidenced by ornamental species, ruins of structures, and trash piles. In the end, no original plant communities of the type discussed at the beginning of the report remain.

Even in the short interval between the last vegetation survey in 1991 and the current one in 2009, vegetation change has been occurring. A subtle change has been the convergence of the Java Plum and Mixed Forest into a diverse, if alien-dominated, Mixed Forest. It is likely that the relative importance of various species in terms of abundance and cover has changed, but this is difficult to characterize. An obvious change is the appearance of *Noronhia emarginata* or Madagascar olive, which was not present in the 1991 survey and is now a prominent component, at least in terms of abundance. The large number of juveniles trees of this species portend that it will be a major component of the forest in the near future. The most striking change was the decline of ironwood in the area mauka of the shoreline, where it was recently described as co-dominant. As observed earlier in this report, many, if not most, of the old ironwood trees have died, perhaps as result of damage from Hurricane Iniki, and false kamani has taken over. Perhaps because of the increasing shade from the kamani trees (along with heavy wave action), the strand vegetation, described by Nagata as already sparse, appears to have declined in size and diversity even further.

3. FAUNA

Birds

Thirteen species of birds were detected during the survey (Table 1), including the federally endangered Hawaiian Duck (Koloa Maoli; *Anas wyvilliana*), two indigenous shorebirds (Kolea; *Pluvialis fulva* and ‘Ulili; *Heteroscelus incanus*), and an indigenous seabird (Koa‘e Kea; *Phaethon lepturus dorotheae*). All other birds were non-native introductions. Japanese White-eyes (*Zosterops japonicus*) were particularly abundant in the mixed forest, as were White-rumped Shammas (*Copsychus malabaricus*) and Red Jungle Fowl (*Gallus gallus*). No native land birds were observed on the project site, nor would they be expected to be found in the area due to the low elevation, lack of native forest habitat and the abundance of disease-carrying mosquitoes. A large number of native species, some endangered, are known from areas mauka, and it is possible that occasional sightings of native forest birds are made at the park. Many species of shorebirds, waterbirds, and seabirds, some of which are federally listed endangered species, might be expected to make occasional use of the project site.

In addition to the Pacific Golden Plovers and Wandering Tattlers that were observed, other shorebirds that likely make occasional use of the project site but were not seen during the surveys include the Ruddy Turnstone (*Arenaria interpres*), Bristle-thighed Curlew (*Numenius tahitiensis*), Sanderling (*Calidris alba*), and various other Sandpipers. The Black-crowned Night-heron (‘Auku‘u; *Nycticorax nycticorax hoactli*), an indigenous wetland bird, would also be expected to make use of the area. Other native water birds that may make use of the wetland areas include the federally endangered Black-necked Stilt (Ae‘o; *Himantopus mexicanus knudseni*), the federally endangered Hawaiian Coot (‘Alae ke‘oke‘o; *Fulica alae*), the federally endangered Hawaiian Moorhen (‘Alae ‘ula; *Gallinula chloropus sandvicensis*) and the federally endangered Nene (*Branta sandvicensis*).

Many species of seabirds would be expected to make use of the airspace over the park. Species that were not seen in our limited surveys include Noddies (*Anous sp.*), Terns (*Sterna sp.*), Frigate Birds (‘Iwa; *Fregata minor palmerstoni*), Shearwaters (*Puffinus sp.*), Albatross (*Phoebastria sp.*), Boobies (*Sula sp.*), Petrels (*Pterodroma sp.*) and Red-tailed Tropicbirds (*Phaethon rubricauda melanorhynchos*). Most notably, three species of rare seabirds undoubtedly fly over the park on their way to nests in mountains of Kaua‘i: the federally endangered Hawaiian Petrel (‘Ua‘u; *Pterodroma phaeopygia sandwichensis*), the federally threatened Newell’s Shearwater (‘A‘o; *Puffinus auricularis newelli*), and the Band-rumped Storm-Petrel (*Oceanodroma castro*), which is listed as endangered by the State of Hawai‘i. Radar surveys indicate that the north shore of Kaua‘i has large populations of these latter three species (N. Holmes *per. comm.*).

Although these threatened and endangered seabirds are not likely to utilize the park’s resources for feeding, resting or nesting, developments that involve structures or lighting can affect these birds. The principal potential impact is the increased threat that birds will be downed after becoming disoriented by exterior lighting, if this is provided at the park.

Table 1
Bird Species Identified On/Near Ha'ena State Park

Scientific Name	Common Name	Status
<i>Acridotheres tristis</i>	Common Myna	Alien Resident
<i>Copsychus malabaricus</i>	White-rumped shama	Alien Resident
<i>Pluvialis fulva</i>	Pacific Golden-Plover	Indigenous Visitor
<i>Cardinalis cardinalis</i>	Northern Cardinal	Alien Resident
<i>Paroaria coronata</i>	Red Crested Cardinal	Alien Resident
<i>Streptopelia chinensis</i>	Spotted Dove	Alien Resident
<i>Phaethon lepturus dorotheae</i>	White tailed Tropicbird	Indigenous
<i>Heteroscelus incanus</i>	Wandering Tattler	Indigenous Visitor
<i>Gallus gallus</i>	Red Junglefowl	Alien Resident
<i>Anas wyvilliana</i>	Koloa	Endemic
<i>Geopelia striata</i>	Zebra Dove	Alien Resident
<i>Carpodacus mexicanus</i>	House Finch	Alien Resident
<i>Zosterops japonicus</i>	Japanese White-Eye	Alien Resident

Mammals, Reptiles and Amphibians

Aside from feral cats (*Felis catus*), no wild mammal species were detected during the course of this survey. It is highly likely that mice (*Mus* spp.) and rats (*Rattus* spp.) are present. The biologists encountered various pet domestic dogs (*Canis f. familiaris*) but no indication that wild dogs are present in the area. Although the biologists did not see wild pigs (*Sus s. scrofa*) or goats (*Capra h. hircus*), they are known to be present in this part of Kaua'i. None of these alien mammals have conservation value and all are deleterious to native flora and fauna.

As with all of Kaua'i, Hā'ena State Park may also be used by the State's only endemic mammal, the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), which is listed as an endangered species. Hawaiian hoary bats are cryptic and little is known of their habits or habitat in Kaua'i, but they often seen in the Hanalei area. They can be regularly observed foraging on insects attracted by the lights of a gas station on the highway in Princeville (R. David, 2008, pers. comm. to R. Terry).

Endangered Hawaiian monk seals (*Monachus schauinslandi*) primarily inhabit the remote Northwestern Hawaiian Islands, which because of the relative lack of disturbance are excellent habitat for the seals to swim and dive for fish, spiny lobsters, octopuses, and eels. Monk seals spend most of their time in the ocean, but come ashore to rest on beaches and even utilize fringe vegetation as shelter from storms. They are increasingly being seen in the main Hawaiian Islands, and are frequently observed (and have been observed by our team at different times) at Hā'ena State Park. Monk seals can become agitated and sometimes aggressive if people approach too closely or are too loud. Disturbing them may also interrupt resting periods and may even cause a mother seals to abandon their pups. Feeding monk seals may adversely change their natural foraging instincts. Hawaiian monk seals are also susceptible to diseases spread by the feral mammals sometimes present in parks, such as leptospirosis (transmitted mainly through feral mammal urine in water) and toxoplasmosis (associated with feral cats).

Table 2
Mammal, Reptile and Amphibian Species Identified in/Near Ha'ena State Park

Scientific Name	Common Name	Status
All species in January 2009 survey		
<i>Rana catesbeiana</i>	Bullfrog	A
UnID'd (Family: <i>Scincidae</i>)	Skink	A
<i>Anolis carolinensis</i>	Green Anole	A
UnID'd (Family: <i>Gekkonidae</i>)	Gecko	A
<i>Felis catus</i>	Cat	A
Native species detected in previous documented surveys		
<i>Lasiurus cinereus semotus</i>	Hawaiian Hoary Bat	E, End
<i>Monachus schauinslandi</i>	Hawaiian Monk Seal	I, End
<i>Chelonia mydas</i>	Green Sea Turtle	I, Th
<i>Eretmochelys imbricata</i> *	Hawksbill Turtle	I, End

Notes: Alien (A), Indigenous (I), Endemic (I), Endangered (End), Threatened (Th); * not confirmed

Three species of reptile, a skink not identified to the species level, a green anole (*Anolis carolinensis*), and a gecko not identified to the species level, as well as one species of amphibian, the bullfrog (*Rana catesbeiana*), were detected during the survey. These species are all common on Kaua'i. There are undoubtedly other species of lizard and frog present in or near the park. The infamously noisy coqui frog (*Eleutherodactylus coqui*) is not yet present on Kaua'i.

Limahuli Stream Fishes

A number of stream surveys have been conducted for Limahuli Stream in its lower, middle and upper reaches. The Hawai'i Stream Research Center (UH-HSRC) was established in 1996 through a partnership between Limahuli Garden (The National Tropical Botanical Garden) and the Hawai'i Division of Aquatic Resources (DAR) to develop and implement a Long Term Ecological Research (LTER) Program monitoring biological structure and function in Limahuli Stream at the ahupua'a-watershed scale. An unpublished report from 2001 by Mike Kido of DAR supplied as part of background material for this survey discussed the findings to date on Limahuli Stream. It appears to be a continuous, perennial system, with an average flow from 1994 to 1999 measured at 6.3 million gallons per day, stabilized by substantial groundwater flow at times when drought limits surface runoff. It drops from an elevation of about 2,000 feet over a distance of less than four miles. The riparian zones adjacent to Limahuli Stream are dominated by invasive tree species that provide heavy shade and contribute substantial organic material in the form of plant litter, which flows to ocean during floods. Ha'ena State Park includes only the very lowest 1,000-foot stretch of Limahuli Stream. This portion is critical, however, because it provides the connection between the stream and the ocean for a number of fish species that are diadromous, meaning they must spend part of their life cycle in the sea and part in a stream.

Five species of endemic and indigenous Hawaiian gobies (o'opu) may inhabit this stream, including the o'opu alamo (*Lentipes concolor*), o'opu nopili (*Sicyopterus stimpsoni*), o'opu naniha (*Stenogobius hawaiiensis*), o'opu akupa (*Eleotris sandwicensis*) and o'opu nakea (*Awaous guamensis*). These o'opu live their adult lives and lay their eggs in the streams, but upon hatching, the larvae drift out to sea where they develop as plankton for a number of months before returning to fresh water. The alamo'o, nopili, and nakea may be found furthest up Limahuli Stream because their sucker-like pectoral fins allow them to climb waterfalls, whereas naniha and akupa lack this ability and would only inhabit the sections of the stream nearest the ocean.

According to the Kido report referenced above, several years of population monitoring studies showed

...a relatively fixed species distribution pattern over time along the “mauka to makai” stream continuum despite variation in species population densities and ranges of species overlap. This is the first documented evidence for a stable population distribution pattern for native fish and invertebrates along the continuum of a Hawaiian stream. Native ‘o‘opu populations in Limahuli Stream are relatively robust overall; however, densities of the herbivorous ‘o‘opu-nopili (*Sicyopterus stimpsoni*) are significantly lower than that in neighboring Hanakapiai Stream at similar elevations. A plausible cause is the light limitation induced by the aggressive alien riparian canopy which lowers primary production levels and regulates algal diversity.

According to Kido, although a number of alien invertebrates are present in Limahuli Stream, alien fish species had been limited, at least until 2001, to periodic invasions near the stream mouth by the alien poeciliid fishes swordtails (*Xiphophorus helleri*) and guppies (*Poecilia reticulata*). The source of these intrusions are poeciliid populations in the *auwai* system that withdraws water from Limahuli Stream just mauka of Kūhio Highway and empties into the stream near its mouth after passing through old taro lands. Poeciliids were also found to in the ponds and marshes near the cultivated areas. As these poeciliid fishes are known vectors of pathogenic parasites that infect native ‘o‘opu species, DAR has researched chemical control.

For the current inventory, our limited survey of Limahuli Stream below Kūhio Highway over the course of two hours on January 18 identified only one species of juvenile fish, which appeared to be aholehole (*Kuhlia sandvicensis*)¹. No ‘o‘opu were apparent. During January, alamo‘o and nopili hatchlings, which have hatched far upstream and traveled downstream as larvae, are developing within the ocean, in preparation for swimming upstream during February to May. Nakea breed in areas just above the stream mouth from August to November and may create swarms, but by January the hatchlings are also in the ocean. It is therefore unsurprising that these three species of ‘o‘opu were not observed. As discussed above, naniha and akupa cannot climb waterfalls and might be more likely to be found near the mouth of Limahuli Stream year-round (Yamamoto and Tagawa 2000).

¹ The number of aholehole species in Hawai‘i and their proper names are currently the subject of discussion. This report will utilize the traditional common and scientific names, and because only fry were observed, does not attempt to determine the precise species. See Randall, J.E. and Randall, H.A., 2001. “Review of the Fishes of the Genus *Kuhlia* (Perciformes: Kuhliidae) of the Central Pacific.” *Pacific Science* 55(3) http://www.hawaiiifishes.com/fish_of_month/past_fom/fom_05_05.htm for discussion and

Table 3
Fish Species Identified in Limahuli Stream

Scientific Name	Common Name	Status
IN January 2009 Survey		
<i>Kuhlia sandvicensis</i>	Aholehole	I
IN previous documented surveys*		
<i>Lentipes concolor</i>	O'opu alamo	E
<i>Stenogobius hawaiiensis</i>	O'opu naniha	E
<i>Awaous guamensis</i>	O'opu nakea	I
<i>Sicyopterus stimpsoni</i>	O'opu nopili	E
<i>Eleotris sandwicensis</i>	O'opu akupa	E
<i>Xiphophorous helleri</i>	Swordtails	A
<i>Poecilia reticulata</i>	Guppies	A

Notes: Alien (A), Indigenous (I), Endemic (E)

*Records from Division of Aquatic Resources, and unpublished report by Mike Kido of DAR supplied to Geometrician Associates by PBR Hawaii Inc.

4. MANAGEMENT RECOMMENDATIONS

Sensitive Resources and Areas

As discussed above, no listed or proposed threatened or endangered plant species (USFWS 2009) were found at Hā'ena State Park, and none are likely to be found. Several endangered seabird species fly over the park on their way to nesting sites in the mountains. The endangered Hawaiian hoary bat probably utilizes the area for foraging and may roost in trees or large shrubs.

Other than perhaps portions of the cliff, which while not dominated by native species, contain a diverse assemblage of natives, no areas of botanically significant vegetation are present at the park. As Nagata (1991) noted, although some native species are present, they are widely scattered and do not present ecologically meaningful patterns. Because of the relatively scarcity of native plants, the habitat value for native animals is not significant. The vegetation does perform other ecological functions, such as helping to absorb rainfall and thus avoid erosion and sedimentation, as well as retarding the rate of coastal erosion. This report does not evaluate the cultural significance of the vegetation, but it is important to note the general persistence of at least some of the culturally important native or Polynesian-introduced plants, despite being largely overwhelmed by invasive alien species. Limahuli Stream is an important resource for the conservation of native fishes (and other organisms) and merits protection.

Effects of Recreation Activities on Biological Resources

As Hā'ena State Park develops and visitor use grows there will be more pressure on its reef, shoreline, stream and botanical resources. In general, because the biological value of most of property aside from the shoreline and Limahuli Stream is modest, such threats are limited. However, the stream and the shoreline will continue to require protection, and if parts of the park are restored, the areas needing protection will expand.

Another impact faced by all parks is that they act as concentrated points for dropping off unwanted pet animals and releasing pests such as rats, coqui frogs, and non-native plant species. The public nature of parks and their general lack of security may make members of the public less reluctant to engage in these inappropriate activities deliberately and also make it likely that occasional accidental acts may occur. Hā'ena State Park is the gateway to the Na Pali trail and Kalalau Valley, and a large proportion of its visitors come from North America, Europe, Asia and Australia. Their hiking boots and camping gear may contain seeds, spores, and even live alien organisms.

Potential Restoration Opportunities

Although the current vegetation may not currently have great conservation value, there is potential to improve the species structure of the vegetation by removing aliens and planting native species, at least in selected environments. While some of the alien species detected in the survey are invasive at least to some degree, none are currently restricted to Hā'ena State Park and thus pose a risk of spreading regionally outward from the park. Therefore, the considerations related to removing invasives center on its utility towards restoring native vegetation and the cost and difficulty of maintenance.

Probably the most important opportunity is in the coastal areas occupied by the Strand, Ironwood and False Kamani Forest zones. According to research by PBR Hawaii Inc., historical photos indicate that the false kamani trees invaded since the tsunami of 1946 and 1960, prior to which the entire area was open coastal dunes. Restoration of a native dune ecosystem consisting of plants such as pohuehue, naupaka, nanea, pohinahina, nehe, pa'u-o-Hi'iaka, akiaki grass, milo, hala and kou, would provide an improved and more authentic vegetation. Nagata (1991) pointed out that ironwood and false kamani have been widely used for erosion control and are currently performing this function at least to some degree, and seem well-suited for the task. However, native species are also adapted to coastal environments and such an effort, if carefully conducted, would likely not increase and might in fact reduce coastal erosion. Restoration of these dunes would also improve habitat for common native shorebirds, including Kolea, 'Ulili, Ruddy Turnstone, Bristle-thighed Curlew, Sanderling, and Sandpiper.

Another area with potential for beneficial impact is restoration of the riparian areas around Limahuli Stream. A large proportion of the lands below 2,000 feet in elevation in Hawai'i is agricultural. Where streams flow through these areas, the surrounding riparian forest is becoming highly invaded by a number of alien tree species, particularly rose-apple (*Syzygium jambos*), waiawi, and to a lesser degree, Java plum (*Syzygium cumuni*), as at Hā'ena State Park. These trees are especially problematic in lowland riparian areas where they form a dense, closed canopy forest that effectively prevents sunlight from reaching the ground (Smith 1985). The deep shade produced by these trees likely prevents the establishment of a mid-canopy and ground cover layer in the forest. Because of this, much of the land beneath these forests consists of bare soil that erodes easily and likely produces large amounts of sedimentation into streams during rains. Dense shade may also prevent the growth and establishment of native riparian plant species. In streams, reduced sunlight limits the growth of benthic algae (Larned and Santos 2000), which are a major food source for many rare and federally endangered native fish (Fitzsimons et al. 2003) and invertebrates (Brasher 1997). A reduction in this important food source, coupled with increased sediment loading, could ultimately result in decreased habitat quality of streams.

Less critical but perhaps still of interest in the long run would be a program to restore selected areas of the talus slopes and cliff faces. As discussed above, these areas already offer the most pristine

native habitat and diversity of native species. The difficulty and hazard of working or visiting this environment, however, may dictate against a project such as this being implemented.

The restoration of threatened and endangered (T&E) plants species provides the opportunity to not only assist directly in native plant conservation but also to educate the public. State and private landowners may utilize T&E species as long as they obtain these plants from licensed nurseries and keep records that demonstrate this.

Restoring habitat that encourages repopulation by endangered *animal* species is another matter. It brings with it the responsibility to protect these animals once they are established. In order to provide for maximum compliance with State and federal endangered species laws, the State must enter into a "Safe Harbor Agreement" prior to undertaking the habitat improvement. This is a voluntary arrangement between the U.S. Fish and Wildlife Service and a cooperating non-federal landowner under the authority of Section 10(a)(1) of the Endangered Species Act of 1973, 16 U.S.C. 1536(b)(4), 1539(a)(1). Under the Safe Harbor Agreement and an associated enhancement of survival permit, the non-federal property owner implements actions that will result in a net conservation benefit for species listed under the Act without the risk of further restrictions pursuant to section 9 of the Act, which prohibits take of listed species. The property owner also receives assurances related to modifications of the SHA or termination of the permit. Such agreements allow a landowner to promote threatened and endangered species on their property without liability for incidental takes that may occur. It might be possible to restore the small wetlands on the property with the purpose of creating native bird habitat that encourages native endangered waterbirds such as Nene, Koloa (which already utilize the pond), or Black-necked Stilts. However, the wetlands area is so small that it would be of limited value. Furthermore it is located directly adjacent to the road, where endangered birds might be harassed, injured or killed directly or indirectly by people or their pets. For both practical and legal reasons, we advise against modifying this small wetlands to attract endangered birds.

Landscape design including plantings, signage and trails can be designed to not only access, beautify, and interpret places within the park, but also to protect certain environments. If the park undertakes restoration of the strand, convenient trails should be established to direct foot traffic along paths that minimize trampling of vegetation. Signage can educate visitors and help protect plants. Limahuli Stream should be protected from use as a trash can or toilet through signage. If restored, the wetlands should be protected through fringing vegetation that encourages viewing but discourages direct entry. Although it is unlikely that many visitors will clamber up the steep, slippery and vegetation-tangled talus areas to access the cliffs (aside from the established trail accessing the Wai-a-ka-pala'e Wet Cave and the Rock Shelter features), any new trails in this area should consider both visitor hazard and native plant preservation.

Specific Management Recommendations

The following management measures are recommended to minimize impacts to biological resources:

- Park planning, particularly the location of trails and destinations, warning signage, and security personnel training and duties, must take into account balancing recreation and ecosystem protection.
- Signage and other educational material should be developed and distributed to advise the visiting public about the value of native species and not to drop off pests or unwanted pets.
- Park personnel, DLNR experts, and volunteers should monitor the park periodically for invasive species.

- Landscaping should avoid invasive species, as well as employ native species to the greatest degree consistent with project goals. Given the alien character of the vegetation and the presence of many invasive species, landscaping with natives could substantially improve on the existing botanical environment and bird habitat.
- When restoring with threatened and endangered plant species, ensure that all plant material is obtained from licensed nurseries and that records are kept to demonstrate this.
- Landscape design including plantings, signage and trails should be designed to protect the strand, stream and wetlands environments.
- In order to prevent impacts to Hawaiian hoary bats, State Parks should restrict any cutting of large shrubs or trees to periods outside the April to August pupping period for Hawaiian hoary bats.
- To reduce the potential for interactions between nocturnally flying threatened or endangered seabirds, any external lighting planned to be used during construction or within the completed project must be shielded so that light shines only downward.
- The park should continue cooperation with federal, State of Hawai‘i, and non-profit organizations that help protect Hawaiian monk seals from natural and human threats.
- The park should continue to cooperate with the Division of Aquatic Resources to keep new alien fish out of *auwai* and stream and in ridding stream of periodic invasions of swordtails, guppies, and other alien fish.

REFERENCES

- Brasher, A. M. 1997. *Life history characteristics of the native Hawaiian stream snail Neritina granosa (hihiwai)*. Cooperative National Park Resources Studies Unit Hawaii Technical Report 114, 46p.
- Fitzsimons, J. M., M. G. McRae, H. L. Scheoenfuss, and R. T. Nishimoto. 2003. "Gardening behaviour in the amphidromous Hawaiian fish *Sicyopterus stimpsoni* (Osteichthyes: Gobiidae)." *Ichthyological Exploration of Freshwaters* **14**:185-191.
- Gagne, W., and L. Cuddihy. 1990. "Vegetation," pp. 45-114 in W.L. Wagner, D.R. Herbst, and S.H. Sohmer, eds., *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- Handy, E.S.C. & E.G. Handy. 1972. *Native Planters in Old Hawaii*. Bernice P. Bishop Museum Bull. 233. Honolulu.
- Hawai'i State of Department of Agriculture. 1979. Foreign Noxious Weed Survey. A cooperative function of Hawaii Dept. of Agriculture & U.S. Dept. of Agriculture
- Larned, S. T., and S. R. Santos. 2000. "Light- and nutrient-limited periphyton in low order streams of Oahu, Hawaii." *Hydrobiologia* **432**:101-111.
- Macdonald, G.A., A.T. Abbott, and F.L. Peterson. 1986. *Volcanoes in the Sea: The Geology of Hawaii*. 2nd ed. Honolulu: University of Hawai'i Press.
- McKeown, S. 1996. *A Field Guide to Reptiles and Amphibians in the Hawaiian Islands*. Honolulu: Diamond Head Publishing.
- Nagata, K. M. 1991. Botanical Survey, Hā'ena State Park, Hā'ena, Kaua'i. Prep. for Division of State Parks, Hawai'i DLNR, Honolulu.
- Palmer, D.D. 2002. *Hawai'i's Ferns and Fern Allies*. Honolulu: University of Hawai'i Press.
- Ripperton, J.C. & E.Y. Hosaka. 1942. "Vegetation Zones of Hawaii." *Hawai'i Agric. Exp. Sta. Bull.* No. 89. Honolulu.
- Smith, Clifford W. 1985. "Impact of alien plants on Hawai'i's native biota." In: Charles P. Stone and J. Michael Scott, eds. *Hawai'i's Terrestrial Ecosystems: Preservation and Management*. Cooperative National Park Resources Studies Unit, University of Hawaii, Manoa. p. 186.
- University of Hawai'i at Hilo, Dept. of Geography. 1998. *Atlas of Hawai'i*. 3rd ed. Honolulu: University of Hawai'i Press.
- U.S. Department of the Army (Army Corps of Engineers [USACOE]). 1987. Corps of Engineers *Wetlands Delineation Manual*. Prep. By Environmental Laboratory, Department of the Army, Vicksburg, MS.

- U.S. Fish and Wildlife Service (USFWS). 2009. *USFWS Threatened and Endangered Species System (TESS)*. Washington: GPO. http://ecos.fws.gov/tess_public/StartTESS.do
- W. L. Wagner, D.R. Herbst, and S.H. Sohmer, eds. 1990. *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- Yamamoto, M.N., and A.W. Tagawa. 2000. *Hawai'i's Native and Exotic Freshwater Animals*. Honolulu: Mutual Publishing.

Appendix 1
Plant Species Identified in/Near Ha'ena State Park

Scientific Name	Family	Common Name	Life Form	Status*
<i>Adiantum raddianum</i>	Pteridaceae	Maidenhair fern	Fern	A
<i>Ageratum conyzoides</i>	Asteraceae	Maile honohono	Grass	A
<i>Aleurites moluccana</i>	Euphorbiaceae	Kukui	Tree	P
<i>Alocasia sp.</i>	Araceae	'Ape	Herb	P
<i>Alpinia mutica</i>	Zingiberaceae	Small shell ginger	Herb	A
<i>Alpinia purpurata</i>	Zingiberaceae	Red ginger	Herb	A
<i>Alpinia zerumbet</i>	Zingiberaceae	Shell ginger	Herb	A, INV
<i>Archontophoenix alexandrae</i>	Arecaceae	King palm	Tree	A, INV
<i>Artemisia kauaiensis</i>	Asteraceae	'Ahinahina	Shrub	E
<i>Artocarpus altilis</i>	Moraceae	Breadfruit	Tree	P
<i>Artocarpus heterophyllus</i>	Moraceae	Jack fruit	Tree	A
<i>Bidens forbsii</i>	Asteraceae	Ko'oko'olau	Shrub	E
<i>Blechnum appendiculatum</i>	Blechnaceae	Blechnum	Fern	A
<i>Bougainvillea sp.</i>	Nyctaginaceae	Bougainvillea	Shrub	A
<i>Canavalia cathartica</i>	Fabaceae	Mauna Loa	Vine	A
<i>Carex meyenii</i>	Cyperaceae	Carex	Sedge	I
<i>Carica papaya</i>	Caricaceae	Papaya	Tree	A, INV
<i>Casuarina equisetifolia</i>	Casuarinaceae	Ironwood	Tree	A
<i>Cenchrus echinatus</i>	Poaceae	Common sandbur	Grass	A
<i>Chamaecrista nictitans</i>	Fabaceae	Partridge Pea	Herb	A
<i>Chamaesyce celastroides</i>	Euphorbiaceae	Akoko	Shrub	E
<i>Chloris barbata</i>	Poaceae	Swollen finger grass	Grass	A
<i>Chloris radiatae</i>	Poaceae	Radiate finger grass	Grass	A
<i>Christella dentata</i>	Thelypteridaceae	Pai'i'iha	Fern	A
<i>Cinnamomum verum</i>	Lauraceae	Cinnamon tree	Tree	A, INV
<i>Citrus sp.</i>	Rutaceae	Citrus	Tree	A
<i>Clidemia hirta</i>	Melastomataceae	Coster's curse	Shrub	A, INV
<i>Clusia rosea</i>	Clusiaceae	Autograph tree	Tree	A
<i>Cocos nucifera</i>	Arecaceae	Niu	Tree	P
<i>Colocasia esculenta</i>	Araceae	Taro	Herb	P
<i>Coffea arabica</i>	Rubiaceae	Coffee	Shrub	A
<i>Coix lachrymal-jobi</i>	Poaceae	Job's tears	Grass	A
<i>Commelina diffusa</i>	Commelinaceae	Honohono	Herb	A
<i>Cordia subcordata</i>	Boraginaceae	Kou	Tree	I
<i>Cordyline fruticosa</i>	Agavaceae	Ki	Shrub	P
<i>Costus speciosus</i>	Costaceae	Spiral flag	Herb	A
<i>Crinum asiaticum</i>	Amaryllidaceae	Spider lily	Herb	A
<i>Cynodon dactylon</i>	Poaceae	Bermuda grass	Grass	A
<i>Cyperus papyrus</i>	Cyperaceae	Papyrus	Sedge	A
<i>Cyperus polystachyus</i>	Cyperaceae	None	Sedge	I
<i>Desmodium incanum</i>	Fabaceae	Desmodium	Herb	A
<i>Desmodium sandwicense</i>	Fabaceae	Spanish clover	Vine	A
<i>Desmodium tortuosum</i>	Fabaceae	Florida beggarweed	Herb	A
<i>Dieffenbachia sp.</i>	Araceae	Dumb cane	Shrub	A

Appendix 1, continued
Plant Species Identified in/Near Ha'ena State Park

Scientific Name	Family	Common Name	Life Form	Status*
<i>Digitaria setigera</i>	Poaceae	Kukaipua'a	Grass	I?
<i>Doryopteris decipiens</i>	Pteridaceae	Kumuniu	Fern	E
<i>Elephantopus mollis</i>	Asteraceae	Elephant's foot	Shrub	A
<i>Eleusine indica</i>	Poaceae	Wire grass	Grass	A
<i>Emilia fosbergii</i>	Asteraceae	Pualele	Herb	A
<i>Epidendrum x obrienianum</i>	Orchidaceae	Scarlet orchid	Herb	A
<i>Epipremnum pinnatum</i>	Araceae	Pothos	Vine	A
<i>Ficus microcarpa</i>	Moraceae	Chinese banyan	Tree	A
<i>Gladiolus x hortulanus</i>	Iridaceae	Gladiolus	Herb	A
<i>Heliconia humilis</i>	Musaceae	Common heliconia	Shrub	A
<i>Hibiscus sp.</i>	Malvaceae	Hibiscus	Shrub	A
<i>Hibiscus tiliaceus</i>	Malvaceae	Hau	Tree	I
<i>Ipomoea indica</i>	Convolvulaceae	Koali	Vine	I
<i>Ipomoea pes-caprae</i>	Convolvulaceae	Pohuehue	Vine	I
<i>Ipomoea triloba</i>	Convolvulaceae	Little bell	Vine	A
<i>Kalanchoe pinnata</i>	Crassulaceae	Air plant	Shrub	A
<i>Lepisorus thunbergianus</i>	Polypodiaceae	pakahakaha	Fern	I
<i>Leucaena leucocephala</i>	Fabaceae	Koa haole	Tree	A
<i>Livistona chinensis</i>	Arecaceae	Chinese fan palm	Tree	A
<i>Macadamia ternifolia</i>	Proteaceae	Macadamia	Tree	A
<i>Macroptilium lathyroides</i>	Fabaceae	Cowpea	Vine	A
<i>Malvaviscus penduliflorus</i>	Malvaceae	Turk's cap	Shrub	A
<i>Mangifera indica</i>	Anacardiaceae	Mango	Tree	A
<i>Melinis minutiflora</i>	Poaceae	Molasses grass	Grass	A
<i>Metrosideros polymorpha</i>	Myrtaceae	'Ohi'a lehua	Tree	E
<i>Mimosa pudica</i>	Fabaceae	Sensitive plant	Herb	A
<i>Morinda citrifolia</i>	Rubiaceae	Noni	Tree	P, INV
<i>Musa x paradisiaca</i>	Musaceae	Banana	Shrub	P
<i>Nephrolepis exaltata hawaiiensis</i>	Nephrolepidaceae	Ni'ani'au	Fern	E
<i>Noronhia emarginata</i>	Oleaceae	Madagascar olive	Tree	A
<i>Oplismenus hirtellus</i>	Poaceae	Basket grass	Grass	A
<i>Pandanus tectorius</i>	Pandanaceae	Hala	Tree	I
<i>Panicum maximum</i>	Poaceae	Guinea grass	Herb	A, INV-H
<i>Paspalum conjugatum</i>	Poaceae	Hilo grass	Grass	A, INV-H
<i>Paspalum vaginatum</i>	Poaceae	Seashore paspalum	Grass	A, INV
<i>Passiflora edulis</i>	Passifloraceae	Lilikoi	Vine	A
<i>Passiflora laurifolia</i>	Passifloraceae	Yellow water lemon	Vine	A
<i>Peperomia leptostachya</i>	Piperaceae	'Ala'alawainui	Herb	I
<i>Persea americana</i>	Lauraceae	Avocado	Tree	A
<i>Phlebodium aureum</i>	Polypodiaceae	Rabbit's foot fern	Fern	A
<i>Phymatosorus grossus</i>	Polypodiaceae	Laua'e	Fern	A
<i>Plantago lanceolata</i>	Plantaginaceae	Narrow leaved plantain	Herb	A
<i>Plantago major</i>	Plantaginaceae	Common plantain	Herb	A
<i>Plectranthus parviflorus</i>	Lamiaceae	'Ala'alawainui	Herb	I

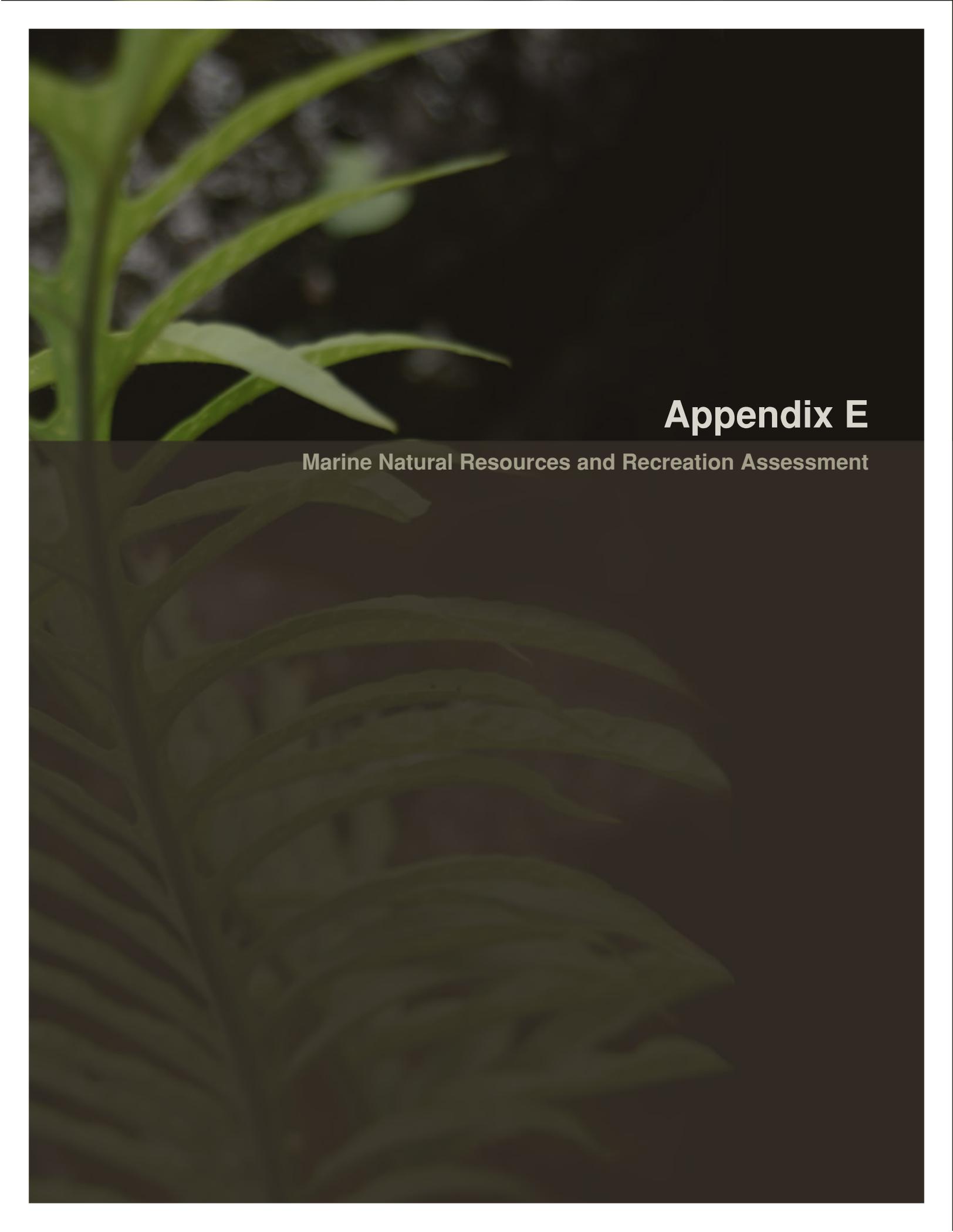
Appendix 1, continued
Plant Species Identified in/Near Ha'ena State Park

Scientific Name	Family	Common Name	Life Form	Status*
<i>Pluchea symphytifolia</i>	Asteraceae	Sourbush	Shrub	A
<i>Plumeria sp.</i>	Apocynaceae	Plumeria	Tree	A
<i>Polyscias sp.</i>	Araliaceae	Panax	Tree	A
<i>Psidium cattleianum</i>	Myrtaceae	Strawberry guava	Tree	A, INV-H
<i>Psidium guajava</i>	Myrtaceae	Guava	Tree	A, INV-H
<i>Psilotum nudum</i>	Psilotaceae	Moa	Fern ally	I
<i>Ptychosperma elegans</i>	Arecaceae	Solitaire palm	Tree	A
<i>Rhapis excelsa</i>	Arecaceae	Bamboo palm	Tree	A
<i>Ricinus communis</i>	Euphorbiaceae	Castor bean	Tree	A
<i>Rivina humilis</i>	Phytolaccaceae	Coral berry	Shrub	A
<i>Rosa sp.</i>	Rosaceae	Rose	Shrub	A
<i>Saccharum officinarum</i>	Poaceae	Sugar cane	Grass	P
<i>Sacciolepis indica</i>	Poaceae	Glenwood grass	Grass	A
<i>Samanea saman</i>	Fabaceae	Monkeypod	Tree	A
<i>Scaevola taccada</i>	Goodeniaceae	Naupaka	Shrub	I
<i>Schefflera actinophylla</i>	Araliaceae	Octopus tree	Tree	A, INV-H
<i>Schinus terebinthifolius</i>	Anacardiaceae	Christmas berry	Tree	A, INV-H
<i>Senna pendula</i>	Fabaceae	Senna	Shrub	A
<i>Setaria gracilis</i>	Poaceae	Yellow foxtail	Grass	A
<i>Sida acuta</i>	Malvaceae	Sida	Shrub	A
<i>Solanum americanum</i>	Solanaceae	Popolo	Shrub	I
<i>Spathodea campanulata</i>	Bignoniaceae	African Tulip tree	Tree	A
<i>Spathoglottis plicata</i>	Orchidaceae	Philippine ground orchid	Herb	A
<i>Sphenomeris chinensis</i>	Lindsaeaceae	Pala'a	Fern	I
<i>Spondias dulcis</i>	Anacardiaceae	Otaheite apple	Tree	A
<i>Sporobolus indicus</i>	Poaceae	West Indian dropseed	Grass	A
<i>Stachytarpheta jamaicensis</i>	Verbenaceae	Jamaica vervain	Shrub	A
<i>Synedrella nodiflora</i>	Asteraceae	Nodeweed	Herb	A
<i>Syngonium auritum</i>	Araceae	Five fingers	Vine	A
<i>Syzygium cumini</i>	Myrtaceae	Java plum	Tree	A
<i>Syzygium jambos</i>	Myrtaceae	Rose apple	Tree	A
<i>Syzygium malaccense</i>	Myrtaceae	Mountain apple	Tree	P
<i>Terminalia catappa</i>	Combretaceae	False kamani	Tree	A
<i>Thespesia populnea</i>	Malvaceae	Milo	Tree	I
<i>Tournefortia argentea</i>	Boraginaceae	Tree heliotrope	Tree	A
<i>Urochloa mutica</i>	Poaceae	California grass	Grass	A
<i>Verbena litoralis</i>	Verbenaceae	Owi	Herb	A
<i>Wedelia trilobata</i>	Asteraceae	Wedelia	Herb	A

Notes: Non-Polynesian-introduced Alien (A), (P) Polynesian-introduced, Indigenous (I), Endemic (I), Endangered (End)

INV, Likely to be invasive in Hawai'i and on other Pacific Islands as determined by the Hawai'i-Pacific Weed Risk Assessment of the USDA Forest Service, based on published sources describing species biology and behavior in Hawaii and/or other parts of the world.

INV-H Documented to cause significant ecological or economic harm in Hawai'i, as determined from published information on the species' current impacts in Hawai'i.



Appendix E

Marine Natural Resources and Recreation Assessment



**Marine Natural Resources
and Recreation Assessment,
Hā`ena State Park, Kaua`i, Hawai`i**

Prepared for
PBR Hawai`i
1001 Bishop Street, Suite 650
Honolulu, HI 96813

Prepared by
SWCA Environmental Consultants
201 Merchant Street, Suite 2310
Honolulu, HI 96813

February 2010

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0	Background	3
2.0	Introduction and Setting	3
3.0	Beach Erosion	9
4.0	Water Quality	9
5.0	Marine Biological Resources	10
6.0	Endangered Marine Species and Habitats	15
7.0	Recreational Resources and Assessment	19
7.1	Principal Existing Recreational Uses	19
7.2	Visitor Impacts	25
7.3	Park Management Requirements	30
7.4	Sustainability of Recreational Uses	30
7.5	Complementary and Conflicting Use Issues	31
7.6	Impacts of Increased Recreational Uses	34
8.0	Design Considerations and Resource Management Concepts	34
8.1	Water Quality Issues	34
8.2	Shoreline Erosion	34
8.3	Marine Resource Issues and Conservation	35
8.4	Mitigation of Conflicting Uses	36
8.5	Shoreline Access	36
9.0	Interpretive Concepts for Outdoor Recreational Use	37
10.0	Literature Cited	38

LIST OF FIGURES

1.0	Hā'ena State Park and Shoreline Sub Areas	5
2.0	Shallow Water Benthic Habitats – Zone	6
3.0	Shallow Water Benthic Habitats – Geomorphology	7
4.0	Shallow Water Benthic Habitats – Habitat	8
5.0	Draft Shoreline Erosion Map for Hā'ena State Park	12
6.0	Marine Management Areas at Hā'ena State Park	17
7.0	Reef Environment and Surf Breaks Map	23

LIST OF TABLES

1.0	State of Hawai'i Department of Health water quality monitoring data	10
2.0	List of marine shore fishes observed within and adjacent to Hā'ena State Park	13
3.0	CRAMP shallow water (1m) video-transect data of coral cover	14
4.0	CRAMP mid-water (10m) video-transect data of coral cover	15
5.0	Macroalgae observed at Ka'ilio Point, Hā'ena (Abbott and Hunter 2000).	18

1.0 Background

In March 2008, PBR Hawai'i tasked SWCA Environmental Consultants with the description of the marine resources of the Hā'ena State Park. The project encompasses 64 acres within the park boundaries and the adjacent nearshore waters and Kē'ē Beach. Information to be provided includes a description of the physical characteristics including shoreline erosion; inventory of biological resources, and an assessment of recreational resources and current visitor impacts. Included in these tasks is a discussion of special design considerations, resource management concepts, and interpretive concepts for marine recreation use.

The overall goal of the project is to plan for a public park that accommodates recreational opportunities, preserves the significant natural, cultural, and scenic resources, and enhances the natural park setting. The objectives of this project include refinement of the draft Community Preferred Master Plan prepared in 1999 by The Keith Companies, Inc., and providing information to support preparation of an EIS for the future development of Hā'ena State Park. The intent is to balance public usage of the park's recreational resources with the protection and preservation of the natural and scenic features and significant cultural resources within, and associated with, the park area.

SWCA conducted extensive literature reviews, and performed brief reconnaissance surveys of marine resources at the park, and compiled geospatial data to prepare resource maps. The report was prepared by Tiffany Thair, B.A., John Ford, M.S., Robert A. Kinzie III, Ph.D., and Ryan Taira, B.A.

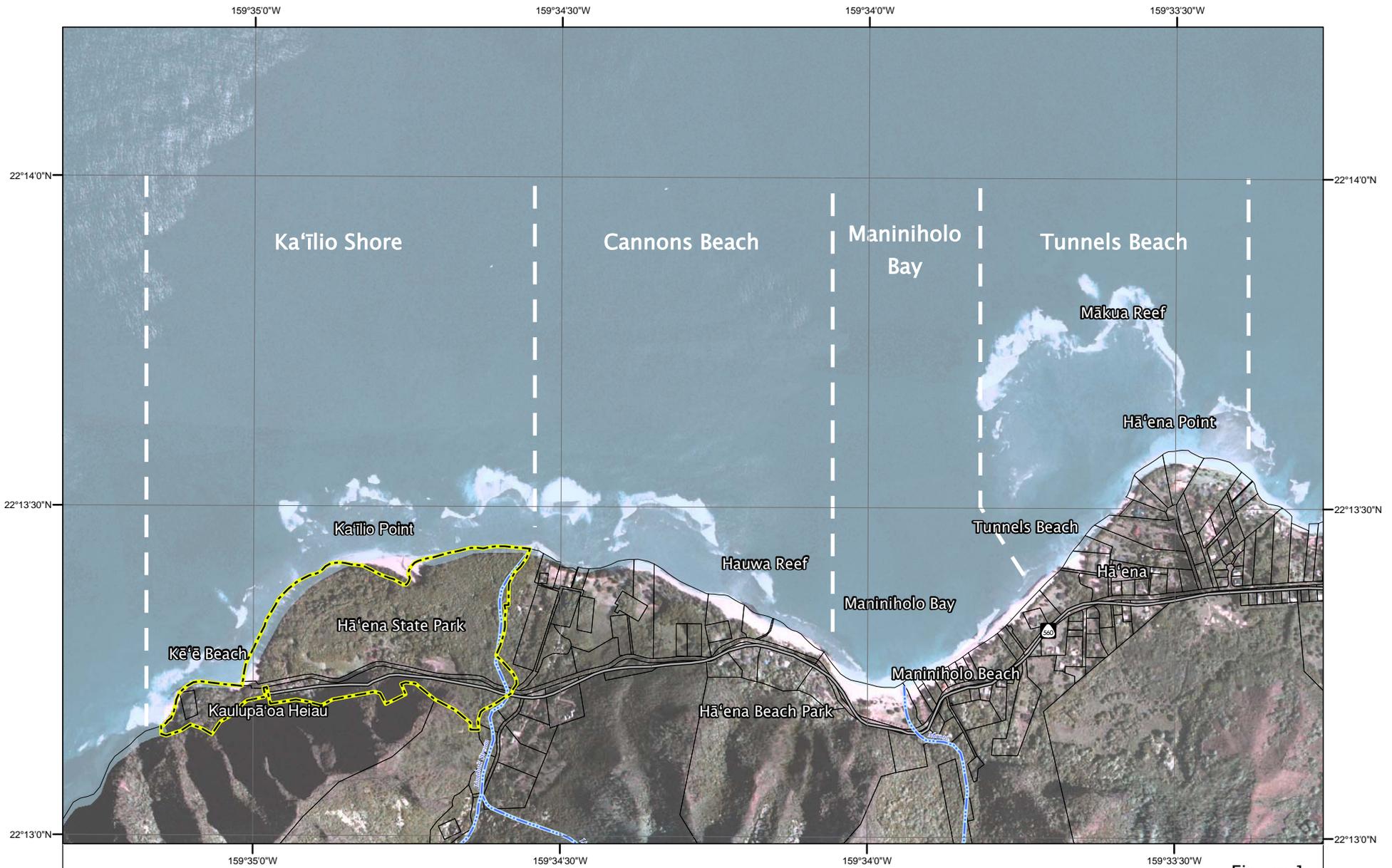
2.0 Introduction and Setting of the Coastal Environmental at Hā'ena State Park

Hā'ena State Park is located within Ka'ilio Shore sub-area of Hā'ena (Clark 1992). Four coastal sub-areas are recognized between Kē'ē and Hā'ena Point (Figure 1). The beaches of these areas are fringed with scattered beachrock slabs along the water line. The mouth of Limahuli Stream, a small intermittent stream, and freshwater seeps bisect the beach within the Park boundaries. The backbeach area consists of low sand dunes roughly 4 to 8 ft high that are overgrown with ironwood and false kamani trees. The roots of ironwood in many areas are exposed due to erosion by the action of storm waves. Immediately seaward of Kē'ē Beach, located within the Ka'ilio Shore, is a shallow lagoon that provides one of the most popular swimming areas in Hawai'i (Clark 1999). The lagoon is formed by a shallow fringing reef platform that joins the shore roughly 200 feet to the east of highway's end at Kē'ē Beach.

Clark (1992) provided a comprehensive description of the reef structure within the Park boundaries which remains accurate today. In 2003 and 2007, the Center for Coastal Monitoring and Assessment (CCMA), National Ocean Service, Biogeography Branch, in cooperation with Analytical Laboratories of Hawai'i, published detailed maps of the reef and benthic marine habitat at Hā'ena State Park (Figures 2-4). Sand and reef pavement comprise the dominant marine geomorphologic structures between Kē'ē Beach and Maninihola Bay to the east. From Maninihola Beach west to Hā'ena Point the reef consists of aggregate reef, scattered coral and rock, and rubble with small patches of reef pavement. The reef pavement is covered with macro-algae, coralline algae, and corals; however, the sandy lagoon floors and channels are uncolonized.

Ocean conditions at the Park are typical of exposed northern coasts in Hawai'i. Between October and May, North Pacific storm swells bring dangerously high surf in excess of 10 feet to the area (Clark 1992). When trade wind swells are prevalent between June and September, surf heights and swells at Hā'ena generally reduced (Clark 1992). North east trade winds are present between 90-95 percent of the year and almost always generate some surf activity on the outer reef margins. Predominant long shore currents run east to west outside the reef. Dangerous rip currents are created in reef channels by storm waves and tidal conditions. Haraguchi (1979) suggested tidal currents ranging from 0.1 to 1.0 knots, and Clark (1992) suggested that such current velocities were not usually a concern for nearshore ocean recreation

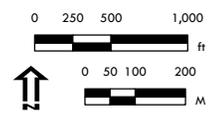
activities. Nevertheless, life guards at Kē'ē Beach strongly objected to SWCA biologists' plan to conduct snorkel surveys of the outer reef during a day with unusually calm conditions in November 2008.



Legend

-  Hā'ena State Park
-  Streams

Figure 1
Hā'ena State Park and Shoreline Sub-Areas



Source: State of Hawaii GIS; NOAA; PDC; Clark, J. 1992. Beach and ocean recreation study, Hā'ena, Kaua'i. Contract report prepared for Division of State Parks, Department of Land and Natural Resources, State of Hawaii, Honolulu. 49pp

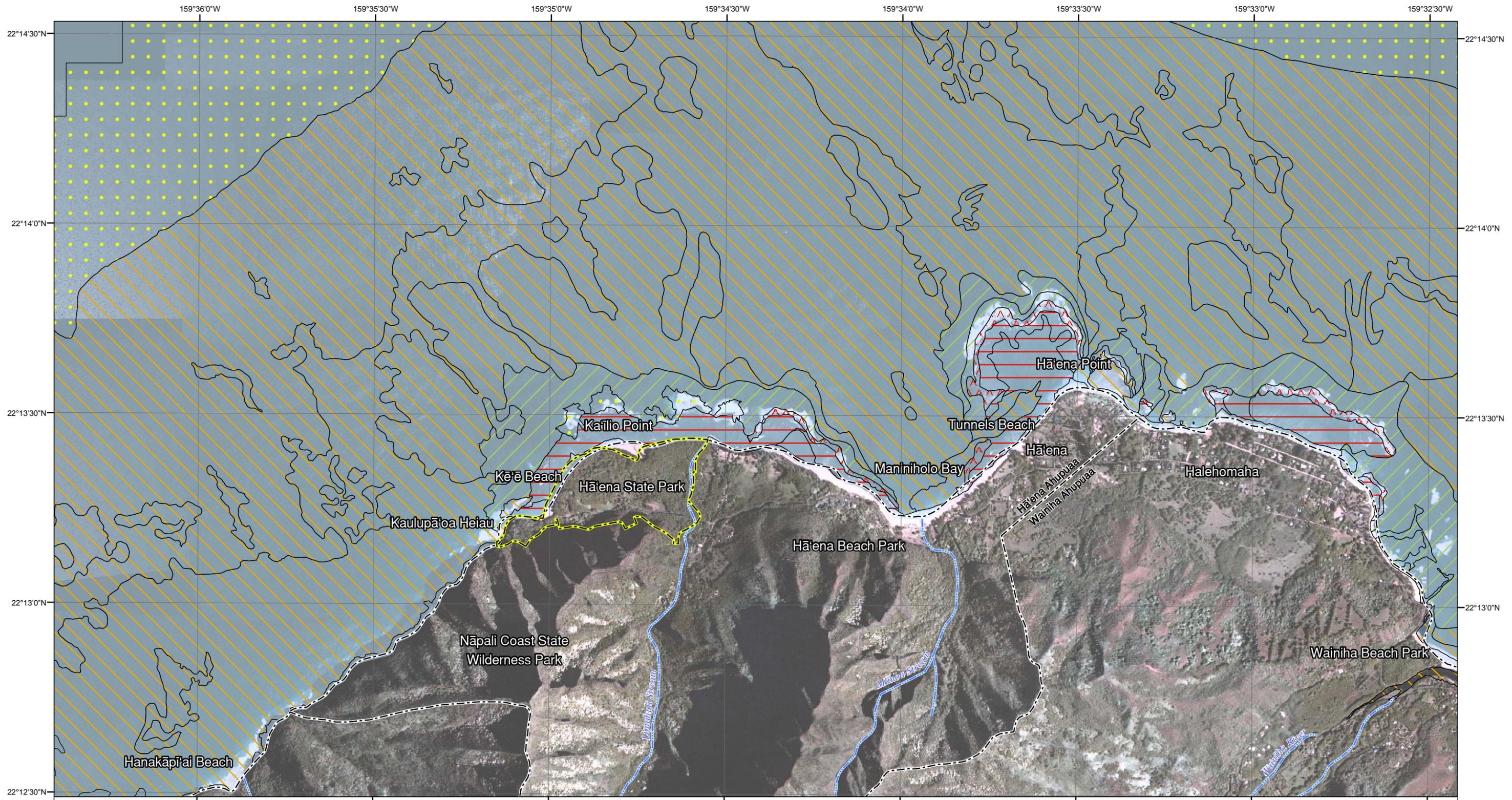
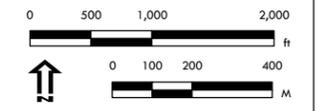
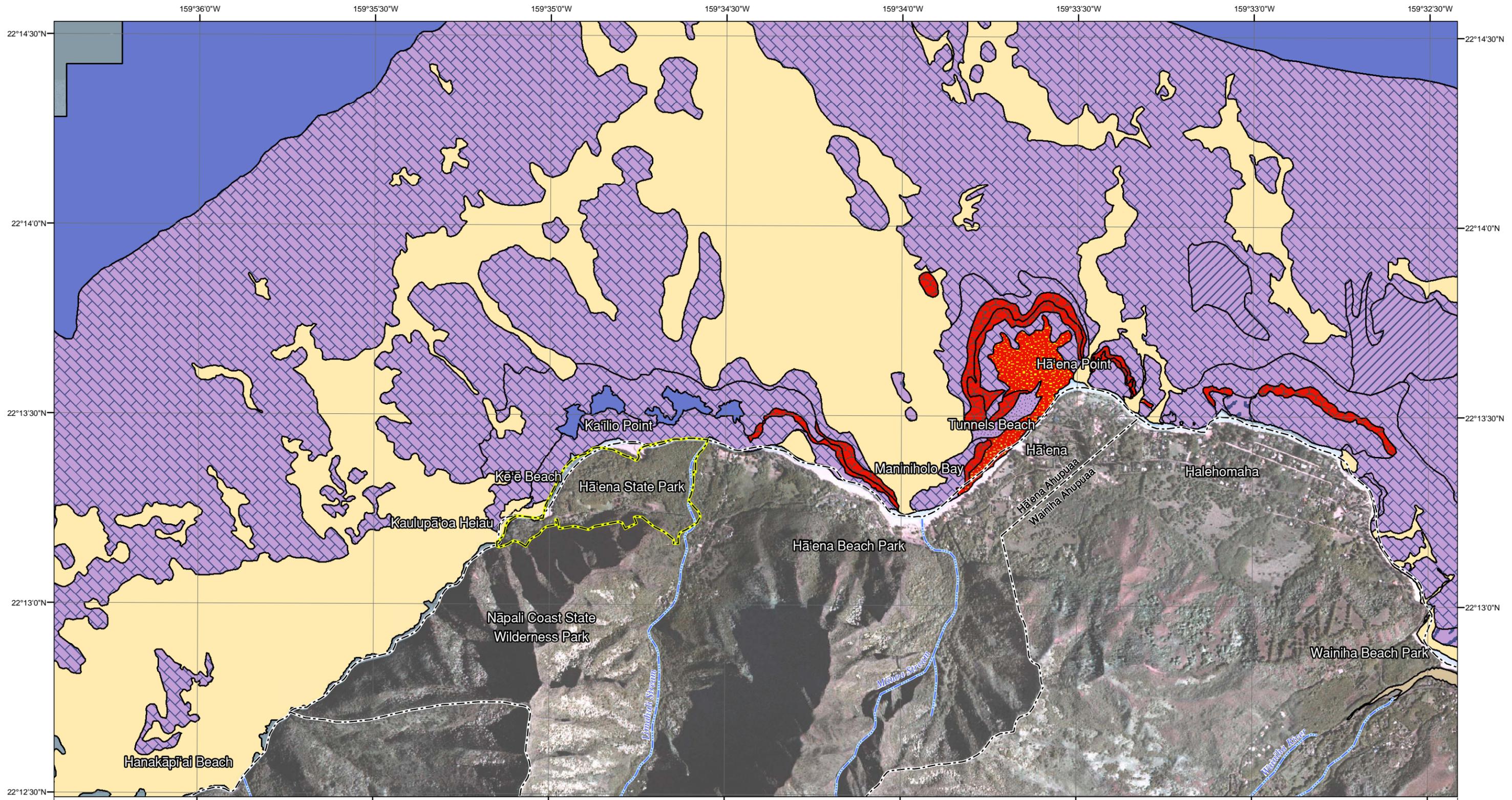


Figure 2
Shallow-Water Benthic Habitat - Zone



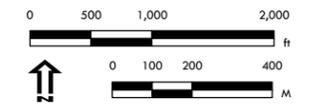
Source: State of Hawaii GIS, NOAA, PDC



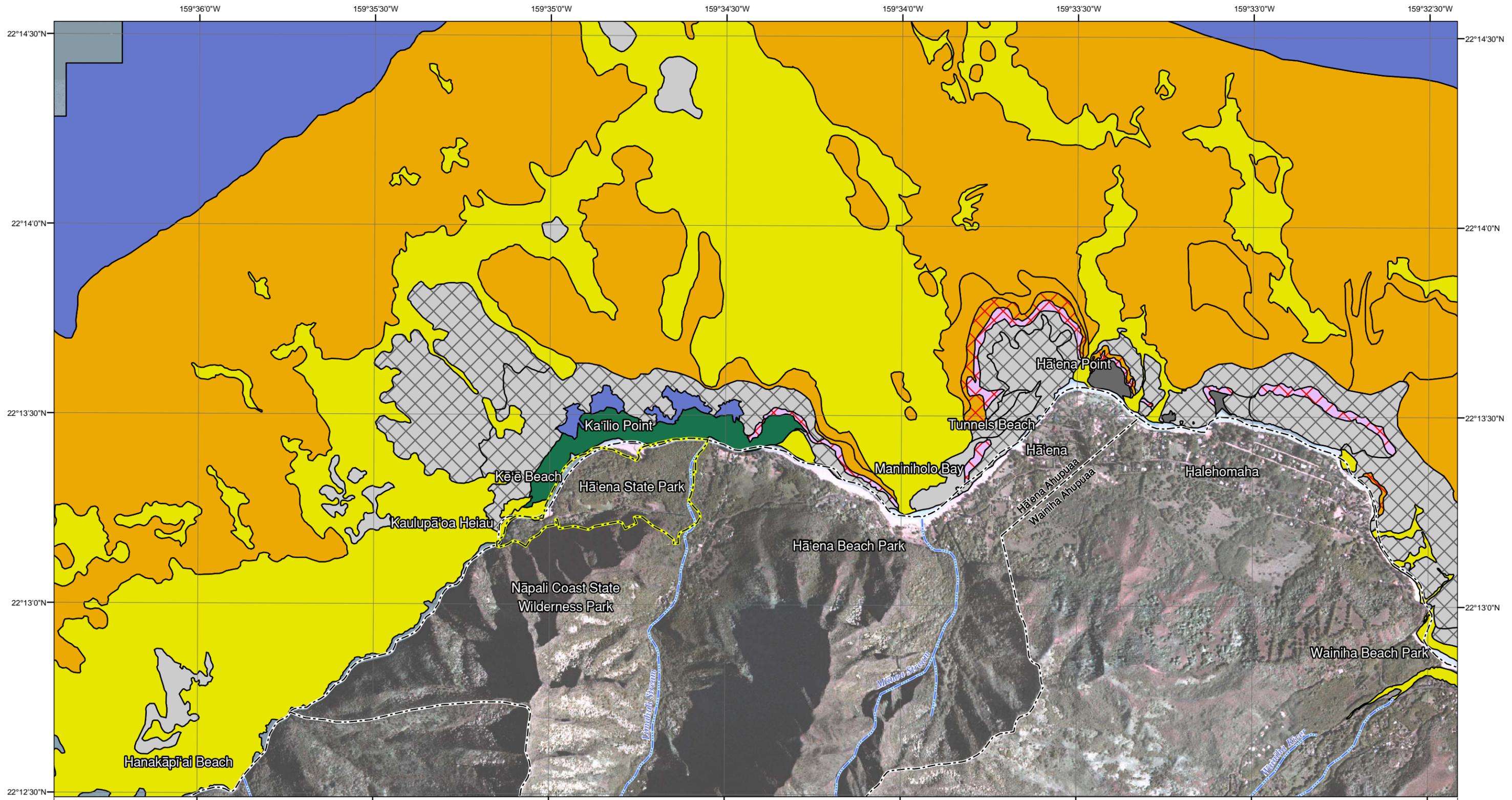
Legend

Hā'ena State Park	Benthic Habitat - Geomorphological Structure Types	Pavement with Sand Channels
Ahupuaa	Aggregate Reef	Rock/Boulder
Streams	Aggregated Patch Reef	Rubble
	Mud	Sand
	Pavement	Scattered Coral/Rock
		Unknown

Figure 3
Shallow-Water Benthic Habitat - Geomorphology



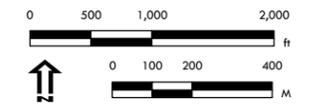
Source: State of Hawaii GIS, NOAA, PDC



Legend

- | | | |
|-------------------|---|-----------------------|
| Hā'ena State Park | Benthic Habitat – Biological Cover | Turf, 10%–<50% |
| Ahupuaa | Coral, 10%–<50% | Turf, 50%–<90% |
| Streams | Coralline Algae, 10%–<50% | Turf, 90%–100% |
| | Coralline Algae, 50%–<90% | Uncolonized, 90%–100% |
| | Macroalgae, 10%–<50% | Unknown |

Figure 4
Shallow-Water Benthic Habitat - Habitats



Source: State of Hawaii GIS, NOAA, PDC

3.0 Beach Erosion

Kē'ē Beach and shoreline of Hā'ena State Park are exposed to high surf during the winter months and occasionally during the summer months. Storm waves are responsible for erosion of sand dunes behind the beach. Waves sweeping across the beach undermine ironwood trees, exposing their roots and occasionally toppling them onto the beach. High surf also generates a powerful rip current that runs out the narrow channel at the west end of the lagoon to the open ocean creating a hazard for swimmers and divers.

To determine the extent of erosion and beach loss, the Hawai'i Shoreline Study, an initiative of the University of Hawai'i (UH) Coastal Geology Group (<http://www.soest.hawaii.edu/coasts/>), provides information on shoreline change data to assist in decision-making for actions affecting the coastal zone. The Surfrider Foundation maintains valuable links to beach erosion resources on its website (<http://www.surfrider.org/>).

The shoreline at Hā'ena State Park is subject to a number of natural hazards including tsunami, storm surge, high winds, coastal erosion, sea-level rise, and high waves. Evaluating changes to the configuration of shorelines helps define zones of avoidance for conservation of sensitive areas, and identify appropriate means to mitigation and control beach loss.

The UH erosion study area, bounded by Nāpali coast on the west and Hā'ena Point on the east, encompasses a total of 166 transects. Here the shoreline consists of carbonate sand, exposed beach rock, and basalt boulders deposited by stream discharge. The fringing reefs at Kē'ē, Limahuli, and Hā'ena cause waves to break in various directions along the shore. Figure 5 illustrates the draft results of beach loss studies conducted by the UH Coastal Geology Group in the vicinity of Kē'ē Beach and Hā'ena State Park. The UH Coastal Geology Group estimated that the overall rate of beach erosion between Kē'ē Beach and Hā'ena State Park is -0.9 ft/yr. Along the eastern-most portion of Hā'ena State Park sand is eroding at an average rate of -1.2 ft/yr, while the central area around Limahuli Stream mouth is eroding at an average rate of -1.0 ft/yr.

The western-most area by Kē'ē Beach is eroding at an average rate of -0.6 ft/yr. Figure 5 also illustrates the location of historic beach configurations mapped from previous aerial imagery and registered to a common coordinate system through the use of geographic information systems (GIS) technology.

4.0 Water Quality

The marine waters of the Hā'ena State Park are considered Class AA coastal waters by the State Department of Health (DOH) (HAR 11-54). Class AA waters possess high ecological and recreational value. It is the objective of Class AA waters that these remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent possible, the wilderness character of these areas is to be protected.

Within the defined reef at Hā'ena, Class AA waters are bounded by areas less than 18 meters (60 feet) in depth. Uses to be protected in the class of waters include oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment. Until recently, the coastal waters of Hā'ena State Park were not actively monitored by DOH. However, in late 2005, the DOH Clean Water Branch (CWB) and the Hanalei Watershed Hui (HWH) joined in the protection of Kaua'i beaches through a partnership between DOH and the community based organization. Hanalei Watershed Hui's involvement allowed DOH to increase the number of beaches that it monitors on Kaua'i, and the frequency at which they are sampled. Hā'ena Beach Park is one of the beaches covered under this agreement.

Table 1 illustrates the results of initial water quality sampling at Hā'ena State Park. DOH (2008) noted that state standards for enterococci were attained at Hā'ena. The reported parameters for temperature, salinity, dissolved oxygen, pH, and turbidity reflect clean coastal waters within Hawai'i DOH water quality

standards for Class AA waters. Coliform and enterococci levels are not reported here, but were found to be within state standards for Class AA waters.

Table 1. State of Hawai'i Department of Health water quality monitoring data collected at Kē'ē Lagoon within Hā'ena State Park.

Date	Time	Temp (C)	Salinity (PPT)	DO (mg/l)	DO (%)	pH	Turbidity (NTU)
1/18/2005	8:29:00 AM	24.09	34.52	6.13	93.2	8.17	5.47
8/4/2005	8:41:00 AM	24.84	34.41	5.06	78	7.92	0.7
8/10/2005	8:46:00 AM	26.16	34.4	5.38	85.1	7.97	0.84
8/17/2005	8:50:00 AM	25.73	34.53	4.58	71.9	7.95	0.69
8/31/2005	8:59:00 AM	26.82	34.44	5.26	83.9	8	0.79
9/8/2005	8:53:00 AM	25.95	34.39	5.8	91.1	8.12	1.61
9/14/2005	8:52:00 AM	26.02	34.17	5.99	94	8.12	3.27
9/21/2005	8:52:00 AM	26.13	33.66	5.59	87.9	8.07	2.47
9/28/2005	8:34:00 AM	25.61	33.78	5.74	89.3	8.16	1.08
12/12/2006	8:03:00 AM	24.78	35	6.12	91.2	8.03	2.37

5.0 Marine Biological Resources

Clark (1992) presented a general description of marine resources within the Park boundaries. The results of five previous marine studies of Kē'ē Beach and reef (The Keith Companies 2001; Stepath 1999); Limahuli Beach and reef (Jokiel and Brown 2000); and nearby Hanalei Bay (Friedlander and Parrish 1998) were cited to prepare a description of the nearshore marine environment. These studies were supplemented with a brief snorkel reconnaissance of the Kē'ē Lagoon and inner reef flat conducted on November 3, 2008 by SWCA biologists Dr. Robert Kinzie and John Ford. Additional anecdotal information on species observed by others was obtained from oral histories recorded by Maly and Maly (2003), and related records of interviews with area residents and fishermen (PBR database).

Eighty (80) fish species representing 26 families have been reported from nearshore waters along the north shore of Kaua'i by the four previous surveys referenced above (Table 2). Species abundance and diversity within the Kē'ē Lagoon and reef flat is lower than that found at the outer reef/offshore sites (Jokiel and Brown 2000, Stepath 1999, this study), with only 46 species of fishes occurring here. Kē'ē Lagoon and reef flat provide an excellent habitat for juvenile reef fishes. Fish assemblages in the Limahuli offshore study site had the greatest number of individuals and highest biomass observed on fish transects around Kaua'i in 1999 (Friedlander 2000). Wrasses, surgeonfishes, and damselfishes comprised the majority of the species observed in the lagoon and along the reef flat at Kē'ē. Small schools of weke'ula (*Mulloidichthys vanicolensis*), hinalea lau-wili (*Thalassoma duperrey*), ma'i'i'i (*Acanthurus nigrofuscus*), omaka (*Stethojulis balteata*), and manini (*Acanthurus triostegus sandvicensis*) were commonly observed within the lagoon and reef flat. For many species, juveniles appeared to be very common along the reef flat.

Fish diversity is much greater on the seaward side of the reef crest and studies conducted nearby, off Limahuli Stream and in Hanalei Bay, recorded over 160 species of fishes in these areas (Jokiel and Brown 2000, Friedlander and Parrish 1998). Friedlander (2000) found that fish biomass at the Limahuli offshore site to be more than twice that observed at the site with the second largest biomass (Ho'ai Bay near Po'ipu offshore) and an order of magnitude greater than the inshore habitat at Limahuli. Among 60 reefs

monitored by the Hawai'i Coral Reef Assessment & Monitoring Program (CRAMP), the shallow reef station (1m) at Limahuli ranked 58 in species richness, 51 in density, 57 in biomass, and 57 in diversity. Limahuli 10m ranked 5 in species richness, 24 in density, 8 in biomass, and 21 in diversity. The most abundant species were the hinalea lauili (*Thalassoma duperrey*) and the kole (*Ctenochaetus strigosus*) at the 3m and 10m reefs respectively. The species with the highest biomass were the manini (*Acanthurus triostegus*) and the māikoiko (*Acanthurus leucopareius*) at the 3m and 10m reefs respectively (Jokiel and Brown 2000).

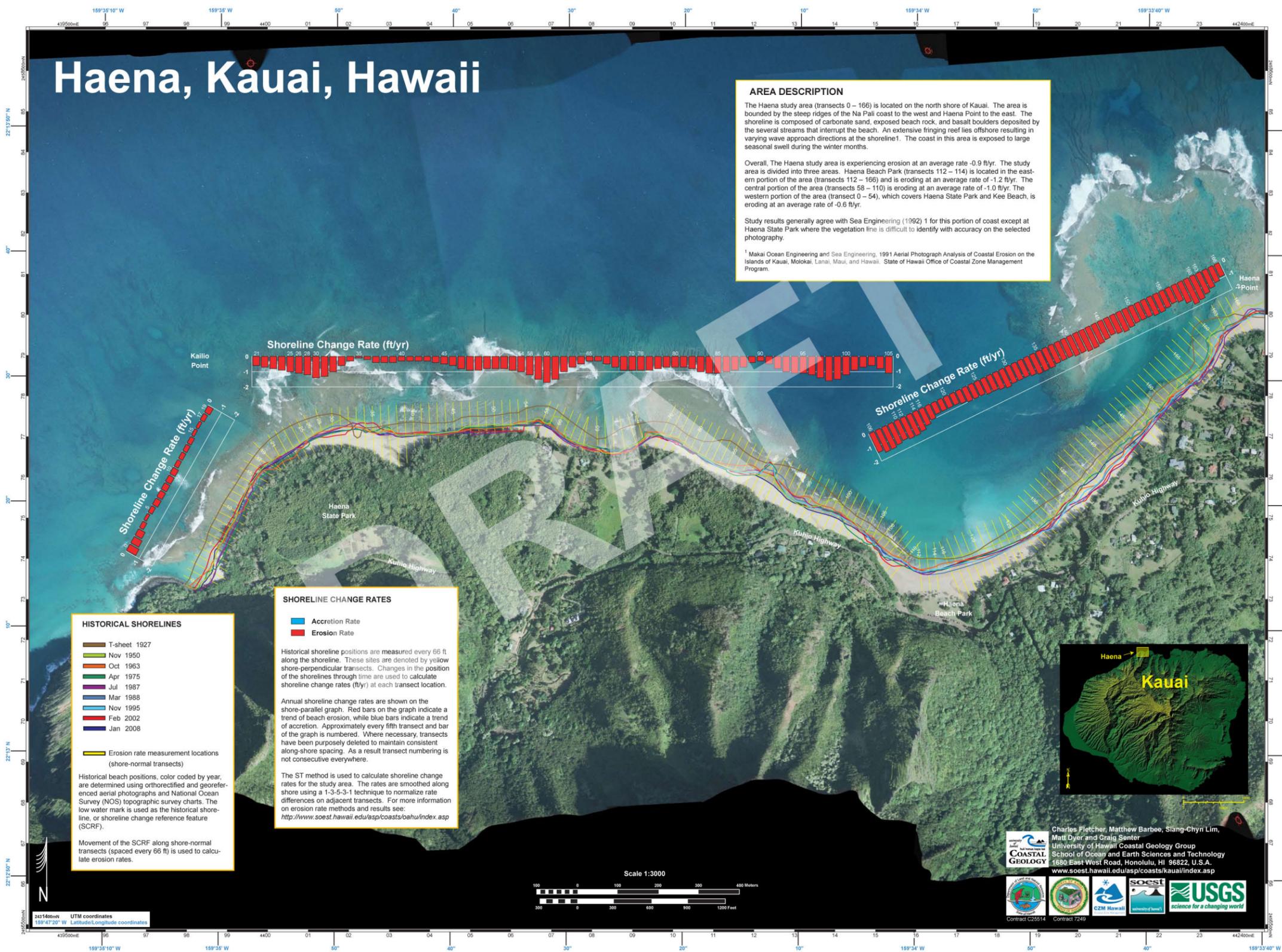


Figure 5. Draft shoreline erosion map for Hā'ena Beach Park available through SOEST at the University Of Hawaii and the Hawaii Coastal Erosion Website (<http://www.soest.hawaii.edu/asp/coasts/kaui/index.asp>), illustrating the estimated degree of beach erosion at Kē'ē and Limahuli Beaches and historic shorelines.)

TABLE 2. List of marine shore fishes observed within and adjacent to Kē'ē Lagoon and Reef Flat, Hā'ena State Park

Fish Species	Hawaiian or Common Name	SWCA	Stepath (1999)	The Keith Companies (2001)		CRAMP Data (1998-2004)		Friedlander et al 2003
		Present/Absent A=adult/J=juvenile	Index of Relative Dominance (IRD)	Present/Absent Shallow Inshore	Present/Absent Seaward Slope	#/125 sq m 1m depth	#/125 sq m 10 m depth	Top 20 Fish IRD (Rank)
<i>Abudefduf abdominalis</i>	mamo	A	2					60.13 (14)
<i>Abudefduf sordidus</i>	kupipi	A	2	✓				
<i>Acanthurus achilles</i>	paku'iku'i		2					
<i>Acanthurus blochii</i>	pualu	A					1.5	
<i>Acanthurus dussumieri</i>	palani			✓			1.0	
<i>Acanthurus leucopareus</i>	maikoiko	A	5		✓		34.5	147.27 (7)
<i>Acanthurus nigrofuscus</i>	ma'i'i		168	✓		2.0	11.5	512.07 (1)
<i>Acanthurus nigrororus</i>	maiko			✓	✓			
<i>Acanthurus olivaceus</i>	n'ena'e			✓		0.5	10.0	85.23 (11)
<i>Acanthurus triostegus</i>	manini	A	757	✓	✓	18.5	2.5	88.87 (10)
<i>Anampses cuvier</i>	opule			✓			1.5	
<i>Aulostomus chinensis</i>	nunu			✓			0.5	
<i>Bodianus bilunulatus</i>	a'awa					0.5	1.0	
<i>Calotomus carolineus</i>	ponuhunuhu	A,J					0.5	
<i>Catherhines dumerilii</i>	o'ili						1.0	
<i>Canthigaster amboinensis</i>	Ambon toby						2.5	
<i>Canthigaster jactator</i>	Hawaiian whitespotted toby	A				1.0	6.0	
<i>Centropyge potteri</i>	Potter's angelfish						1.5	
<i>Cephalopholis argus</i>	roi						1.0	40.99 (17)
<i>Caranx melampygus</i>	omilu	J		✓	✓			
<i>Chaetodon auriga</i>	kikakapu						1.0	
<i>Chaetodon fremblii</i>	kikakapu	A					0.5	
<i>Chaetodon miliaris</i>	lauwiliwili			✓				
<i>Chaetodon multicinctus</i>	kikakapu						3.0	
<i>Chaetodon quadrimaculatus</i>	lauhau	A				0.5		
<i>Chaetodon unimaculatus</i>	lauhau						1.0	
<i>Chlorurus perspicillatus</i>	uhu ululi	A,J		✓	✓			66.40 (13)
<i>Chlorurus sordidus</i>	uhu	A,J						155.29 (6)
<i>Chromis hanui</i>	chocolate-dipped chromis						0.5	
<i>Chromis ovalis</i>	oval chromis			✓			8.0	
<i>Chromis vanderbilti</i>	blackfin chromis			✓				28.29 (20)
<i>Cirrhites fasciatus</i>	piliiko'a		2	✓				
<i>Cirrhites pinnulatus</i>	po'poo'a			✓			0.5	
<i>Conger cinereus</i>	puihi uha	Dead on beach						
<i>Coris flavovittata</i>	hilu		2					
<i>Coris venusta</i>	hinalea		28	✓		4.0		
<i>Ctenochaetus strigosus</i>	kole			✓	✓		46.5	408.95 (3)
<i>Entomacrodus marmoratus</i>	pao'o	A						
<i>Fistularia commersonii</i>	nunu peke	J	35					
<i>Gomphosus varius</i>	hinalea i'iwi	J	9					
<i>Halichoeres ornatus</i>	ohua	A				0.5	3.0	
<i>Kuhlia xenura</i>	aholehole				✓			
<i>Kyphosus sp</i>	nenu	A	2	✓	✓		26.0	
<i>Labroides phthirophagus</i>	Hawaiian cleaner wrasse	A					4.5	
<i>Lutjanus kasmira</i>	ta'ape						1.0	
<i>Melichthys niger</i>	humuhumu 'ele 'ele						10.5	487.72 (2)
<i>Monotaxis grandoculis</i>	mu				✓		0.5	
<i>Mulloidichthys vanicolensis</i>	weke 'ula		5	✓	✓		5.0	
<i>Mulloidichthys flavolineatus</i>	weke'a'a	A, J		✓	✓			
<i>Myripristis sp.</i>	mempachi			✓	✓			
<i>Naso literatus</i>	umaumalei	A						216.65 (5)
<i>Naso unicornis</i>	kala	A		✓	✓		1.5	34.42 (18)
<i>Paracirrhites arcatus</i>	piliiko'a			✓			3.0	
<i>Paracirrhites forsteri</i>	hilu piliiko'a			✓			1.0	
<i>Parupeneus bifasciatus</i>	munu						0.5	
<i>Parupeneus cyclostomus</i>	moano kea						2.0	
<i>Parupeneus multifasciatus</i>	moano	A		✓		0.5	11.5	42.38 (16)
<i>Paurupeneus pleurostigma</i>	malu						1.0	
<i>Parupeneus porphyreus</i>	kumu	A	2	✓	✓			
<i>Pervagor spilosoma</i>	o'ili 'uwi'uwi			✓				
<i>Plageotremus goslinei</i>	Gosline's fangblenny	A	2				1.0	
<i>Platybelone argalus</i>	aha	A		✓				
<i>Plectroglyphidodon imparipennis</i>	bright-eyed damselfish	A	354			1.5		
<i>Plectroglyphidodon johnstonianus</i>	blue-eyed damselfish			✓			0.5	
<i>Priacanthus meeki</i>	aweoweo				✓			
<i>Pseudocheilinus octotaenia</i>	eightstripe wrasse						1.0	
<i>Rhinecanthus rectangulus</i>	humuhumu nukunuku a pua'a	A	21	✓		3.0		33.28 (19)
<i>Scarus psittacus</i>	uhu							67.86 (12)
<i>Scarus rubroviolaceus</i>	palukaluka	A,J					0.5	101.68 (8)
<i>Scorpaenopsis sp.</i>	scorpionfish				✓			
<i>Spratelloides delicatulus</i>	piha	A		✓				
<i>Stegastes fasciolatus</i>	Pacific Gregory		209	✓	✓		9.0	52.83 (15)
<i>Stethojulis balteata</i>	omaka	A	168	✓		28.0	1.5	
<i>Sufflamen bursa</i>	humuhumu lei						3.5	
<i>Thalassoma ballieui</i>	hinalea luahine						2.5	
<i>Thalassoma duperrey</i>	hinalea lauwilli	A,J	412	✓	✓	46.0	21.5	338.27 (4)
<i>Thalassoma purpuraceum</i>	hou		2	✓	✓			
<i>Thalassoma trilobatum</i>	awela	A,J	442			1.0		
<i>Zanclus cornutus</i>	kihikihi	A			✓		1.0	
<i>Zembrasoma flavescens</i>	lau'ipala							92.10 (9)

Fish biomass at the Limahuli offshore site was dominated by large mobile herbivores, mainly surgeonfishes, triggerfishes, and parrotfishes. On the shallow Limahuli reef flat, small wrasses and surgeonfishes made up most of the fish biomass. Friedlander (2000) attributed the high standing stock of fishes observed at this site to the high spatial complexity of the habitat and the relatively light fishing pressure. During winter when high waves pound the exposed north shore of Kaua'i, fishing pressure is further reduced. This situation creates a de facto marine preserve along the north shore for nearly six months each year by excluding fishers from access to nearshore waters within the Park. Little comparable information on the marine invertebrates of Kē'ē Lagoon and reef is available from previous studies; however, the CRAMP studies have monitored benthic invertebrates at Limahuli (Jokiel and Brown 2000) (Table 3). Coral cover rank is 36 among 60 reefs studied statewide. Coral cover was found to be very similar between the 2 sampling periods. Coverage by macro-algae was found to be relatively low; however, there was a high percentage of crustose coralline algae and turf algae present. Despite the proximity to the mouth of Limahuli Stream, a low percentage of fine sediments with low content of terrigenous material was found in this high wave energy environment. No rare or unusual species were observed.

The CRAMP coral cover rank for mid-water (10m or 33 ft) habitat at Limahuli is 31 among the 60 reefs studied statewide (Table 4). As with the shallow station, coral cover was very similar between the 2 sampling periods, and macro-algae coverage was found to be relatively low. As with the shallow reef station, there was a high percentage of crustose coralline algae and turf algae.

Table 3. CRAMP shallow water (1m) video-transect data of coral cover for Limahuli Reef of percent cover over between 1999 and 2004. Source: Paul Jokiel, HIMB.

Video Transect data (1m): % Cover: Coral Species	6/7/1999		7/15/2000		6/3/2002		9/7/2004	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0	0	0
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0
<i>Leptastrea purpurea</i>	0	0	0	0	0	0	0	0
<i>Montipora flabellata</i>	2.2	1.5	2.0	1.4	3.2	1.8	1.9	1.4
<i>Montipora patula</i>	0.8	0.8	0.9	1.1	0.1	0.2	0.3	0.7
<i>Montipora studeri</i>	0	0	0	0	0	0	0	0
<i>Montipora capitata</i>	0.0	0.1	0	0	0.1	0.3	0.0	0.1
<i>Pavona duerdeni</i>	0	0	0	0	0	0	0.0	0.1
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0
<i>Pavona varians</i>	0	0	0	0	0	0	0	0
<i>Pocillopora damicornis</i>	0	0	0	0	0	0	0	0
<i>Pocillopora eydouxi</i>	0	0	0	0	0	0	0	0
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0
<i>Pocillopora meandrina</i>	0.1	0.2	0.5	0.6	0.9	1.6	0.1	0.1
<i>Porites brighami</i>	0.7	1.0	1.1	0.6	1.4	1.5	0.1	0.1
<i>Porites compressa</i>	0	0	0.3	1.1	0.2	0.6	0	0
<i>Porites evermanni</i>	0	0	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0	0	0	0
<i>Porites lobata</i>	11.1	7.2	9.7	3.7	16.8	10.6	14.8	8.1
<i>Porites rus</i>	0	0	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0
Total Coral	14.9	7.5	14.5	5.1	22.8	11.4	17.2	8.5
Species Richness	7		6		8		9	
Macro-algae	1.0	1.3	0.3	0.5	0.4	0.5	0.2	0.1

Abbott and Hunter (2000) conducted a statewide study to document the location, abundance, and distribution of alien and invasive algae species. A primary objective of their research was to map the distribution of the most prominent alien and invasive species of algae in the state to enable managers to track rates of expansion and invasion of new sites in the future. One of their field research sites included Ka'ilio Point at Hā'ena. No invasive species of marine algae were found on the reef during their studies.

A complete list of algae observed by Abbott and Hunter (2000) within 0 – 5 m (0 – 16 ft) depth in 2000 and 2002 surveys appears in Table 5.

Table 4. CRAMP mid-water (10m) video-transect data of coral cover for Limahuli Reef of percent cover over between 1999 and 2004. Source: Paul Jokiel, HIMB.

Video Transect data (10 m): % Cover: Coral Species	8/4/1999		7/11/2000		6/3/2002		9/7/2004	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Cyphastrea ocellina</i>	0	0	0	0	0	0	0	0
<i>Fungia scutaria</i>	0	0	0	0	0	0	0	0
<i>Leptastrea purpurea</i>	0	0	0	0	0.20	0.63	0	0
<i>Montipora flabellata</i>	1.8	2.4	1.1	1.2	0.7	1.3	0.4	0.6
<i>Montipora patula</i>	14.5	7.4	17.5	8.8	22.2	8.4	20.6	9.1
<i>Montipora studeri</i>	0	0	0	0	0.2	0.7	0	0
<i>Montipora capitata</i>	0.1	0.1	0.5	0.8	0.1	0.1	0.2	0.2
<i>Pavona duerdeni</i>	0	0	0.0	0.1	0.1	0.1	0.0	0.1
<i>Pavona maldivensis</i>	0	0	0	0	0	0	0	0
<i>Pavona varians</i>	0.0	0.1	0.2	0.3	0.0	0.1	0.3	0.5
<i>Pocillopora damicornis</i>	0	0	0	0	0	0	0	0
<i>Pocillopora eydouxi</i>	0	0	0.2	0.7	0.6	1.9	0	0
<i>Pocillopora ligulata</i>	0	0	0	0	0	0	0	0
<i>Pocillopora meandrina</i>	0.6	0.7	0.6	0.8	0.6	0.9	0.9	0.9
<i>Porites brighami</i>	0.0	0.1	0.0	0.0	0	0	0	0
<i>Porites compressa</i>	0.1	0.3	0.0	0.1	0	0	0	0
<i>Porites evermanni</i>	0	0	0	0	0	0	0	0
<i>Porites lichen</i>	0	0	0	0	0	0	0.1	0.1
<i>Porites lobata</i>	2.4	6.3	0.1	0.3	0.3	0.6	0.3	0.5
<i>Porites rus</i>	0	0	0	0	0	0	0	0
<i>Psammocora nierstraszi</i>	0	0	0	0	0	0	0	0
Total Coral	19.5	6.7	20.4	8.9	25.1	8.2	22.7	8.7
Species Richness:	8		9		10		9	
Macro-algae	0.3	0.8	0.2	0.3	0	0	0.1	0.1

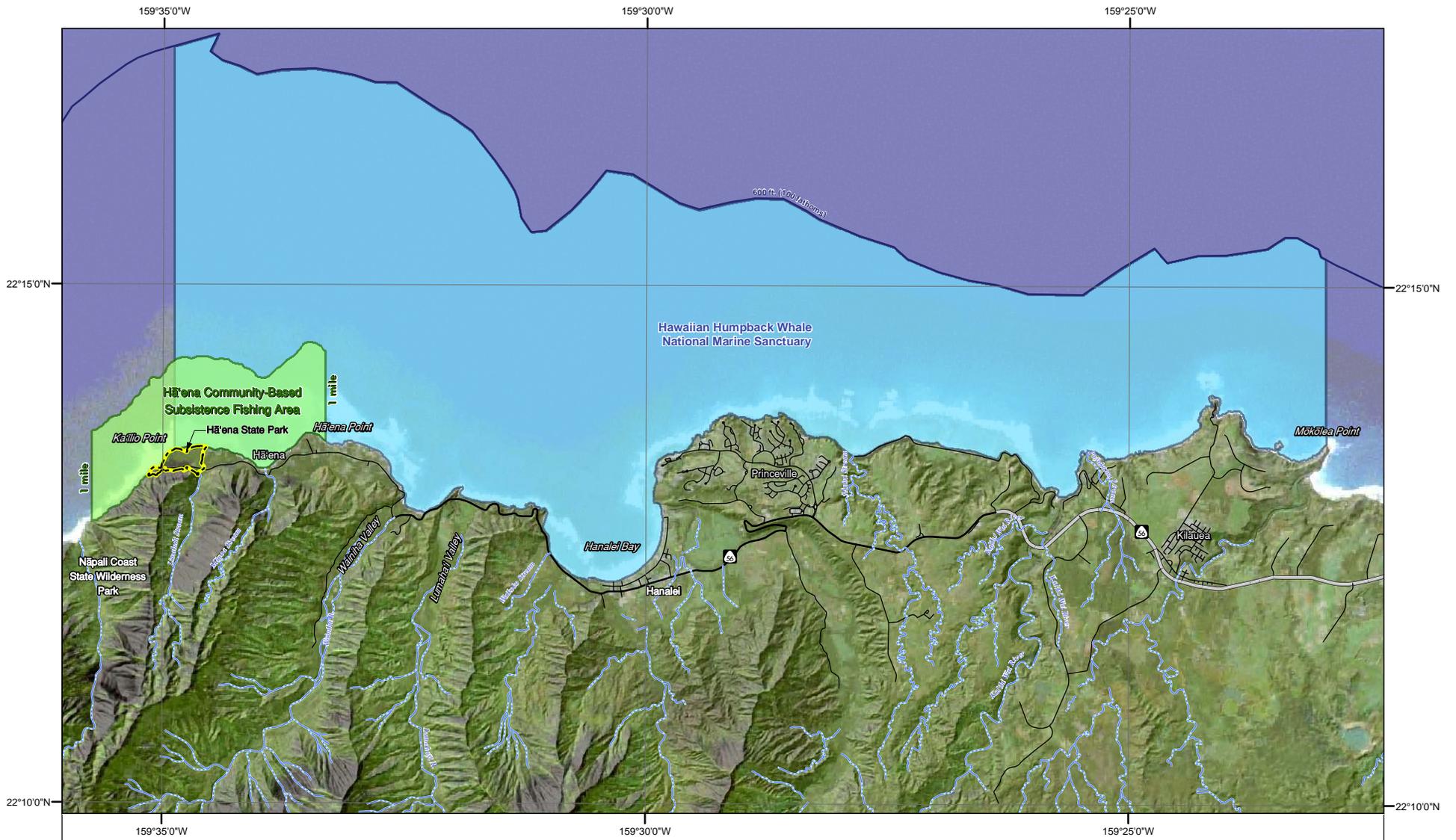
6.0 Endangered Marine Species and Habitats

Endangered humpback whales (*Megaptera novaeangliae*) are found seasonally in the offshore waters of Kaua'i's north shore. The marine waters at Hā'ena State Park lie within the Hawaiian Humpback Whale National Marine Sanctuary established under Subtitle C of Public Law 102-587, as amended by Pub. L. 104-283. The sanctuary boundaries of the Kaua'i unit consist of the submerged lands and waters seaward from the shoreline, cutting across the mouths of rivers and streams to the 100-fathom (183 meter) isobath from Ka'ilio Point eastward to Mōkōlea Point (Figure 6).

Among the goals and objectives of the National Marine Sanctuaries Program are to support and coordinate long-term scientific research on the resources on these marine areas; to enhance public awareness and wise use of the areas; and to give particular attention to the protection of the area's natural resource and ecosystem values.

The Hawaiian monk seal (*Monachus schauinslandi*), was listed as an endangered species pursuant to the Endangered Species Act (ESA) on November 23, 1976 (41 FR 51612) and remains listed as endangered. Hawaiian monk seals, regular residents of the Northwest Hawaiian Islands, began appearing more frequently on Kaua'i and Ni'ihau beaches in the 1960's. The National Marine Fisheries Service (NMFS) believes that the total Hawaiian monk seal population is at its lowest level in recorded history and it is estimated that about 1,200 individuals are alive today. They are distributed predominantly in six Northwestern Hawaiian Islands (NWHI), with subpopulations at French Frigate Shoals, Laysan and Lisianski Islands, Pearl and Hermes Reef, and Midway and Kure Atoll. Small numbers also occur at Necker, Nihoa, and in the Main Hawaiian Islands (MHI). In 2005, the total number of individual monk seals in the MHI was estimated to be 77.

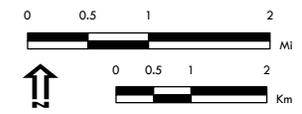
The number of monk seals born in the MHI has increased since the mid-1990 (<http://www.fpir.noaa.gov/>). In 2006 and 2007 there were 12 and 13 pups born, respectively, within the MHI. Scientists believe that Hawaiian monk seals are beginning to repopulate the MHI. Only a few females are actually known to have given birth on popular public beaches.



Legend

- Hā'ena Community-Based Subsistence Fishing Area
- Hawaiian Humpback Whale National Marine Sanctuary Boundary
- Hā'ena State Park
- 600' Bathymetric Contour

Figure 6
Marine Management Areas at Hā'ena State Park



Source: State of Hawaii GIS; NOAA; PDC
Whale Sanctuary: 15 CFR 992.41
Subsistence Fishing Area: S.B. 2501 Act 241 June 26, 2006 revising HRS 188 Part II

Table 5. Macroalgae observed at Ka'ilio Point, Hā'ena (Abbott and Hunter 2000).

REEF FLAT		0 – 5 m (0 –16 ft) DEPTH	
GREEN ALGAE	<i>Bornetella sphaerica</i>	GREEN ALGAE	<i>Boodlea composita</i>
	<i>Bryopsis pennata</i>		<i>Caulerpa racemosa</i>
	<i>Caulerpa taxifolia</i>		<i>Caulerpa taxifolia</i>
	<i>Cladophoropsis herpestica</i>		<i>Chaetomorpha antennia</i>
	<i>Codium arabicum</i>		<i>Codium edule</i>
	<i>Dictyosphaeria cavernosa</i>		<i>Dictyosphaeria cavernosa</i>
	<i>Dictyosphaeria versluysii</i>		<i>Dictyosphaeria versluysii</i>
	<i>Enteromorpha sp.</i>		<i>Enteromorpha flexuosa</i>
	<i>Halimeda discoidea</i>		<i>Halimeda discoidea</i>
	<i>Microdictyon setchellianum</i>		<i>Neomeris annulata</i>
	<i>Neomeris vanbosseae</i>		<i>Ulva fasciata</i>
	<i>Siphonocladus tropicus</i>		<i>Valonia aggagrophila</i>
	BROWN ALGAE		<i>Dictyota acutiloba</i>
<i>Dictyota ceylanica</i>		<i>Dictyota friabilis</i>	
<i>Dictyota friabilis</i>		<i>Lobophora variegata</i>	
<i>Padina sp.</i>		<i>Padina japonica</i>	
<i>Turbinaria ornata</i>		<i>Rosenvingea intricata</i>	
RED ALGAE	<i>Vaughaniella stage</i>	<i>Sargassum echinocarpum</i>	
	<i>Dictyota acutiloba</i>	<i>Sargassum polyphyllum</i>	
	<i>Dictyota ceylanica</i>	<i>Stytopodium hawaiiensis</i>	
	<i>Dictyota friabilis</i>	<i>Turbinaria ornata</i>	
	<i>Padina sp.</i>	RED ALGAE	<i>Asparagopsis taxiformis</i>
	<i>Turbinaria ornata</i>		<i>Botryocladia skottsbergii</i>
	<i>Vaughaniella stage</i>		<i>Dasya irridescens</i>
	<i>Acanthophora spicifera</i>		<i>Falkenbergia</i>
	<i>Actinotrichia fragilis</i>		<i>Galaxaura marginata</i>
	<i>Amansia glomerata</i>		<i>Galaxaura rugosa</i>
	<i>Amphiroa valonioides</i>		<i>Gracilaria sp.</i>
	<i>Centroceras clavulatum</i>		<i>Gracilaria sp.</i>
	<i>Ceramium flaccidum</i>		<i>Haliptilon subulatum</i>
	<i>Galaxaura marginata</i>		<i>Laurencia mcdermidae</i>
	<i>Gelidiella acerosa</i>		<i>Martensia fragilis</i>
	<i>Griffithsia heteromorpha</i>		<i>Melanamansia glomerata</i>
	<i>Herposiphonia crassa</i>		<i>Polysiphonia sp.</i>
<i>Herposiphonia delicatula</i>	<i>Potriera hornemanii</i>		
<i>Herposiphonia nuda</i>	<i>Pterocladia capillacea</i>		
<i>Hypnea spinella</i>	<i>Rhodymenia leptophylla</i>		
<i>Jania adhaerens</i>	<i>Spyridia filamentosa</i>		
<i>Jania pumila</i>			
<i>Laurencia crustiformans</i>			
<i>Laurencia sp.</i>			
<i>Pterocladia capillacea</i>			
<i>Stenopeltis setchelliae</i>			
<i>Tolypocladia glomerulata</i>			
<i>Womersleyella pacifica</i>			

In 1995, 21 male monk seals, and no females, were relocated from the NWHI and released off of the Big Island of Hawai'i. Since their release, only six of these seals have been recently observed and reported. Research has also shown that the monk seals rarely migrate from the NWHI to the MHI. NMFS estimates that there are 31-40 monk seals on Kaua'i today. It is not unusual to find a monk seal resting on any north shore Kaua'i beach. Signs are posted along the beaches at various locations on the shore at Hā'ena State Park warning visitors not to harass resting seals.

The nearshore marine waters and beaches of Hā'ena State Park are not designated as critical habitat for any marine species. However, in July of 2008, the National Marine Fisheries Service (NMFS) received a petition from conservation groups to review and establish revised "critical habitat" for the monk seal.

The Endangered Species Act (ESA) in turn prohibits any changes or "destruction or adverse modification" by Federal activities (those that are federally funded or permitted) to these areas that will diminish its value as important habitat for the survival and recovery of the species. It is important to note that critical habitat designation does not turn an area into a reserve, refuge, Marine Protected Area (MPA) or a park. Public access and usage in areas that are designated as critical habitat are not affected. NMFS is currently reviewing and evaluating the recommendations contained in the petition.

Although threatened Green sea turtle (*Chelonia mydas*) nesting in the Hawaiian Archipelago is mostly limited to French Frigate Shoals (FFS) in the NWHI, they are common around all eight of the main Hawaiian Islands (MHI) (NMFS & USFWS 2007). Green sea turtles are frequently seen grazing upon algae in shallow nearshore reef waters around the north shore of Kaua'i, including the waters of Hā'ena State Park. Although there have been no recent reports of sea turtles nesting on the beach at Hā'ena, there have been 17 reported sea turtle nests on Kaua'i in the past year alone (Heacock, pers. comm.). The sandy beaches within the Hā'ena State Park are suitable for sea turtle nesting, and the possibility of a future turtle nesting there cannot be dismissed.

7.0 Recreational Resources and Assessment

7.1 Principal Existing Recreational Uses

The beautiful beaches, reef formations, cultural features, and verdant landscape of Kaua'i offer various recreation activities to locals and visitors on the island. The Hā'ena State Park, from Kē'ē Beach to the mouth of Limahuli Stream attracts a large number of visitors each year. The area is a popular spot for scenic shoreline sightseeing and ocean-related recreation. Selected recreation sites and reefs within the Hā'ena State Park boundaries are depicted in Figure 7.

The popularity of this region for recreation has increased dramatically over the past several decades. It has been estimated that Hā'ena State Park receives roughly 1,500 visitors during low periods (February) and approximately 10,600 visitors during high peak periods (August) (TKC and Earthplan 2001). Stepath (1999) counted approximately 1,250 people visiting the Kē'ē area for recreation daily during his study in June and July 1999. He found that people use the lagoon and reef flat area is highest between 10 a.m. and 6 p.m. with a peak usage at 4 p.m.

Other popular recreation areas adjacent to Hā'ena State Park include Cannons Beach, Maniniholo Beach, and Tunnels Beach. Use of the beach and nearshore waters at Hā'ena State Park are regulated by the Hawai'i Administrative Rules (HAR) for Shore Waters and Shores, Chapter 2: North Shore Kaua'i Ocean Recreation Management Area.

7.1.1 Shoreline Sightseeing

The scenic shoreline resources at Hā'ena State Park make the area an important sightseeing spot for visitors to the island. The shoreline offers views of tropical vegetation, steep mountains, sandy beaches,

ocean waters, colorful sunsets, and the Nāpali coastline. These features make it a destination point for many tourists (TKC and Earthplan 2001, Sprout and Sprout 2004, Klein 2007).

7.1.2 Beachcombing

Due to the frequency and severity of heavy surf on the northern portion of Kaua'i, shells and other marine debris are often dislodged from the reefs and carried to shore. As a result, many of the beaches in the area are popular beachcombing spots for collecting driftwood, beach glass, micro-mollusks, cats' eyes, and puka shells. Ka'ilio Shore at the east end of the beach adjacent to Limahuli Stream is one of the best shell collecting sites (Clark 1992).

7.1.3 Sunbathing

Sunbathing is a popular activity throughout the Hawaiian Islands. Sunbathing occurs at many beaches along Hā'ena State Park. The most level and widest beach section within the park is at Ka'ilio Point near Limahuli Stream. From this point, the beach narrows and becomes steeper before widening again at the lagoon. Kē'ē Beach is popular with tourists for sunbathing. Stepath (1999) found that sunbathing was the most common activity at Kē'ē Beach in June and July of 1999. Sunbathing is difficult at some areas on this part of the island during periods of heavy trade winds (Clark 1992). Clark (1992, 1999) found that visitors preferred Kē'ē Beach over Ka'ilio Point due to the convenience of showers, restrooms, and paved parking.

7.1.4 Hiking

Although there are no maintained hiking trails within the Hā'ena State Park, the trailhead to the famous 11-mile Kalalau Trail is located in the project area at the end of Kūhiō Highway. This trail provides access to the Nāpali Coast State Wilderness Park, which had 423,100 recreation visits in 2007 (DBEDT 2008). Kalalau Trail traverses five steep valleys before terminating at Kalalau Beach. The first two miles of the trail, from Hā'ena State Park to Hanakāpī'ai Beach is a popular day hike for visitors. Day-use hiking permits are required for users hiking beyond Hanakāpī'ai valley and camping permits are required for overnight hikers (Division of State Parks 2008).

7.1.5 Swimming

There are two ocean swimming areas in the vicinity of the project area located at Pohofokeiki and Kē'ē Beach. Pohofokeiki Channel is located where Limahuli Stream meets the shoreline. It was formed by the freshwater discharge of Limahuli Stream, which created a narrow waterway through the reef offshore. The channel offers a protected swimming area under calm ocean conditions. The water is slightly colder and less saline in the channel due to the freshwater discharge from Limahuli Stream. The suggested swimmer level for this site is "intermediate and advanced swimmers eight year of age and older" (Clark 1992). Some visitors or residents occasionally use the lower reaches of Limahuli Stream as a freshwater dipping and wading area. The level of use of Limahuli Stream for this activity is not known (TKC and Earthplan 2001).

Kē'ē Lagoon is located at the west end of Kē'ē Beach and is considered to be of statewide importance for recreational swimming. The lagoon's sandy bottom slopes gradually toward the sea to a depth of roughly 10 ft. It is connected to the open ocean by a deep, narrow channel through the reef (referred to as Puka Ulua). This swimming area is protected by the west end of Ka'ilio Reef making it suitable for all ages and swimming levels. Because of the calm, protected conditions, it is very popular with tourists and families with children. However, during periods of high surf, there is a powerful rip current that runs out the narrow channel (Clark 1999). As of 2008, there are at least two lifeguards on duty at this beach from 9A.M. to 5P.M. everyday of the year, including holidays (Yuen, PBR, pers. comm.)

7.1.6 Picnicking

Visitors and local residents use the beach at Hā'ena State Park for picnicking. Currently, there are no tables or barbecue areas;

7.1.7 Shorefishing

Although no statistics on shorefishing could be found for the Park, Hamnett et al (2004) noted that approximately 109,055 households in the state, or 31 percent of all households, enjoyed recreational fishing in 2004. Twenty-six percent of this total used pole and line fishing. The shoreline along Hā'ena State Park is an important recreational fishing area. Pole fishing is popular off the point at Kē'ē. At low tide, pole fishing also occurs off the west end of Kē'ē Lagoon. Throw-net fishing is conducted on the reef margins of the lagoon. Free dive spear fishing (without the use of SCUBA) is also popular in the area. The frequency of shoreline fishing activity increases during spring and summer when the ocean is calm more often. Fishers typically arrive at the Hā'ena State Park very early in the morning or after dark (Clark 1992).

The most valuable information on traditional fishing in the vicinity of the comes from the personal interviews of local fishermen and kupuna (Maly and Maly 2003). Several prominent local fishers from Hā'ena related stories to Maly and Maly (2003) of their fishing experience in the nearshore waters for honu (sea turtle), akule (bigeye scad), moi (Pacific threadfin), 'ama 'ama (mullet), 'ōio (bonefish), nenu (rudderfish), aholehole (flagtail), 'āweoweo (Hawaiian bigeye), manini (convict tang), kala (bluespine unicornfish), 'oama (juvenile goatfish), kumu (whitesaddle goatfish), pāpio and ulua (various species of jacks), he'e (octopus), ula (lobsters), 'a'ama (crab), and several kinds of limu (seaweed). Kahala (amberjack) and 'ōpelu (mackerel scad), 'Ahi (yellowfin tuna), ono (wahoo), aku (skipjack tuna), mahi-mahi (Dorado) were commonly caught offshore from Hā'ena.

A simple Google query of "fishing" + "Hā'ena" returns 52 pages of travel guides, vacation rentals, and real estate advertisements that entice visitors to the north shore of the Garden Isle, but with little substantive information about fishing and fisheries of the North Shore. Concern about the impact of visitors on reef resources of Hā'ena led to the enactment of a new law creating a community-based subsistence fishery area. On June 26, 2006, Hawai'i Governor Linda Lingle signed into law Act 241 to help protect the fish stocks and coral reef habitats within the ahupua'a of Hā'ena. The Act took effect on June 30, 2007. The act states that the waters of Hā'ena have been an important subsistence fishery resource for native Hawaiians and local families of the ahupua'a, and that the area's natural beauty attracts thousands of visitors each year to the 'end of the road' at Hā'ena State Park. It is believed that the influx of visitors has resulted in adverse impacts to fish stocks and the integrity of the coral reef habitats in the area. The purpose of the Act is to allow inhabitants of the ahupua'a to develop and enforce traditional regulations for the maintenance of the fishery within the Hā'ena ahupua'a. The approximate boundaries of the new subsistence fishing area are shown in Figure 6. Commercial activities, issuance of a commercial marine license, aquarium fishing permits, gill net fishing, spear fishing with SCUBA, must still be considered for approval by DLNR in consultation with the inhabitants of the ahupua'a.

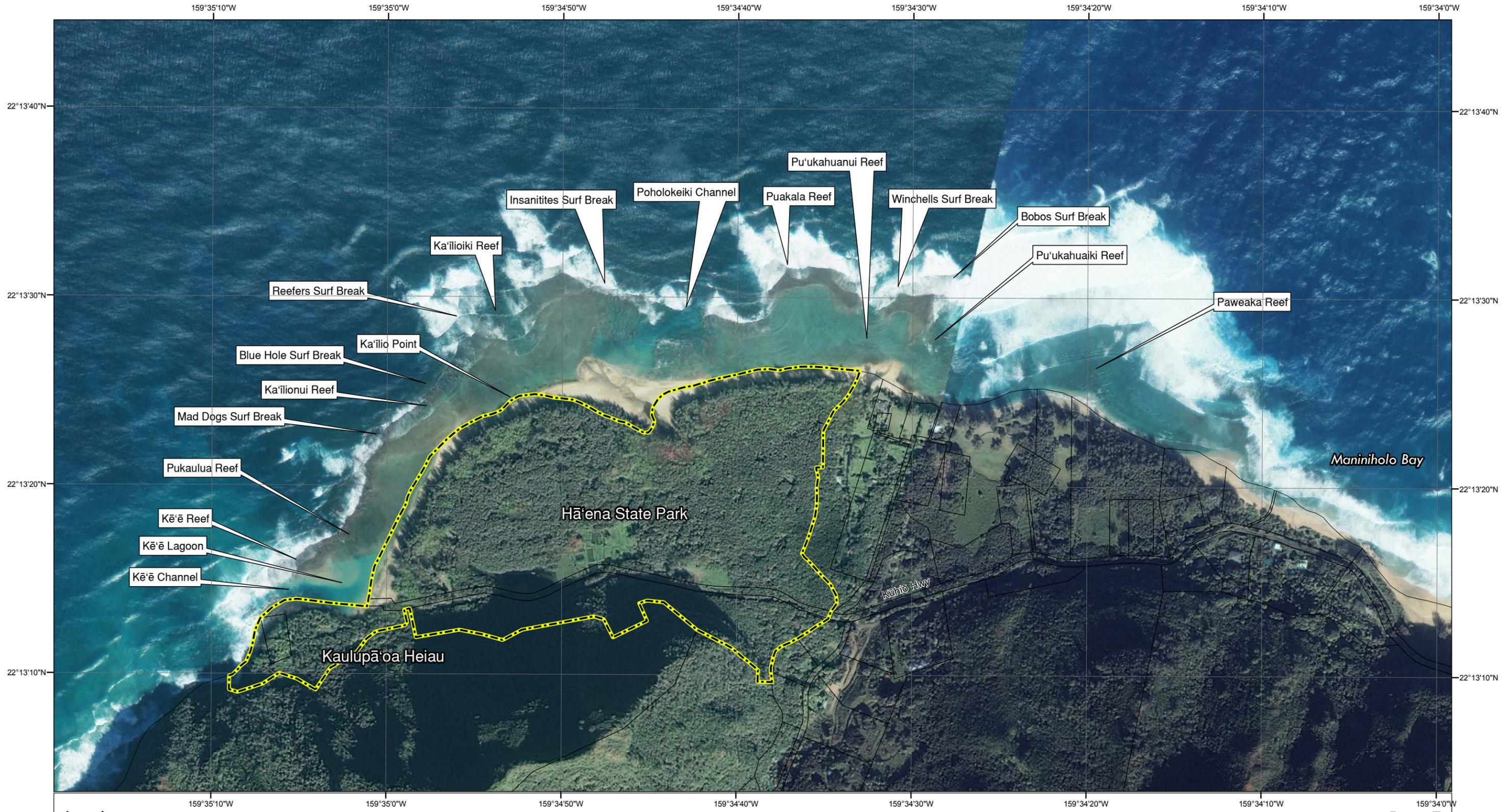
In 2002, DOH statistics reported a single case of ciguatera poisoning from consumption of a knifejaw (*Oplegnathus* sp.) caught at Hā'ena.

7.1.8 Snorkeling and SCUBA Diving

Kē'ē Beach is a primary snorkeling and diving area for Kaua'i. Snorkeling and diving occur in the protected Kē'ē Lagoon and back reef, and less often outside the reef. This activity includes organized groups of divers from clubs and classes as well as individual divers. The overhangs, tunnels, and unique reef features attract many divers. These features, in combination with excellent water visibility and protection from heavy surf, make the lagoon a popular snorkeling and diving spot (Clark 1992). Outside

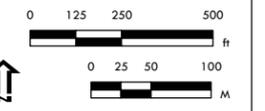
of the reef, intermediate and advanced snorkeling and diving also occur during calm conditions. Reef features in this area are similar to those in the lagoon, but fish diversity and abundance is higher (Clark 1992). The quality of diving decreases in the winter due to high surf and turbidity (Nielsen 2005).

Cannon's Reef is a popular shore diving site just east of Hā'ena State Park. Water depths at this site range from 5 to 70 ft (1.5-21 m). This diving spot is suitable for beginner to intermediate divers and is considered a good snorkeling location (Nielsen 2005).



Legend
 Hā'ena State Park

Figure 7
 Reef Environment and Surf Breaks Map



Source: State of Hawaii GIS; Microsoft
 Clark, J. 1992. Beach and ocean recreation study, Ha'ena, Kaua'i. Contract report prepared for Division of State Parks, Department of Land and Natural Resources, State of Hawaii, Honolulu. 49pp.

7.1.9 Surfing, Bodysurfing, and Body Boarding

Hā'ena State Park shoreline is also a popular site for surfing, bodysurfing, and body boarding, surfing being the most popular of the three (TKC and Earthplan 2001). DBEDT (2008) has defined a surfing site as "a specific wave-breaking zone caused by a shoal and having sufficient consistency to be identified as a surfable riding area, either seasonally or in a combination of seasons."

Surfing breaks located in the area are described in detail in the *Beach and Ocean Recreation Study* conducted by Clark (1992). Several surfing breaks occur offshore of the park (Figure 7). Three surfing sites break off Ka'ilioiki Reef: "Insanities", "Mad Dogs", and "Reefers". Another less popular surfing spot, "Blue Hole", is located off Ka'ilionui Reef.

These sites are infrequently surfed because the waves break very close to the reef margin and can be dangerous. The level of surfing at these sites ranges from intermediate, when waves are 2 to 5 ft (0.6 to 1.5 m) high, to advanced and expert when waves are 6 ft (1.8 m) and higher (Clark 1992).

Two other surfing breaks are located just east of Limahuli Stream, but are accessible from the Hā'ena State Park shoreline. "Winchell's" is located off Pu'u Kahuaiki Reef to the east of Pu'u Kahuanui Reef. "Bobo's" is a surfing break that forms on the forereef slope fronting Pu'u Kahuanui Reef. These breaks are suitable for intermediate to advanced and expert surfers, depending on wave height (Clark 1992).

7.1.10 Windsurfing

Statewide, "Reefers" is an important sailboarding and wave-jumping spot for windsurfers, and is considered one of the best wave-jumping sites on the north shore. During periods of moderate surf (2 to 5 ft) this spot is appropriate for intermediate windsurfers, while conditions are suitable for advanced and expert windsurfers during higher surf (6 ft and higher). "Reefers" attracts between 30 and 40 windsurfers during good conditions and is exclusively used during high tide. Windsurfing activity generally increases during high northeast trade winds (Clark 1992).

7.1.11 Boating and Kayaking

Kē'e Lagoon is the primary take off and landing point for sea kayakers touring the Nāpali shoreline. The activity includes both individual kayakers and groups of kayakers. The lagoon offers a sand-bottom, wave protected location at the shoreline to easily enter and exit the ocean through the "Puka Ulua" channel. Poholoikeiki Channel is also used as a take off and landing site by kayakers during calm seas (Clark 1992). Commercial boating is seasonal along the north shore of Kaua'i due to wave impacts and surf events, mostly occurring in summer. The closest boat launch ramp is the Hanalei Bay Offshore Mooring Area and Pier adjacent to the town of Hanalei in the northeast corner of Hanalei Bay (DBOR 2008).

7.1.12 Biking

Biking is becoming a more popular activity throughout the state and also serves as a means of transportation for some visitors (TKC and Earthplan 2001). Forest reserve roads, resort bike paths, and old agricultural roads are often used as bike trails on Kaua'i (Sprout and Sprout 2004). *Bike Plan Hawai'i* (1994), a State master plan for bikeways, is proposing a bike route that extends from the west side of Kaua'i to the north shore. Due to the narrow roads in this area, bicycle access and safety will require special consideration (County of Kaua'i Planning Department 2000).

7.1.13 Off the Road Vehicle (ORV) Use

The 2001 draft park plan noted that ORVs were known to drive through the sand dunes and across the sandy beaches at Ka'ilio Point flattening dunes and impacting strand species (Clark 1992, DLNR 1999). However, this activity has essentially ceased since 2007 when a gate blocking vehicular access to the dunes was installed. Four-wheel ATVs are also used by lifeguards and can be driven along the sandy beaches as necessary in the pursuit of their duties.

7.1.14 Visiting Historical/Cultural Sites

Historical and cultural sites have the potential to be recreational and educational areas for both local residents and tourists. The cultural resources at the Hā'ena State Park are considered to be some of the most complete and well preserved features throughout the Hawaiian Islands. The Hā'ena Archaeological Complex is listed on the State and National Registers of Historic Sites. The Complex is bounded by the Pacific Ocean on the north and west, Limahuli Stream on the east, and the pali (cliff) base on the south. Feature types found within the Hā'ena Archaeological Complex include heiau, house platforms, rock shelters, agricultural complexes, enclosures, subsurface cultural deposits, cemeteries, wet caves, and source areas for volcanic glass (TKC and Earthplan 2001).

Tourists and residents can visit Keahualaka, a flat hula platform, and Kauluapā'oa Heiau, a temple dedicated to Laka, the goddess of the hula. These cultural sites are located southwest of Kē'ē Beach and are managed by the State Historic Preservation Division (SHPD) on land owned by the County. Both sites are presently used by hula halau from across the state for various ceremonies (Clark 1999).

Two wet caves situated in the Hā'ena State Park are also premier designations for visitors and residents. These ancient sea caves were formed during a higher stand of sea. Waiakanaloa Wet Cave is located mauka of Kuhio Highway in the face of the pali and Waikapala'e Wet Cave is located slightly to the east within the pali face. These deep, dark caves contain pools of cold water (Yamamoto 2006). "Spiritual" cave visits, using incense and other paraphernalia, are popular visitor activities within the caves (TKC and Earthplan 2001).

7.1.15 Wildlife Observation

Whale watching and bird watching also takes place occasionally within the park boundaries. The peak time to see endangered North Pacific Humpback whales in Hawaiian waters is late November through early May (Yamamoto 2007). Several tour operators offer whale watching tours within the boundaries of the Hawaiian Humpback Whale National Marine Sanctuary (Figure 6).

7.2 Visitor Impacts

7.2.1 Traffic Congestion and Parking Issues

Two of the most popular visitor destination areas on Kaua'i are located within the boundaries of Hā'ena State Park. Both the Kalalau Trail head and Kē'ē Beach are located at the end of the highway. The end of the highway serves as a turnaround point for all vehicles reaching this point. There are only three parking areas within the Park, one is located adjacent to the sea caves at Hā'ena Point, another was recently created near the taro ponds west of the sea caves, and the third is located at the end of the highway at Kē'ē Beach. On the lot at the end of the highway is paved. As these fill, many visitors parallel park along the seaward side of the highway margin. A high density of visitors to the area decreases the amount of available parking for local residents, and reduces the quality of user experiences (Needham et al. 2008).

7.2.2 Non-point and Point-Source Pollution

Point-source pollution is pollution from any confined or discrete conveyance such as pipes, ditches, channels, wells, or vessels. This type of pollution is also referred to as “end-of-pipe discharge” because it is often discharged from sewage treatment plants and factories close to nearshore waters (DBEDT and DOH 2000). At the Hā'ena State Park, recreational and commercial boats can create point source pollution in the offshore waters. The amount of point source pollution from these sources is unknown and likely varies during the year depending on the number of boats.

Hawai'i's Implementation Plan for Polluted Runoff Control (2001) defines non-point source pollution as “water pollution that comes from many diffuse sources rather than from a specific point, such as an outfall pipe, and is often the result of human activities.” Pollutants are carried by rainwater on the surface or through the ground to the stream and oceans. These pollutants can include fertilizers, herbicides, insecticides, oil, grease, sediment, and pathogens (DBEDT and DOH 2000). Non-point source pollution is related to the amount of impervious surfaces in an area. Impervious surfaces (including roads, parking lots, sidewalks, and roofs) prevent water and pollutants from passing through the ground and percolating into the soil, expressing them into nearby aquatic environments (Schueler 1994).

At the Hā'ena State Park, pollutants from motor vehicles, trash, and other debris not properly disposed of can be carried to nearshore and freshwater areas in storm, flood, or wash water across impervious surfaces. Sewage seepage from the restroom facilities could also enter these aquatic environments (Stepath 1999). Dipping or wading in the Limahuli Stream may contribute to soil erosion, sedimentation, and temporary impacts to water quality (TKC and Earthplan 2001).

According to the *Hawai'i Coastal Nonpoint Pollution Control Management Plan* (1996), non-point source pollution has a greater impact on nearshore waters than point-source pollution. Non-point source pollution can result in increased turbidity, sediment accumulation on coral reefs, fish kills, and destruction of aquatic habitats. Excess nutrients can also lead to eutrophication or algae blooms in coastal waters (DBEDT and DOH 2000). Toxic chemicals and pollutants can pose a risk to marine plants and animals (County of Kaua'i Planning Department 2000) and increase the risk of human diseases during aquatic recreation (DBEDT and DOH 2000).

Clean coastal water is an important component of the tourism industry in Hawai'i. More than 80% of visitors to the Islands engage in recreation activities in coastal and marine areas (Needham et al. 2008). Coastal leisure and recreation activities (swimming, diving, surfing, etc) are also vital to native Hawaiian cultural practices and local resident recreation (DBEDT and DOH 2000). Most local residents engage in ocean recreation on a regular basis (Friedlander et al. 2008). One intent of Class AA marine water quality designation at Hā'ena State Park is to protect the area in as pristine condition as possible to help insure the protection of the coral reef ecosystem offshore as well as the visitor experience to the Park.

7.2.3 Sunscreen

Some chemicals contained in commercial sunscreens can adversely impact coral reefs by promoting viral infections of endosymbiotic zooxanthellae, which are essential for the survival of coral species. The chemical compounds in sunscreen can cause dormant viruses present in zooxanthellae to continually replicate until the zooxanthellae are expelled and the coral is bleached (Buddemeier et al. 2004, Danovaro et al. 2008, and Than 2008). Sunscreens may also decrease the penetration of UV radiation, impacting marine organisms that depend on light for various functions (Eichenseher 2006, Blitz and Norton 2008). Furthermore, sunscreen agents have been shown to bioconcentrate in freshwater or brackish aquatic species (Daughton and Ternes 1999). The impact of sunscreen on the coral reef environment at the Hā'ena State Park is not known; however, according to scientific interviews by Juran (2007), the impact of sunscreen at the park is believed to be minimal compared to other sites around the state.

7.2.4 Fishing

The impact of recreational and subsistence fishing in Hawai'i has been difficult to quantify because neither recreational and subsistence fishers are required to have licenses or report their catch to the Hawai'i Division of Aquatic Resources (Friedlander et al. 2008, Zeller et al. 2008). Recently, however, there is a growing body of scientific evidence to suggest that fishing may have the greatest overall effect on the diversity and abundance of nearshore fishes on coral reefs in Hawai'i and the Pacific (Grigg 1994, Stepath 1999, Birkeland and Friedlander 2001, Williams et al 2008, Singh et al 2008).

Fishers of all kinds tend to target specific species, many of which are top carnivores. Today, these resources are scarce. In studies of shore fish populations throughout the main Hawaiian Islands, Friedlander et al (2003) found that fish standing stock and diversity were higher in areas protected from fishing pressure and in areas of greater substrate complexity. In a similar island-wide study of 89 coral reef survey sites, Williams et al (2008) found 'clear and consistent negative associations between human population density and biomass of fishes in a range of functional and taxonomic groupings'.

Declines were evident among fishes targeted by fishers, but not among non-target groups of fishes in hard bottom and mid-depth habitats. Standing stock of highly desired target species (e.g. surgeonfishes, wrasses, parrotfishes, snappers, goatfishes, big-eyes, jacks, squirrelfishes, barracuda, moi, milkfish, and hawkfish) in accessible and populous locations were significantly lower than in areas where public access was prevented and also in lightly populated or remote areas. Williams et al (2008) concluded that a number of lines of evidence point to fishing pressure as the prime driver for these negative trends.

Indiscriminant use and discard of inexpensive monofilament gillnets has had a major effect on reef fish throughout the state of Hawai'i (Endreson et al, undated). Lay gillnets take unwanted as well as target species and can lead to habitat destruction and fatal entanglement of endangered species. Objections to this controversial method of fishing have raised an emotional debate in Hawai'i (e.g. <http://www.ulua-fishing.com/forum>; <http://gillnetskill.blogspot.com/>). A general consensus to outlaw the indiscriminate use of lay gillnets (Fair Catch 2006) resulted in the enactment of new DLNR Administration Rules signed by Governor Linda Lingle in March 2007 which severely restrict the use of lay gillnets in Hawai'i.

Night spear fishing, particularly with SCUBA, has also been implicated as being detrimental to fish populations (e.g. Stepath 1999). No studies could be found that quantify the catch by free dive and SCUBA spearfishers at Hā'ena State Park or elsewhere in the state. In May 1981, a visitor disappeared while spearfishing with SCUBA at the Park, presumably the victim of shark attack.

Fishing can also adversely affect endangered marine species. During the period 1982-2007, there have been 49 documented cases of interactions between fishers and monk seals in the Main Hawaiian Islands (MHI) (Katekaru 2008). Twenty-seven of these cases were reported from Kaua'i, two of which were from Hā'ena State Park. These cases usually involved the accidental hooking by ulua fishers using slide-bait tackle.

Chaloupka et al (2008) investigated cause-specific temporal and spatial trends in sea turtle strandings in the Hawaiian Archipelago. The most common known cause of the green turtle strandings was tumor-forming disease (28%) followed by hook-and-line fishing gear-induced trauma (7%), gillnet fishing gear-induced trauma (5%), boat strike (2.5%), and shark attack (2.7%). Miscellaneous causes comprised 5.4 percent of strandings whereas 49 percent of green turtle strandings could not be attributed to any known cause (Chaloupka et al 2008). They concluded that the Hawaiian green turtle stock continues to recover following protection since the late 1970s despite exposure to disease, nets, and hook-and-line fishing gear.

7.2.5 Diving

Damage to coral reef as a result of diving has been documented worldwide (Rouphael and Inglis 1995, Tratalos and Austin 2001, and Tabata 1992). Divers and snorkelers can physically damage reef corals, invertebrates, and algae by standing on the reef, accidentally kicking coral with their fins, or stirring up silt that suffocates coral. Contact with corals can facilitate disease transmission. Physical damage to coral species can be long lasting since due to generally slow tissue regeneration (Davenport and Davenport 2006).

7.2.6 Fish Feeding

Some divers and snorkelers feed fish at Kē'ē Lagoon in order to attract large schools of fish. Feeding fish can disrupt normal distribution and abundance patterns (DLNR 1999, SPC Fisheries 2004) and alter normal reproductive output of marine species (Sweatman 1996). Fish feeding may modify natural feeding cycles of fish (Roberts 2006), and have negative effects on prey populations by minimizing feeding on algae (Milazzo et al. 2005, Hollier 2009).

Feeding large fish can attract predators that scare off smaller fish, thereby reducing local biodiversity (Davenport and Davenport 2006). This activity has been shown to interfere with natural instincts and behaviors essential for fish survival (Roberts 2006). Studies conclude that feeding fish alters fish behavior towards humans; fish become conditioned to associate humans with food, often causing fish to become aggressive to humans and inducing attacks (DLNR 1999, SPC Fisheries 2004, Roberts 2006, Hollier 2009).

7.2.7 Reef Walking

During periods of low tide and calm waters, it is possible to walk on the exposed and shallow reef flats at the Hā'ena State Park. Visitors walk on the reef to view tide pools (Yamamoto 2006) and some divers transverse the coral reef to dive off the outer portion of the reef at Kē'ē Beach (Stepath 1999), resulting in the same impacts discussed in Section 7.2.5 above. Walking on the reef has the potential to degrade areas of the reef flat by trampling corals. This can result in mortality and an overall reduction in coral cover (Woodland and Hooper 1977, Stepath 1999, Juran 2007, Rodgers and Jokiel 2007). Trampling can directly or indirectly affect coral tissue, growth rates, reproductive success, and community structure (Liddle and Kay 1987, Rodgers and Jokiel 2007).

A decrease in coral cover can also impact fish populations, which are dependent on coral for shelter (Rodgers and Cox 2003), as well as algal populations (Davenport and Davenport 2006). Impacts to coral reefs can be severe, even with relatively low levels of trampling (Brown and Taylor 1999, Rodgers and Jokiel 2007). The ability of corals to withstand trampling depends on coral morphology, branch geometry, and mechanical properties (Rodgers and Jokiel 2007).

In Hawai'i, studies have found a clear pattern of decreasing coral cover with increased visitor use (Rodgers 2001, Rodgers and Cox 2003, Rodgers et al. 2003). Stepath (1999) conducted a study at Hā'ena State Park which studied the impact of humans walking on the reef flat. The peak time of reef walking was at 1:30PM. Stepath (1999) concluded that trampling may be decreasing coral cover in the nearshore waters of the Park.

7.2.8 Sand Dunes

Within the vicinity of Hā'ena State Park, the shoreline is backed by low coastal sand dunes. These ridges or mounds of sand are formed by an accumulation of wind blown sand that is trapped by strand plants at the Park. Sand dunes are dynamic features that erode during periods of high waves (usually October to May) and accrete when heavy wave action subsides (usually May to October). Sand dunes function as

natural, elevated buffers that protect marine shorelines against erosion, flooding, high waves, storms, tsunamis, and other coastal hazards (Clark 1992, University of Hawai'i Sea Grant Extension Service and County of Maui Planning Department 1997, University of Hawai'i 2006).

Some recreational activities are known to affect coastal dunes in Hawai'i. The continuous trampling by vehicles and pedestrians on the dunes causes erosion and sand movement. Vogt (1979) found that fewer than 10,000 pedestrians walking over sand dunes during a single season can eliminate dune vegetation and result in erosion (Tabata 1980). Dune vegetation has little resistance to trampling due to the extremely low soil penetration and is slow to recover (Davenport and Davenport 2006).

ORVs also flatten dunes and impact strand species (DLNR 1999). ORVs drive through the sand dunes and across the sandy beaches at Ka'ilio Point (Clark 1992). Both motor vehicles and pedestrian traffic can lead to sediment disruption and erosion. ORVs destroy sand coastal vegetation that helps to stabilize the dunes. ORVs can also disturb sand dune and shore ecosystems for use by wildlife including birds, turtles, worms, and crustaceans (Schlacher et al. 2008).

7.2.9 Invasive Species

An invasive species is defined as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health” (Executive Order 13112). Isolated island ecosystems, such as Hawai'i, are vulnerable to the establishment of alien or non-native species due to a variety of factors. Islands typically have high habitat diversity, favorable climate, high resource availability, low biotic resistance, small populations, and limited social capital (Denslow et al. 2008). It is estimated that over 5,000 alien species have established in the Hawaiian Islands. Of this total, roughly 343 are marine species (Belt Collins Hawai'i LTD 2008).

Invasive species affect island ecosystems in a variety of ways. They compete with native flora and fauna, carry diseases, affect trophic structure, change fire regimes, alter nutrient cycling patterns, modify surface runoff of water, and alter biodiversity (Vitousek 1990, D'Antonio and Vitousek 1992, Vitousek 1992, and Belt Collins Hawai'i LTD 2008). The ability of invasive species to reach new areas is influenced by the number of individuals involved in a release event and the number of release events, also referred to as *propagule pressure* (Lockwood et al 2005). Propagule pressure increases in areas with high visitation (Leung and Mandrak 2007), such as recreational parks. In particular, recreational boating, diving, snorkeling, and fishing increases the risk of introducing non-native species through hulls, wetsuits, bait, or other equipment (Meliane and Hewitt 2005). Recreational hiking can also introduce invasive species, especially plants, by passive dispersal on hiker's shoes and clothing. Ironwood (*Casuarina equisetifolia*), false kamani (*Terminalia catappa*) are invasive terrestrial plant species found within the park boundaries that compete with native vegetation.

Two non-native reef fish species introduced by the Hawai'i Department of Land and Natural Resources Division of Aquatic Resources to supplement coastal sport fisheries are present in the nearshore waters of the Park. Although the predatory grouper roi (*Cephalopholis argus*) and the blue line snapper ta'ape (*Lutjanus kasmira*) successfully established large populations throughout the main Hawaiian Islands, their impact upon preferred local species has not been well-understood and is the subject of controversy. Roi feed on small fishes over shallow reefs, while ta'ape feeds over sand flats during the night (Dierking 2007, Birkeland and Dierking 2007).

Invasions by non-native limu (seaweed) in some areas of Hawai'i have been shown to blanket coral reefs, kill coral, and reduce water exchange within the reef (Hadfield and Koehl 2007). However, none of the four noxious invasive algae species known from Hawai'i were found at Hā'ena during surveys conducted there a decade ago by University of Hawai'i investigators Isabella Abbott and Cynthia Hunter (www.hawaii.edu/ssri/hcri/text/research/results/kauai/haena.html). Some native algae species have the potential to become invasive, or to dominate the marine substrata to the exclusion of other species, in

areas that receive excessive nutrient input or have been altered in some other way in which to foster the growth of a single species of algae. There is no evidence that this has become a problem at Hā'ena.

7.3 Park Management Requirements

The natural beauty and cultural features at the Hā'ena State Park depend on the proper management and use of the park. Management policies derived from the *Hā'ena State Park Master Plan and Draft Environmental Impact Statement* (2001) include the following:

- Prevent and rectify existing anthropogenic erosion;
- Upgrade wastewater facilities;
- Eliminate or control exotic plant species;
- Utilize non-chemical plant management techniques when feasible; and
- Identify and protect fragile habitats;

Kaua'i's Economic Development Plan 2005-2015 (2004) states that the island's parks require "improvements and better maintenance" in order to meet recreational demands. In particular, roads are inadequate for residents and visitors. The plan suggests dedicated user fees be initiated at all state parks to support maintenance and improvement costs.

DLNR, DAR, and Hawai'i Ecotourism Association (2005) suggest that coastal and marine recreation areas can be managed by reducing human uses or reducing the impact of human use. The strategy specifically identifies the following management techniques for coastal and marine recreation areas:

- Restrict access: reduce the level of use by determining a site's carrying capacity and setting limits on number of users or banning certain types of activities or behaviors;
- Relocate use: create artificial reefs for recreation users (in suitable areas);
- Education: modify human behavior through signage, brochures, videos, tours, etc.; and
- Mechanisms for compliance: design physical infrastructure to encourage certain limits or behaviors or institute legal or voluntary compliances with tangible consequences.

7.4 Sustainability of Recreational Uses

With proper management, most of the recreational uses currently occurring at the Hā'ena State Park can be sustainable. The sustainability of a recreational use depends on the carrying capacity of the recreational area. Within a recreational context, carrying capacity can be defined as "the amount of visitor use that can be appropriately accommodated within a park or outdoor recreation area" while providing "sustained quality recreational experiences" (Lankford et al. 2005). The carrying capacity of a recreational use is determined by evaluating the following issues:

- Physical capacity: the amount of space available for the recreational use;
- Ecological or biological capacity: the ability of natural resources to withstand the recreational use;
- Facility capacity: the degree that the recreational area is able to support visitor needs during the recreational use; and
- Social capacity: the ability of the recreational use to provide an acceptable recreation experience (Lankford et al 2005).

DLNR, DAR, and Hawai'i Ecotourism Association (2005) recommended development of a carrying capacity tool to help determine optimal levels of activity for the various users at various sites. Management actions stemming from such a study might include limits on commercial operating permits and regulated visitor and vehicle entry. The report also advances the concept of establishing an ecological carrying capacity to take into account the various recreational activities and the unique physical conditions at a particular reef site; to provide a sound scientific basis for proactive management;

and to allow managers to identify optimal levels of use and set limits of use and set limits for various sites before projected increases in use occur. Additional recreational impacts to reefs and local action strategies (RIS-LAS) of pertinent to Hā'ena State Park can be found in DLNR, DAR, and Hawai'i Ecotourism Association (2005).

A study of this kind may be beneficial to identify the sustainability of existing recreational uses within the Park boundaries. To be successful, a carrying capacity study should be adequately funded and should be conducted with the collaboration of stakeholder groups in particularly controversial projects (NOAA 2007).

7.5 Complementary and Conflicting Use Issues

There is a growing number of eco-tourists and adventure-tourists who seek remote locations in Hawai'i, such as Hā'ena and Nāpali, for recreation and adventure. Many Hawai'i residents also visit these remote areas in search of greater resources, such as free diving spearfishers, who travel throughout the state to find populations of their preferred game fishes. These remote areas traditionally had small populations of local residents, many of whom rely upon the environment for sustenance (Friedlander et al. 2008). As visitor and resident populations on the north shore of Kaua'i, conflicts among and between recreational users are likely to increase.

7.5.1 Ahupua'a 'Ohana vs. Visitor and Other Residents

Ahupua'a 'ohana (family) are former Hā'ena residents and their descendents who have ancestors from the ahupua'a of Hā'ena and therefore have close ties to the land. Some private land was condemned from the ahupua'a 'ohana for the park establishment. Many members of the Hā'ena 'ohana are upset about the existing conditions of the park. Their specific complaints include rubbish on the beaches and trails, spiritual rituals conducted by visitors, souvenir vending, disturbing fishermen, harassing marine life, inappropriate public activities, commercial activities, and failure to heed traditional community protocols. Many believe these activities degrade the natural resources and cultural significance of the area (TKC and Earthplan 2001).

Some ahupua'a 'ohana members also feel that walking on the reef and using suntan oil in the area have a negative impact on the marine species, specifically limu (algae) that they collect for food. Because of the density of visitors to the park, the local 'ohana claim that can not practice cultural activities or enjoy the environment as they did in the past (Stepath 1999, TKC and Earthplan 2001). In turn, the ahupua'a 'ohana believe that denying them access affects their physical, mental, and spiritual health (Juran 2007).

7.5.2 Residents vs. Visitors

Residents in the Hā'ena area use Hā'ena State Park for various recreational activities, such as picnicking, camping, fishing, and windsurfing. Though residents consider the park, and especially Kē'ē Beach, to be their personal recreation area (TKC and Earthplan 2001), some will not go to the area because of the large number of tourists. Other property owners have denied public access to the beach (Juran 2007). According to a 2002 tourism study (Kaua'i Economic Development Board 2004), Kaua'i residents are more strongly opposed to increased tourism activity than the residents of any other island in the state.

Traffic congestion and parking are major user conflicts between residents and visitors. This congestion is the result of the popularity of Kē'ē Beach and the location of the entry point to the Kalalau trail head at the end of the highway (TKC and Earthplan 2001). A State Park Visitors Survey conducted in 2006, found between as many as 451 cars parked at the Hā'ena State Park per day. Of this total, only 13 percent were thought to be locally owned (Hā'ena State Park Visitors Survey 2006).

Residents tend to prefer Kē'ē Beach area to other sub-areas of the Park (Figure 1), and enjoy the lax enforcement and rules, vehicle access, and convenient location. Residents have requested better comfort stations and other amenities at the park. Visitors have requested improvements for security and safety, as well as upgrading existing comfort stations (TKC and Earthplan 2001).

Some residents believe that visitors should be paying fees to offset impacts to the Hā'ena State Park. All State Parks receive money through the State Parks Special Fund which is generated through camping fees, cabin rentals, concessions leases, and recreational leases (DLNR 2003). Funding may be allocated from the Hawai'i Tourism Authority's Transient Accommodations Tax (TAT) Trust Fund depending on the amount of money in the fund (DLNR 2003). Therefore, if visitors to the Hā'ena State Park are not staying at nearby hotels, residents argue that they are not paying for enjoyment of the area.

7.5.3 Recreation vs. Conservation

Resource conservation is outlined as an important issue in the State Comprehensive Outdoor Recreation Plan (2003). The unique natural environment of Hawai'i is one of the main attractions for tourists. Preserving nearshore ecosystems in Hawai'i is critical to the tourism industry (Rodgers and Jokiel 2007). However, the need to conserve can constrain public access if the activity has the potential to endanger resources.

Solving this conflict requires a balance between allowing public access for recreation and restricting some public use to protect resources (DLNR 2003). As at other coastal recreation areas in the state, there is a need to measure and monitor recreation carrying capacity and to establish indicators to ensure that coastal resources (as well as user experiences) do not deteriorate (Needham et al. 2008).

7.5.4 Commercial Use vs. Private Use

Hā'ena State Park is widely promoted in visitor's guides, adventure travel books, equipment rental facilities, hotels, and tour companies (TKC and Earthplan 2001). Commercial activities occurring in the park boundaries include weddings on Kē'ē Beach, kayak tours of Nāpali Coast, spiritual enlightenment tour groups, SCUBA diving instruction, and other commercial operators. Residents and native Hawaiians generally do not support having commercial activities at the Hā'ena State Park arguing that they degrade and exploit resources (TKC and Earthplan 2001). Furthermore, many residents or visitors would prefer to enjoy park without commercial operators, while others require a vendor to provide them with the necessary equipment (TKC and Earthplan 2001).

All private enterprises are required to have a state issued Special Use Permit from the Division of State Parks to conduct these activities on State owned lands. Commercial permits can provide a way to ensure compliance with legal requirements (DLNR, DAR, Hawai'i Ecotourism Association 2005); however, most commercial businesses which occur at Hā'ena State Park are not sanctioned by the State (TKC and Earthplan 2001).

7.5.5 Ecotourism vs. Development

Ecotourism is one of the fastest growing sectors of the tourism industry. According to the International Ecotourism Society, ecotourism is "responsible travel to natural areas that conserves the environment and improves the well-being of local people" (Blangy and Mehta 2006). Ecotourism in Hawai'i can be nature or culture based (<http://www.hawaiiecotourism.org/Default.aspx?pageId=117830>). This type of tourism is designed to prevent negative social and environmental impacts that can be associated with tourism (DLNR 2003). Development has the potential to adversely impact natural and cultural resources on which the ecotourism industry relies on.

“Hard-core” eco-tourists typically seek isolated destinations with minimal development. Thus, development has the potential to compromise the ecotourism experience of these individuals (TKC and Earthplan 2001). However, more developed facilities still have the potential to attract some eco-tourists seeking nature and culture-based activities (DLNR 2003). In addition, there are increasing concerns about sustainability and carrying capacities of ecotourism (Rodgers and Jokiel 2007). Because of their interest in remote areas, eco-tourists are also a means of passive dispersal by non-native invasive species.

7.5.6 Homeless/Squatters vs. Park Visitors

Homelessness remains an issue throughout the state as a result of nation-wide economic problems, mental illnesses, and cuts in state social programs (DLNR 2003). Squatters and homeless were evicted from the Hā'ena State Park during the Taylor's Camp era in the 1970s. However, squatters still reside in various locations throughout the isolated valleys of the adjacent Nāpali Coast and can be frequently seen at the Hā'ena State Park. Beach encampments can impact the visual image of the island, restrict users' access to facilities, create sanitation problems, and contribute to park maintenance needs (DLNR 2003, Gererna-Morales 2007). The presence of these individuals can ultimately impact the tourism industry; the Hawai'i Tourism Authority has stated that tourists have commented that seeing homeless people in parks or at the beaches makes them felt uncomfortable (Gererna-Morales 2007).

7.5.7 Windsurfers vs. Other Recreational Pursuits

Windsurfing has been shown to disrupt other recreational users at parks throughout the state (CSV Consultants 2007). Windsurfers often come close to others at high speeds. Beginning windsurfers often find control of their boards difficult and represent a greater risk to others in the water than expert windsurfers. In turn, park users, such as swimmers, sunbathers, snorkelers, and divers, can obstruct windsurfing zones and launching areas (CSV Consultants 2007).

At the Hā'ena State Park, Clark (1992) identifies only a “minor conflict” between windsurfers and fishermen. Throw-net fishing primarily occurs during low tides when the reefs are more exposed. Low tides often coincide with strong, consistent trade winds, which are ideal conditions for windsurfing. When these activities happen together, windsurfers can scare away schools of fish for throw net and pole fishermen (TKC and Earthplan 2001).

7.5.8 ORVs vs. Beach Users

ORVS can degrade the visual appearance of the beach by damaging vegetation and sand dunes. In addition, the noise and safety hazards associated with vehicle use on the beach conflict with other beach users and can detract from visitor experiences at the park (TKC and Earthplan 2001).

7.5.9 Traditional Fishing vs. Recreational Fishing

In 2006, HRS 18-22.6 designated a community based subsistence fishing area at the shoreline of the Hā'ena district “for the purpose of reaffirming and protecting fishing practices customarily and traditionally exercised for purposes of native Hawaiian subsistence, culture, and religion (SB2501). Enacted in 2007, the subsistence fishing area law was modeled after other community-based subsistence areas elsewhere in the state (e.g. Mo'omomi, Moloka'i). Because the Hā'ena area is relatively new, specific management protocols are still being discussed amongst community members (Heacock, DAR, pers. comm.). It is anticipated that the self-policing of the area as called for by the act will include protocols for recreational fishers and visitors to seek permission to fish within the area from local stewards of the resource, seasonal and take limits, limits on gear, and so forth.

The only area on the north shore of Kaua'i where nearshore marine life is protected from fishing pressure is the Kilauea Point National Wildlife Refuge managed by the U.S. Fish and Wildlife Service. This area,

along with the more remote portions of the Nāpali Coast, may serve as defacto marine preserves because of their inaccessibility.

Reef waters of Hā'ena State Park also serve as a defacto preserve during winter months when high waves and strong currents limit fishing opportunities. Preserves provide safe havens for fish development and sources of stock enhancement following periods of increased fishing pressure on adjacent areas.

7.6 Impacts of Increased Recreational Uses

An increase in recreational uses at the Hā'ena State Park would place greater demands on existing facilities infrastructure, and on the physical, ecological, and societal capacity of the area (See Section 7.4). Attracting more recreational users would further increase current traffic congestion and parking issues for both visitors and residents. More users would also have the potential to impact stream and nearshore water quality by increasing the amount of non-point and point-source pollution in the area. The reef ecosystem would be significantly impacted by an increase in unregulated recreational activity at the Park. Potential impacts to the coral reef ecosystem as a result of increased recreation in the nearshore area include: decreased coral coverage, altered coral growth, decreased fish populations, reduced local biodiversity and increased propagule pressure of invasive species. Without an enforceable Park management plan, an uncontrolled increase in current recreational activities at the Hā'ena State Park would lead to further dune erosion and the removal of dune vegetation; create untenable traffic congestion and conflicts; increase the level of pollutants in non-point source stormwater runoff; conflicts between recreational and subsistence fishers, and between other and various users of the Park's marine waters; loss of the unique socio-cultural character of the Park and surrounding neighborhood; reduced level of enjoyment by visitors and residents alike; and ultimately as a 'worst case', the potential economic collapse of the area as a visitor destination.

8.0 Design Considerations and Resource Management Concepts

8.1 Water Quality Issues

Several design considerations can be assessed to help maintain Class AA coastal water quality standards at Hā'ena State Park as visitations increase. These include following actions:

- Conduct a high-resolution assessment of Park topography and evaluate alternate storm drainage features to minimize or slow runoff into the ocean
- Upgrade sanitation facilities and conduct regular inspection and maintenance of sanitation systems at the public restrooms to prevent sewage seepage or spillage into the ocean or groundwater
- Create parking areas remote from the Park and allow only pedestrian or shuttle bus access
- Carefully design parking areas and apply best management practices to prevent the runoff of contaminants to streams and coastal waters
- Conduct regular maintenance of, and apply best management practices to, the Kalalau Trail to prevent unnecessary soil erosion, siltation, high turbidity, and possible coral mortality within the Kē'ē Lagoon and reef
- Provide and regularly maintain an appropriate number of trash and recycling receptacles to reduce the amount of plastic and other solid waste that blows or gets washed into the ocean in storm runoff.

8.2 Shoreline Erosion

Sandy beaches are at the heart of the multi-billion dollar visitor economy in Hawai'i that provides the greatest share of the state's jobs and income. When erosion threatens the built environment a common reaction is to armor the shoreline with a seawall or revetment. Armoring may impound sand thereby

impacting the sediment budget of a beach and exacerbating the erosion. Shoreline armoring also increases wave turbulence and reflection. It is common to find that the construction of one seawall on a beach leads to proliferation of additional seawalls. Armoring a chronically eroding coast leads to beach loss (Fletcher, et al. 1997). Beach loss because of seawall construction on eroding shorelines has been estimated to be 25% on O'ahu and 20% on Maui (<http://www.surfrider.org/>). In an era of accelerating sea-level rise (Church and White 2006) the threat of chronic erosion and beach loss is growing and the use of shoreline data becomes a potentially significant coastal management tool in the effort to conserve beaches for future generations.

The Kaua'i Shoreline Erosion Management Study (DHM et al 1999) developed management recommendations and plans for selected Kaua'i shoreline areas including the area between Hā'ena and Wainiha. The recommendations developed from this and related studies for preservation and restoration of sandy beaches and setbacks to compensate for coastal erosion at the Hā'ena State Park are consistent with the policies and guidelines of HRS 205A Hawai'i Coastal Zone Management, Hawai'i Coastal Erosion Management Plan (DLNR 1997), DLNR Office of Conservation and Coastal Plans and the County of Kaua'i General Plan (2000), and Kaua'i County Council Ordinance 863: Shoreline Setback and Coastal Protection Ordinance. Erosion prevention and control actions specifically relevant to the Park include:

- Delineate and manage specific erosion prone areas by 'littoral cells'. Littoral cells are self-contained beach compartments that are geographically bounded by specific physical features (e.g. groins, piers, points of land) that either provide or remove sand from the cell.
- Establish shoreline setbacks of no less than 60 feet for Hā'ena
- Prohibit shore protection structures
- Remove unpermitted shoreline structures
- Preservation of public shorelines in natural state
- Give non-structural remedies (e.g. beach nourishment) preference over structural work
- Develop and update a shoreline structure inventory

Design of future Hā'ena State Park facilities should employ the recent data and maps developed by the University of Hawai'i (UH) Coastal Geology Group (<http://www.soest.hawaii.edu/coasts/>) to calculate appropriate setbacks.

8.3 Marine Resource Issues and Conservation

Coral reef ecosystems have high gross primary productivity, yet the net productivity and potential fisheries yields on coral reefs are relatively low (Birkeland 2001). Populations of fishes and invertebrates on coral reefs can be fished out quickly and if severely depleted, may not return. Coral reef species are particularly vulnerable to overfishing partly because of their life-history adaptations. Because of the life-history traits of the targeted species and because of the nature of the ecosystem processes, we must be careful about expecting too much from coral reefs. The fisheries yield of coral reefs should not be expected to keep pace with the growing human population and its demand for protein (Birkeland 2001). Overfishing also can have a deleterious impact upon ecosystem function and marine community structure. While pelagic fisheries might be managed on a species-by-species basis, coral-reef fisheries must be managed on an ecosystem basis.

Four years of CRAMP monitoring data and several independent studies of the reefs within the Park suggest the nearshore waters of Hā'ena State Park from Kē'ē Beach to Hā'ena Point contain largely undisturbed coral reef resources that provide habitat for healthy populations of fishes and invertebrates of subsistence and recreational value. These populations can be sustained provided that they are actively managed through carefully organized stewardship programs. Excessive fishing pressure, particularly upon a limited number of target species, can lead to dramatic adverse changes in community structure. Serious reduction or collapse of fish resources at Hā'ena and/or significant damage to the reef habitat would reduce its overall importance as a visitor destination area and would deprive the local community

of a valuable subsistence resource (Birkeland 2001). Stepath (1999) has highlighted the potential problems associated with excessive and inappropriate uses of the Park waters.

Improvements to the Park facilities through the master planning process may consider the following measures to help protect and sustain the long-term viability of the marine environment. These considerations are adapted in part from the Coral Reef Ecosystem Fishery Management Plan (CREFMP) for the western Pacific which is the first ecosystem-based fishery management plan for U.S. waters:

- Encourage the development of management guidelines and protocols for the Community-Based Subsistence Fishery Area established for Hā'ena by Hawai'i state law within a structured administrative framework;
- Establish a permit system as part of this program that requires catch reporting to allow the evaluation of changes over time in catch per unit effort and size distribution of the resource allows management to improve (Birkeland 2001);
- Establish a program of long-term scientific monitoring of fish and invertebrate populations trends within Park marine waters;
- Allow sufficient flexibility and insure long-term monitoring to employ the principal of adaptive management and allow changes to be made to permitting processes and management actions, as deemed appropriate based upon the results of long-term monitoring and catch statistics;
- Establish a means of enforcing the permitting system for recreational fishing within the Park waters.

Consideration might also be given to the establishment of a marine protected area (MPA) adjacent to or within a portion of the Park to serve as a fishery stock replacement area.

8.4 Mitigation of Conflicting Uses

Community consensus is the best mechanism to achieve a lasting solution of recreational user conflicts. Establishment of a Park users-group consisting of stakeholders, local residents, and government agencies should meet to discuss ways in which the conflicting uses discussed in the previous sections can be mitigated. User group meetings can be led by an independent moderator or by an agency or non-profit group. Segregation of conflicting uses might be considered on a rotating user basis by day and/or month, or weather and sea-condition basis, permit, or other system.

8.5 Shoreline Access

HRS 115-4 and 115-5 provide that the public has a right of access all State beaches and shorelines situated below the "upper reaches of the wash of the waves." In general, counties have the primary authority and duty to develop and maintain public shoreline access. The State's primary role in the shoreline area is to preserve and protect coastal resources within the conservation district and support public access along and below the shoreline (HRS Chapter 205A). Because of the steep shoreline along the Nāpali Coast west of the Park, the portion of the shoreline where pedestrian access becomes feasible begins at Kē'ē Beach and extends eastward along the shore to Hā'ena Point.

- Shoreline access points can be placed to control access for specific recreational and subsistence uses, and should be limited to pedestrian access.
- No public vehicular traffic should be allowed on the beach within the Park.

9.0 Interpretive Concepts for Marine Recreational Use

A number of community-based and non-governmental (NGO) organizations, as well as government-private and NGO partnerships support periodic monitoring and educational studies of the lagoon and reef at Hā'ena State Park. These include Windward Community College (CRAMP), Makai Watch, Save our Seas, Reef Check, The Nature Conservancy, Mālāma Hawai'i, Community Conservation Network, Hawai'i Wildlife Fund, Sea Grant Program, Hawai'i Department of Land and Natural Resources Division of Aquatic Resources. Many of these activities are in turn supported by grants from government agencies and the private sector including those from Tesoro, Harold K.L. Castle Foundation, National Fish and Wildlife Foundation, NOAA, Hawai'i Tourism Authority, and others.

The State of Hawai'i Coastal Zone Management Program (CZMP) has prepared an Ocean Resources Management Plan (ORMP), as required by Chapter 205A of Hawai'i Revised Statutes (HRS), through collaboration with government agencies and stakeholders. The ORMP draws on traditional Hawaiian ecosystem management principles, relies on community and private sector involvement, promotes an adaptive learning approach, identifies responsibilities and a schedule for implementation, and emphasizes interagency collaboration and public-private partnerships. Hā'ena is one of several ORMP stewardship sites being studied over the next five years.

Each of these organizations can be considered a stakeholder in the development of interpretive, education, and management programs for Hā'ena State Park. Following the successful model of Hanauma Bay on O'ahu, consideration should be given to the establishment of a "Friends of Hā'ena State Park" organization. Such a non-profit organization can help develop and sustain a visitor education program, coordinate park cleanups by volunteer service groups, coordinate use of the park by different marine recreation groups (e.g. dive clubs, surfing contests, kayaking, etc.), provide formal and informal docent services, assist the Hawai'i Division of State Parks with management, and help alleviate user conflicts. A service group such as this might also serve as the point-of-contact for the community-based subsistence fishing area for those wishing to shorefish or spearfish within the Park.

Educational signage, a docent program, lectures, films, and interactive kiosks are all valuable approaches to consider for enhancement of visitor and resident enjoyment of Hā'ena State Park. More information on the Hanauma Bay carrying capacity study can be found in Lankford et al (2005). Friends of Hanauma Bay website is: <http://www.friendsofhanauabay.org/history.html>.

10.0 Literature Cited

- Abbott, I., C. L. Hunter. 2000. Ecological success of alien/invasive marine algae in Hawai'i. Available at: <http://www.botany.hawaii.edu/GradStud/smith/websites/alien-overview.htm>. Last accessed 07/10/09.
- Belt Collins Hawai'i LTD. 2008. Statewide Large-Capacity Inter-Island Ferry, Draft Environmental Impact Statement. Prepared for State of Hawai'i Department of Transportation, Harbors Division.
- Blangy, S. and H. Mehta. 2006. Ecotourism and Ecological Restoration. *Journal for Nature Conservation* 14(3-4):233-236.
- Blitz, J.B. and S.A. Norton. 2008. Possible environmental effects of sunscreen run-off. *Journal of American Academy of Dermatology*. 59(5):898.
- Birkeland, C. 2001. Can ecosystem management of coral reefs be achieved? Pp. 15-19 in *Global Trade and Consumer Choice: Coral Reefs in Crisis*, Papers presented at the symposium held at the 2001 Annual Meeting of the American Association for the Advancement of Science.
- Birkeland, C. and A.M. Friedlander. 2001. The importance of refuges to reef fish replenishment in Hawai'i. Honolulu: Audubon Society. 19 pp.
- Birkeland, C. and J. Dierking. 2007. Population level impact of the introduced grouper roi (*Cephalopholis argus*) on native reef fishes in Hawai'i. HCRI Project Final Report.
- Brown, E., E. Cox, P. Jokiel, K. Rodgers, W. Smith, B. Tissot, S. Coles, and J. Hultquist . 2004. Development of Benthic Sampling Methods for the Coral Reef Assessment and Monitoring Program (CRAMP) in Hawai'i. *Pacific Science* 58 (2): 145-158
- Brown, P.J. and R.B. Taylor. 1999. Effects of trampling by humans on animals inhabiting coralline algal turf in the rocky intertidal. *J. Exp. Mar. Biol. Ecol.* 235:45-53.
- Buddemeier, R.W., J.A. Kleypas, and R.B. Aronson. 2004. Coral Reefs and Global Climate Change: Potential Contributions of Climate Change to Stresses on Coral Reef Ecosystems. Pew Centre for Global Climate Change: Arlington, VA. 42 pp.
- Chaloupka, M., T.M. Work, G.H. Balazs, S.K.K. Murakawa and R. Morris. 2008. Cause-specific temporal and spatial trends in green sea turtle strandings in the Hawaiian Archipelago (1982-2003). *Marine Biology* 154(5):1431-1793.
- Church, J. A. and N. J. White., 2006. 20th century acceleration in global sea-level rise, *Geophys. Res. Lett.*, 33(1), L01602.
- Clark, J. 1992. Beach and Ocean Recreation Study, Hā'ena, Kaua'i. Division of State Parks, Department of Land and Natural Resources.
- Clark, J. 1999. Hawai'i's Best Beaches. University of Hawai'i Press.
- County of Kaua'i Planning Department. 2000. Kaua'i General Plan.
- CSV Consultants. 2007. Report to the Hawai'i Department of Land and Natural Resources: Recommended Strategies for Addressing Ocean Recreation User Conflicts.

D'Antonio, C. M. and P.M. Vitousek. 1992. Biological Invasions by exotic grasses, the grass fire cycle, and the global change. *Annual Review of Ecology and Systematics* 23:63-87.

Danovaro, R., L. Bongiorni, C. Corinaldesi, D. Giovannelli, E. Damiani, P. Astolfi, L. Greci, and A. Pusceddu. 2008. Sunscreens Cause Coral Bleaching by Promoting Viral Infections. *Environmental Health Perspectives*. 116(4): 441-447.

Daughton, C.G., T.A Ternes. 1999. Pharmaceuticals and personal care products in the environment: agents of subtle change? *Environ Health Perspect*. 107(6):907-38.

Davenport, J., J.L. Davenport. 2006. The impact of tourism and personal leisure transport on coastal environments: a review. *Est Coast Shelf Sci* 67:280–292.

Department of Business, Economic Development, and Tourism (DBEDT). 2008. 2007 State of Hawai'i Data Book. Available at: <http://hawaii.gov/dbedt/info/economic/databook/db2007/>. Accessed December 22, 2008.

DBEDT and Department of Health (DOH). 2000. Hawai'i's Implementation Plan for Polluted Runoff Control. Available at: <http://hawaii.gov/health/environmental/water/cleanwater/prc/implan-index.html>. Accessed January 7, 2009.

Denslow, J.S, S.C. Space, and P.H. Thomas. 2008. Invasive Exotic Plants in the Tropical Pacific Islands: Patterns of Diversity. *Biotropica*.

Department of Land and Natural Resources (DLNR). 1999. The Coastal Erosion Management Plan (COEMAP). Department of Land and Natural Resources, Coastal Lands Program. Honolulu, HI. 89 pp.

DLNR. 1999. Current Line (Newsletter, Division of Aquatic Resources): Vol. 3; No. 2 (August 1999). State of Hawai'i (Dept. of Land and Natural Resources).

DLNR, DAR, and Hawai'i Ecotourism Association. 2005. Hawai'i's Local Action Strategy to Address Recreational Impact to Reefs.

DOH Clean Water Branch. 2008. 2006 State of Hawai'i Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117), Chapter 1 Marine Waters. 48pp.

DHM Inc., Edward K. Noda & Associates, Inc., and Moon, O'Connor, Tam & Yuen. 1990. Kaua'i Shoreline Erosion Management Study. Contract report prepared for the Hawai'i Coastal Zone Management Program office, Honolulu, HI.

Dierking, J. (2007) Effects of the introduced predatory fish *Cephalopholis argus* on native reef fish populations in Hawai'i. Ph.D. dissertation, Zoology Department, University of Hawai'i at Manoa, Honolulu, Hawai'i, USA: 115 pp.

Division of Boating and Ocean Recreation (DBOR), Hawai'i Department of Land and Natural Resources (DLNR). DOBOR Facilities. Available at: <http://www.hawaii.gov/dlnr/dbor/borfacilities.htm>. Accessed December 22, 2008.

Division of State Parks, DLNR. Hawai'i State Parks website. Available at: <http://www.hawaiistateparks.org/parks/hawaii/>. Accessed December 22, 2003.

Eichenseher, T. The cloudy side of sunscreens. *Environ Sci Technol* 40(5):1377-1378.

Endreson, B., W. Aila, L. Paul. Undated. Destructive Fishing Methods: Lay Gillnets. Pacific Fisheries Coalition White Paper: <http://www.pacfish.org/wpapers/gillnets.html>

Fair Catch. 2006. Statewide Survey: Hawai'i's Attitudes on the Ocean and Lay Gill Net Restrictions.

Available at: <http://www.faircatchhawaii.org/images/pdf/PublicOpinion.pdf>

Fletcher, C.H., Mullane, R.A., and Richmond, B.M., 1997. Beach loss along armored shorelines of Oahu, Hawaiian Islands. *Journal of Coastal Research*, v. 13, p. 209-215.

Friedlander, A.M. 2000. Development of standard fish survey technique. Pp. 23-34 In: Hawai'i Coral Reef Initiative Coral Reef Assessment and Monitoring Program (CRAMP) Final Report 1998-1999. Jokiel, P.L. and E.K Brown. (Eds.) Prepared for National Ocean Service, National Oceanic and Atmospheric Administration, Silver Springs, MD. 45pp.

Friedlander, A., G. Aeby, R. Brainard, E. Brown, K. Chaston, A. Clark, P. McGowan, T.

Montgomery, W. Walsh, I. Williams, and W. Wiltse. 2008. The State of Coral Reef Ecosystems of the Main Hawaiian Islands. Pp. 219-261 in Waddell, J.E. and A.M. Clarke (eds.) The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008. NOAA Technical Memorandum NOS NCCOS 73. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD.

Friedlander, A.M., E.K. Brown, P.L. Jokiel, W.R. Smith, and K.S. Rodgers. 2003. Effects of habitat, wave exposure, and marine protected area status on coral reef fish assemblages in the Hawaiian archipelago. *Coral Reefs* 22:291-305.

Friedlander, A.M. and J.D.Parrish, 1998a. Habitat characteristics affecting fish assemblages on a Hawaiian coral reef. *J. Exp Mar Biol Ecol* 224:1-30.

Friedlander, A.M. and J.D. Parrish. 1998b. Temporal dynamics of the fish assemblages on an exposed shoreline in Hawai'i. *Environ Biol Fish* 53:1-18.

Gererna-Morales, R. 2007. Hawai'i's housing boom takes toll on the homeless. *Post-gazette*. 11 January 2007.

Grigg, R. 1994. Effects of sewage discharge, fishing pressure and habitat complexity on coral ecosystems and reef fishes in Hawai'i. *Marine ecology*. 103(1-2):25.

Hadfield, M.G. and M.A.R. Koehl. 2007. Effects of Invasive Algae on Larval Transport into Coral Reefs. Pacific Biosciences Research Center.

Hamnett, M.P., M. Liu, and D.B. Johnson. 2004. Fishing, Ocean Recreation, and Threats to Hawai'i's Coral Reefs. <http://www.hawaii.edu/ssri/hcri/files/education/fishingbrochure.pdf>. Accessed January 13, 2009.

Hollier, D. 2009. A Fish Diet. *Hawai'i Business*. January 2009.

Jokiel, P.L. and E.K Brown. 2000. Hawai'i Coral Reef Initiative Coral Reef Assessment and Monitoring Program (CRAMP) Final Report 1998-1999. Prepared for National Ocean Service, National Oceanic and Atmospheric Administration, Silver Springs, MD. 45pp.

Juran, M. 2007. Community Base Marine Management, Hā'ena Ahupua'a, Kaua'i, Hawai'i: Listening to Community Members and Respected Scientists to Better Understand the Implications of Community-Based Marine Management on Our Near-Shore Fisheries.

- Katekaru, A. 2008. Transmittal of final Biological Opinion under Section 7 of the Endangered Species Act on the effects of implementation of new bottom fishing regulations in Federal waters of the Main Hawaiian Islands (Amendment 14) on listed marine species. Letter to Chris Yates, Assistant Regional Administrator, Protected Resources Division, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu.
- Kaua'i Economic Development Board. 2004. Kaua'i's Economic Development Plan 2005-2015, Kaua'i's Comprehensive Economic Development Strategy (CEDS) Report.
- Klein, R. 2007. Fodor's Kaua'i, 1st Edition. Random House, Inc.: New York.
- Lankford, S.V., Y. Inui, A. Whittle, R. Luna, and D. Tyrone. 2005. Sustainability of Coastal/Marine Recreation: Modeling Social Carrying Capacity for Hanauma Bay, Hawai'i. Prepared for University of Hawai'i Sea Grant College Program, SOEST.
- Leung, B. and N.E. Mandrak. 2007. The risk of establishment of aquatic invasive species: joining invisibility and propagule pressure. *Proceedings of the Royal Society*. 274:2603-2609.
- Liddle, M.J. and A.M. Kay. 1987. Resistance, survival and recovery of trampled corals on the Great Barrier Reef. *Bio. Conservation*, 42:1-18.
- Lockwood, J.L., P. Cassey, and T. Blackburn. 2005. The role of propagule pressure in explaining species invasions. *Trends in Ecology and Evolution* 20(5):223-228.
- Maly, K. and O. Maly. 2003a. "Hana ka Lima, 'Ai Ka Waha" A Collection of Historical Accounts and Oral History Interviews with kama'āina residents and fisher-people of Lands in the Halele'a-Nāpali Region on the Island of Kauai. Contract report prepared for NTBG and The Nature Conservancy: 506 pp.
- Maly, K. and O. Pomroy-Maly. 2003b. Ka Hana Lawai'a a me na Ko'a o na Kai'Ewalu. A History of Fishing Practices and Marine Fisheries of the Hawaiian Islands. Honolulu, HI. Contract report prepared for NTBG and The Nature Conservancy: 506 pp.
- Meliane, I. and C. Hewitt. 2005. Gaps and priorities in addressing marine invasive species. IUCN Information Document. 9pp.
- Milazzo, M. F. Badalamenti, T. Vega Fernandez, and R. Chemello. 2005. Effects of fish feeding by snorkelers on the density and size distribution of fishes in a Mediterranean marine protected area. *Marine Biology* 146:1213-1222.
- National Marine Fisheries Service and U.S. Fish & Wildlife Service. 2007. Green Sea Turtle (*Chelonia mydas*). 5-Year Review: Summary and Evaluation. 105 p.
- Needham, M.D., J.F. Tynon, R.L. Ceurvorst, R.L. Collins, W.M. Connor, and M.J.W. Culnane. 2008. Recreation carrying capacity and management at Waikiki – Diamond Head Shoreline Fisheries Management Area on Oahu, Hawai'i. Final project report for Hawai'i Coral Reef Initiative – Research Program. Corvallis: Oregon State University, Department of Forest Ecosystems and Society. 95pp.
- Nielsen, F.M. 2005. Franko's Dive Map of Kaua'i: Details on the North, East, and South Shores plus the Islands of Ni'ihau and Lehua.
- NKN Project Planning (2006). Final Environmental Assessment for Hā'ena County Beach Park Improvements. 34pp + Appendices.

NOAA 2007. NOAA Coral Reef Conservation Program (CRCP) External Program Review.
<http://www.coralreef.noaa.gov/review.html>

Roberts, D. 2006. Florida Fishing Weekly. Marine Fish Feeding: Why the FWC Thinks It's Bad for Everyone. Florida Fish and Wildlife Conservation Commission.

Rodgers, K.S. 2001. A quantitative evaluation of trampling effects on Hawai'i's coral reefs. Masters Thesis. University of Hawai'i, Dept. of Geography. Honolulu, Hawai'i. pp.163

Rodgers, K.S. and E. Cox. 2003. The Effects of Trampling on Hawaiian Corals along a Gradient of Human Use. *Biological Conservation* 112(3):383-89.

Rodgers, K.S. and P.L. Jokiel. 2007. Evaluation of the 'Āhihi-Kīna'u Natural Area Reserve Marine Resources.1. Human Impact Evaluation on Nearshore Environments. Hawai'i Coral Reef Assessment and Monitoring Program.

Rodgers, K., C. Newton, and E.F. Cox. 2003. Mechanical Fracturing of Dominant Hawaiian Corals in Relation to Trampling. *Environmental Management* 31:377-384.

Rouphael, T., Inglis, G. 1995. The Effects of Qualified Recreational SCUBA Divers on Coral Reefs. CRC Reef Research Centre. Technical Report No. 4. CRC Reef Research Centre, Townsville.

Schlacher, T.A., D. Richardson, I. McLean. 2008. Impacts of off-road vehicles (ORVs) on macrobenthic assemblages on sandy beaches. *Environmental Management* 41(6):878-892.

Schueler, T.R. 1994. The importance of imperviousness. *Watersh. Protect. Techn.* 1(3):100-111.

Singh, A., H. Wang, W. Morrison, H. Weiss. 2008. Fish biomass structure at pristine coral reefs and degradation by fishing. Unpublished manuscript, Georgia Institute of Technology. 17pp.

SPC Fisheries. 2004. Divers Feeding Fishes: A Continuing Issues in MPA Management. SPC Fisheries Newsletter #111.

Sprout, J. and J. Sprout. 2004. Kaua'i Trailblazer: Where to Hike, Snorkel, Bike, Paddle, Surf. Diamond Valley Company.

Stepath, C. 1999. Ke'e Lagoon and Reef Flat Users Baseline Study. Unpublished marine biological survey report.

Sweatman, H.P.A. 1996. Impact of tourist pontoons on fish assemblages on the Great Barrier Reef. CRC Reef Research Centre Ltd Technical Report No. 5 Townsville; CRC Reef Research Centre Ltd, 54 pp.

Tabata, Raymond S. July 1992. Hawai'i's Recreational Dive Industry Sea Grant Marine Economics Report. Ocean Resources Branch. DBEDT State of Hawai'i. Contribution No. 98.

Tabata, R.S. 1980. The Native Coastal Plant of Oahu, Hawai'i. pp 321- 346. In Smith, C. W. (Ed.). June 4-6, 1980. Proceedings of the Third Conference in Natural Sciences, Hawai'i Volcanoes National Park. Cooperative National Park Resources Studies Unit, University of Hawai'i at Manoa.

Tratalos, J.A., Austin, T.J., 2001. Impacts of recreational SCUBA diving on coral communities of the Caribbean island of Grand Cayman. *Biological Conservation* 102:67-75.

Than, K. 2008. Swimmers' Sunscreen Killing Off Coral. National Geographic News. 29 January 2008. Available at: <http://news.nationalgeographic.com/news/2008/01/080129-sunscreen-coral.html>. Accessed January 5, 2009.

The Keith Companies- Hawai'i, Inc. (TKC) and Earthplan Planning and Design (Earthplan). 2001. Hā'ena State Park Master Plan and Draft Environmental Impact Statement. Prepared for Division of State Parks Department of Land and Natural Resources.

Vogt, G. 1979. Adverse effects of recreation on sand dunes: A problem for coastal zone management. Coastal Zone Management. Journal 6(1): 37-68.

University of Hawai'i, Sea Grant Extension Service and County of Maui Planning Department. 1997. Beach Management Plan for Maui. Available at: <http://hawaii.gov/dlnr/occl/manuals-reports/BeachManagementPlan.pdf/view>. Accessed December 19, 2008.

University of Hawai'i, Sea Grant College Program. 2006. Natural Hazard Considerations for Purchasing Coastal Real Estate in Hawai'i: A Practical Guide of Common Questions and Answers.

Vitousek, P.M. 1990. Biological invasions and ecosystem processes: towards an integration of population biology and ecosystem studies. Oikos 57:7-13.

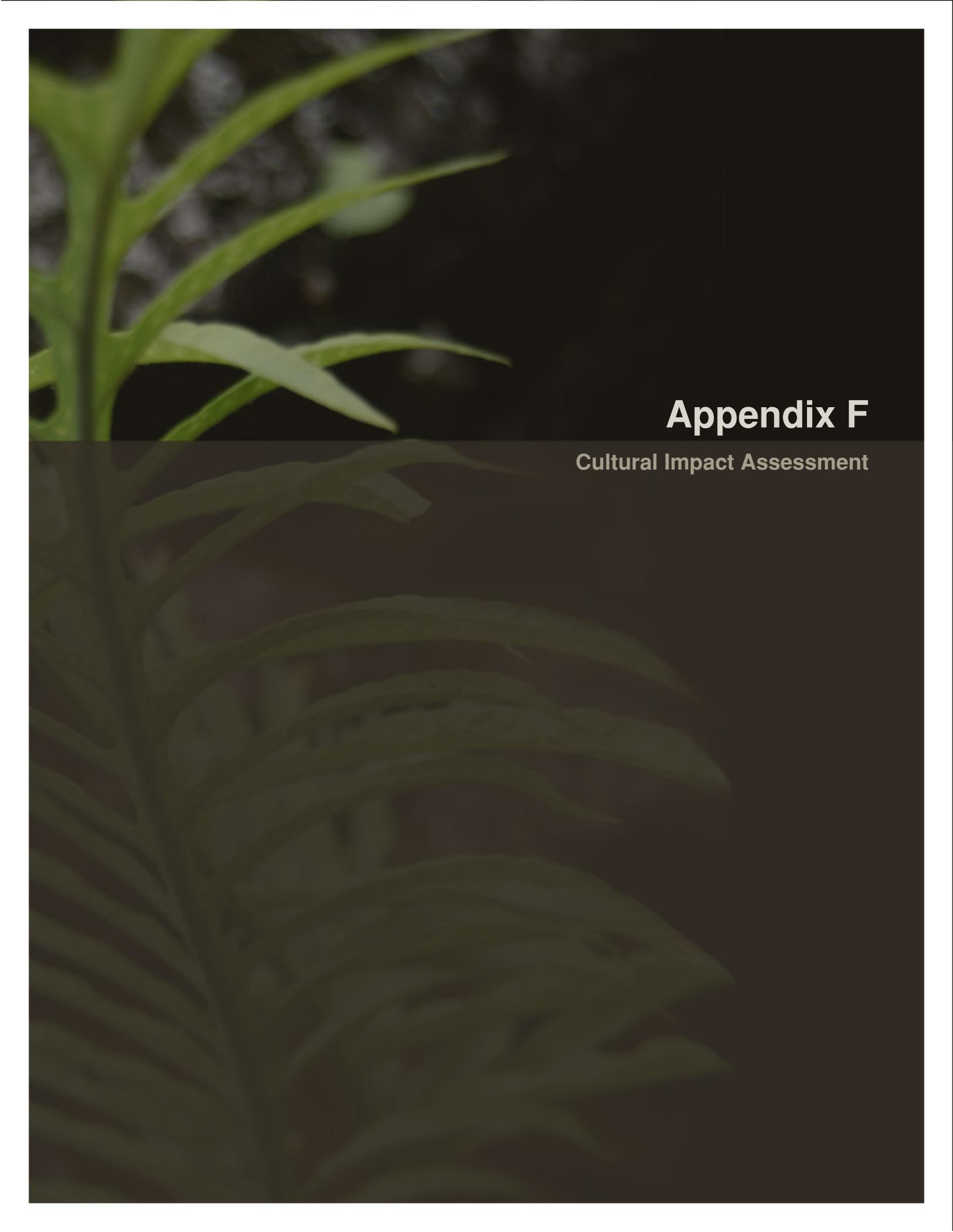
Vitousek, P.M. 1992. Effects of alien plants on native ecosystems. Pages 29-41 in C.P. Stone, C.W. Smith, and J.T. Tunison (eds.), Alien plant invasions in native ecosystems of Hawai'i: management and research. Cooperative National Park Resources Studies Unit, University of Hawai'i, Honolulu. 887 pages.

Williams, I.D., W.J. Walsh, R.E. Schroeder, A.M. Friedlander, B.L. Richards, and K.A. Stamoulis. 2008. Assessing the importance of fishing impacts on Hawaiian coral reef fish assemblages along regional-scale human population gradients. Environmental Conservation 35(3):261-272.

Woodland, D.J. and J.N.A. Hooper. 1977. The Effects of Human Trampling on Coral Reefs. Biol. Conservation, 11:1-4.

Yamamoto, L. 2006. Lonely Planet Kaua'i. Lonely Planet: London. Yuen, K. Personal communication.

Zeller, D. M. Darcy, S. Booth, M.K. Lowe, and S. Martell. 2008. What about recreational catch? Potential impact on stock assessment for Hawai'i's bottomfish fisheries. Fisheries Research (Amsterdam) 91(1): 88-97.



Appendix F

Cultural Impact Assessment

Hā`ena State Park Master Plan/EIS
Cultural Impact Assessment



Prepared for
PBR Hawai`i and Associates Inc.

by
Maria “Kaimi” Orr
Kaimipono Consulting Services LLC
Rev 11-30-2010

Cover Photos 1-12

Hā`ena State Park cultural resources:

Mountain peaks, Kalo, Lohiau's wall,
Ka-Ahu-A Laka, Hula Pā, Ka-Ulu-O-Paoa,
Loko Kē`ē/Loko Naia/Marsh, Park sign, Waiakapala`e Cave,
Kē`ē Beach/Lagoon, Limahuli Stream, Muliwai Beach

EXECUTIVE SUMMARY

At the request of *PBR Hawai`i and Associates, Inc.* and the Division of State Parks, Department of Land and Natural Resources (DLNR), a Cultural Impact Assessment [CIA] was conducted for *Hā`ena State Park* as part of a larger project, *Hā`ena State Park Master Plan/EIS*. The purpose of this CIA was to gather information about traditional cultural practices, ethnic cultural practices and pre-historic and historic cultural resources that may be affected by the implementation of the Master Plan. The *level of effort* of this study included a broad cultural and historical background review; review/analysis of oral histories of six people knowledgeable about Hā`ena State Parks lands.

According to the archival material, Kaua`i has had a long history of habitation that included most of its coastal lands, with great resources in the interior lands and waterways. Kaua`i was inhabited long before the arrival of the Pele *ohana*. The famous epic saga of Pele, her sisters and brothers is where we see Lohi`au mentioned, Hā`ena's most famous resident *ali`i*. The foundation and walls of his *hale* still stand today, as does the *heiau* and *hula* platform where he worshipped and honored the *hula* goddess Laka. Ancient Menehune and Mai`a people were said to have gone back to their homeland from Hā`ena. The ancient ceremony of throwing fire brands (*ōahi*) off the mountain was performed from the top of Pu`u Makana, a prominent natural feature in Hā`ena State Park lands. There are many other stories about gods, goddesses, chiefs and chiefesses who made Hā`ena home, as well as a long tradition of *maka`āinana* who farmed its rich lands and fished in the abundant coastal waters, evidenced by burials and oral histories that have been passed down through generations.

The Hā`ena State Park lands were once part of an ancient Hawai`i an ahupua`a life-system as well as a support system for the *ali`i* who lived there. The physical evidence of multi-use ancient or traditional cultural practices still exists nearby (e.g. Lohi`au's *hale*, *hula* platform, *heiau*, *loko* or fishponds and *lo`i*), which not only indicate traditional land use of the area, but that it was/is considered *wahi pana* (sacred or significant place). They also indicate that Hā`ena was not only well established, but part of ancient Hawai`ian life-systems that included the *ali`i*, officiating *kahuna* and people who lived and cared for the land. The *hale* complex of Lohi`au confirms that portions of Hā`ena were *ali`i* lands with all the infrastructure and required support systems. Fishponds or *loko* were considered resource/property of the *ali`i nui* therefore it can be assumed that Loko Kē`ē and Loko Naia were most likely under the control of and primarily for the benefit of *ali`i*.

According to several sources, there are many pre-Contact burials in the park sand dunes and in the vicinity of the comfort station; one consultant said there were burials in the *lo`i* area as well. There are several historic burials near the area of the foundation of the old poi mill. Burials were and are considered a very significant cultural practice.

Hā`ena State Park lands are located on storied lands, once part of ancient and historic communities who lived, farmed, fished, gathered, tended fishponds and buried their dead. A limited number of people were interviewed and shared their *mana`o* and many concerns regarding Hā`ena State Park; a long list of recommendations for the Hā`ena State Park Master Plan/EIS is provided based on their *mana`o*. It is also highly recommended that a cultural advisory committee or group be formed, hopefully including these interviewees, who could provide cultural expertise during the Master Plan/EIS process and during any later park development projects.

ACKNOWLEDGEMENTS

Mahalo nui loa to all the people who agreed to take the time to be interviewed for the Master Plan/EIS in 2008 whose interviews I reviewed and analyzed for this project: Kumu Kapu Alquiza; Uncle Thomas Hashimoto; Mr. Clarence Hashimoto; Mr. Chipper Wichman; Uncle F. Bruce Wichman; and especially Mr. Randy Wichman (and his wife Victoria) for their awesome hospitality and dinner. And another *mahalo nui loa* to Randy for agreeing to a telephone interview (2009) for the comfort station project.

Mahalo to Mr. Kepā Maly for allowing me to review his reports and to the staff of PBR for providing reports of various studies conducted in Hā`ena State Park.

MAHALO NUI LOA!!!!

TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1.0 Scope of Work	1
1.2.0 Project Area	2
1.2.1 Project Location	3
1.3.0 Environment	4
1.3.1 Terrestrial Ecosystems in Hā`ena State Park	4
1.3.1.1 Native Wet Forest and Woodland	4
1.3.1.2 Lowland Dry and Mesic Forest, Woodland and Shrubland	5
1.3.1.3 Coastal Communities	5
1.3.2 Marine Ecosystems in Project Area	6
1.3.2.1 Sandy Beaches	6
1.3.2.2 Rocky Beaches	6
1.3.2.3 Estuaries	6
1.3.2.4 Fringing Reefs	7
1.4.0 Marsh-Wetland Environment	7
1.5.0 Geology	8
1.6.0 Flora	9
1.6.1 Wetland Community	9
1.6.2 Strand Community	9
1.6.3 Beach Forest Community	9
1.6.4 Java Plum Forest Community	9
1.6.5 Mixed Forest Community	9
1.6.6 Ancient Taro Beds	10
1.7.0 Fauna	10
1.7.1 Stream Fauna	10
1.7.2 Marsh Fauna	10
1.7.3 Park Wildlife	10
2.0 METHODS	12
2.1.0 Personnel	12
2.2.0 Level of Effort	12
2.3.0 Theoretical Approach	12
2.4.0 Archival Research	12
2.5.0 Ethnographic Consultant Selection	12
2.6.0 Ethnographic Questionnaires	13
2.7.0 Ethnographic Interview Process	13
2.8.0 Interview Procedures	13
2.9.0 Transcribing/Review Process	13
2.10.0 Ethnographic Analysis Process	13
2.11.0 Research Problems	13
3.0 CULTURAL & HISTORICAL BACKGROUND REVIEW	14
3.1.0 Models of Hawai`ian Chronology	14
3.2.0 An Overview of Human Impact, Settlement and Socio-economic Development of Kaua`i in the context of Greater Hawai`i	15

3.2.1 Colonization Period (AD 300-600)	15
3.2.2 Developmental Period (AD 600-1100)	16
3.2.3 Expansion Period (AD 100-1650)	19
3.2.4 Proto-Historic Period (AD 1659-1795)	22
3.2.5 Early Historic Period (AD 1795-1900)	30
3.2.6 Territorial History Period (AD 1900-1949)	33
3.2.7 Modern History Period (AD 1950-)	34
3.3.0 Traditional Literature	34
3.3.1 Genealogies	34
3.3.1.1 Kumuhonua	35
3.3.1.2. Kumulipo	35
3.3.1.3 Hawai`ian <i>Genealogies</i>	36
3.3.2 Mo`olelo	36
3.3.2.1 History of Mo`olelo Collecting	37
3.3.2.2 Legends involving Hā`ena	37
3.3.3 Mo`olelo and Genealogy of Ali`inui of Kaua`i	38
3.3.3.1 Papa and Wākea Progenitors of Kaua`i Chiefs	38
3.3.3.2 Waimea and Wainiha Alliance	40
3.3.3.3 Puna Chiefdom and Interisland Ali`i Nui Connections	41
3.3.3.4 Kona and Puna Conflict	42
3.3.3.5 Merge of Puna and Kona Chiefdoms	43
3.3.3.6 Ali`i Nui and Hā`ena Connections	44
3.3.3.7 More Ali`i Nui Interisland Travels and Marriages	44
3.3.3.8 Kaua`i - O`ahu Ali`i Nui Merge	46
3.3.3.9 End of Kaua`i Direct Line Rule	47
3.3.3.10 O`ahu-Kaua`i - Maui Ali`i Nui	47
3.3.4. `Olelo No`eau	49
3.3.5 Place and Object Names	51
3.3.6 Winds	55
3.3.6.1 Winds of Halele`a	55
3.3.6.2 Winds of Hā`ena	55
3.3.7 Wahi Pana of Hā`ena	56
3.3.8 Heiau/Sites of Hā`ena	56
3.4.0 Historic References	58
3.4.1. History of Land Divisions	58
3.4.2. Hā`ena Ahupua`a	61
3.4.3 Konohiki of Hā`ena	61
3.4.3.1 Mo`olelo of Kekela, Konohiki of Hā`ena	61
3.4.3.2 Konohiki Privileges	61
3.4.4 Mahele Awards in Hā`ena State Park Lands	62
3.4.5 Hā`ena Land Transfers (Post 1855)	63
3.4.6 Kē`ē, `Ili of Hā`ena	63
3.4.7 Other `Ili Names of Hā`ena	64
3.5.0 Hā`ena Land Resources and Use (Traditional and Historic)	64
3.5.1 Hā`ena Pu`uone (Dune-banked Ponds)	64
3.5.2 Sand Dune Habitation	65
3.5.3 Taro Lo`i	65
3.5.4 Burials	66
3.5.4.1 Dune Burials	66
3.5.4.2 Hā`ena Cave Burials	66
3.5.5 Hā`ena Caves as Places of Interest in 1800s Literature	66
3.6.0 Hā`ena Demographics of mid-1800s	68
3.7.0 Previous Archaeological and Other Studies: Hā`ena and Vicinity	68
3.7.1 Thrum (1907)	69

3.7.2 Stokes (1908, 1909, 1927)	69
3.7.3 Emory (1929)	69
3.7.4 Bennett (1931)	69
3.7.5 Handy & Handy (1972)	70
3.7.6 Griffin et. al. (1977)	70
3.7.7 Earle (1978)	70
3.7.8 Hammatt et. al. (1978)	70
3.7.9 Riley and Ibsen-Riley (1979)	70
3.7.10 Riley and Clark (1979)	70
3.7.11 Hammatt and Meeker (1979)	70
3.7.12 Yent (1980)	71
3.7.13 Yenta and Ota (1983)	71
3.7.14 Griffin (1984)	71
3.7.15 Silva (1995)	71
3.7.16 Major and Carpenter (2001)	71
3.7.16.1 Chronology of Kē`ē Site 7009 [Agricultural System]	74
3.7.16.2 Significance Evaluation	75
3.7.17 Dye (2002)	75
4.0 ETHNOGRAPHIC SURVEY	76
4.1.0 Research Themes or Categories	76
4.2.0 Consultant Background	76
4.2.1 Kapu Kinimaka Alquiza (Kumu Hula)	77
4.2.2 Tom Hashimoto	78
4.2.3 Clarence Medeiros, Jr.	81
4.2.4 Chipper Wichman	85
4.2.5 F. Bruce Wichman	85
4.2.6 Randy Wichman	87
4.3.0 Land Resources and Use	90
4.3.1 Hā`ena in Halele`a	90
4.3.2 Park Lands: Former Residents	91
4.3.3 Park Lands: Taro Agriculture	93
4.3.4 Park Lands: Other Vegetation	96
4.3.5 Park Lands: Activity	96
4.3.6 Park Lands: Kalalau-Hanakāpī`ai Trail	96
4.3.7 Park Lands: Taylor Camp	97
4.3.8 Park Lands: The Future (Master Plan)	97
4.4.0 Water Resources and Use	98
4.4.1 Fishponds and Fishpond Fauna	98
4.4.2 `Auwai	99
4.4.3 Hā`ena Watershed and Water Sources	99
4.4.4 Limahuli Fauna	100
4.4.5 Hā`ena Floods	100
4.5.0 Marine Resources and Use	100
4.5.1 Fishing Lifestyle	100
4.5.2 Fishing Grounds	101
4.5.3 Fishing Methods	101
4.5.4 Fish Catches	102
4.5.5 Cooking, Preparing Fish, Etc.	103
4.5.6 Open Turtle Season	104
4.5.7 Limu Gathering	104
4.5.8 Gathering `Opihi	105
4.5.9 Beach Erosion	105
4.5.10 Tsunami Impact	105
4.5.11 Surfing	105

4.5.12 Shark Grounds	105
4.6.0 Cultural Resources and Use	106
4.6.1 Burial Sites in the Park and Vicinity	106
4.6.2 Traditional Hawai`ian Sites and Legends in Hā`ena	107
4.6.2.1 Heiau and Hula Platform	107
4.6.2.2 Pele Connections	109
4.6.2.3 Other Legends	110
4.6.3 Traditions	110
4.6.3.1 `Ō`ahi Ceremony	110
4.6.3.2 Kē`ē Pu`uhonua and Halau	111
4.6.3.3 Gathering Rights	111
4.6.3.4 Fish Gods	111
4.6.3.5 Hā`ena Rains	112
4.6.3.6 Hā`ena Boundaries	112
4.6.4 Ali`i of Hā`ena	112
4.6.5 Kē`ē – Na Pali Connections	113
4.6.6 Kekahuna: Park Mapper	113
4.6.7 Cultural Identity and Balance	113
4.7.0 Thoughts/Concerns about Hā`ena State Park	114
4.7.1 Heiau and Hula Pā	114
4.7.2 Lohi`au Site	115
4.7.3 Master Plan: Cultural Methods/Protocol Recommendations	115
4.7.4 Master Plan: General Issues	117
4.7.5 Park Volunteer Issues	120
4.7.6 Kapu Issue	121
4.8.0 Anecdotal Stories	122
4.8.1 Kekela-Wichman House	122
4.8.2 Tsunami	123
4.8.3 Pōhākupukane and Pōhākuloa	124
4.8.4 Lohi`au Stone Wall	124
5.0 SUMMARIES and ASSESSMENTS	125
5.1.0 Act 50 – State of Hawai`i 2000	125
5.2.0 Summary of Findings	125
5.2.1 Summary of Significant People and Events: Project Area and Vicinity	125
5.2.1.1 Ancient or Mythical People	125
5.2.1.2 Significant Ancient Events	126
5.2.1.3 Ali`i Nui	126
5.2.1.4 Ancient Practices	127
5.2.1.5 Historic People	127
5.2.1.6 Historic Events	128
5.3.0 Summary of Interviewee Concerns/Mana`o	128
5.4.0 Guideline Criteria in Relation to Project Lands	131
5.4.1 Cultural Practices/Resources in Project Area	131
5.5.0 Cultural Impact Assessment (CIA)	131
5.5.1 Cultural Resources	131
5.5.2 Cultural Practices	132
5.5.3 Historic Resources	132
5.6.0 Summary of Cultural Impact Assessment/Recommendations	132
5.6.1 Cultural Resources (Land, Water and Marine) Impact	132
5.6.2 Cultural Practices/Access (Land) Impact	132
5.6.3 Historical Resources (Land) Impact	133

5.6.4 Historical Practices (Land and Water) Impact	133
5.7.0 Interviewees Master Plan Recommendations	133
5.8.0 ADDITIONAL RECOMMENDATION	136
REFERENCES CITED/REVIEWED	137

LIST OF APPENDICES

A.	Act 50 SLH 2000 [HB 2895 H.D.1]	145
B.	Scope of Work (SOW)	147
C.	<i>Guidelines for Assessing Cultural Impacts</i> (1997)	148
D.	Consent Form	151
E.	Ethnographic Instrument	153
F.	Release Form	155
G.	Ali`i Aimoku of Kaua`i	156
H.	Signed Consent Forms	157
I.	Signed Release Forms	164

LIST OF FIGURES

1.	Ahupua`a of Hā`ena and Kaua`i Moku (Pacific Worlds/Stokes 1995)	2
2.	Map of Kaua`i (Juvik and Juvik 1998:2)	3
3.	Map of Kaua`i Archaeological Sites (Bennett 1931:98)	57
4.	LCA Claims in Hā`ena State Park (Pacific Worlds)	62
5.	Map illustrating resources within Park boundaries (Pacific Worlds).	64
6.	Map of fishponds, taro pondfields and `auwai systems (Griffin 1984: 9)	65
7.	Recorded Archaeological Sites in Hā`ena (Major and Carpenter 2001:24)	72
8.	Kē`ē Lo`i Complex, Hā`ena State Park (Major and Carpenter 2001:52)	73
9.	Poi Mill Foundation, Site 50-30-02-7014 (Major and Carpenter 2001: 54)	74
10.	Valley Systems of Hā`ena (Pacific Worlds)	90

LIST OF TABLES

1.	Ethnic Demographics of Hawai`i	33
2.	Place and object names in Hā`ena and their <i>mo`olelo</i> and significance	51
3.	Demographics for Hā`ena State Park CIA Interviewees	77

LIST OF PHOTOGRAPHS

1.	Mountain Peaks	Cover
2.	Kalo	Cover
3.	Lohi`au's Wall	Cover
4.	Ka-Ahu-A-Laka	Cover
5.	Hula Pā	Cover
6.	Ka-Ulu-O-Pā`oa	Cover
7.	Loko Kē`ē/Loko Naia/Marsh	Cover
8.	HSP Sign	Cover
9.	Waiakapala`e Cave	Cover
10.	Kē`ē Beach/Lagoon	Cover
11.	Limahuli Stream	Cover
12.	Muliwai Beach	Cover
13.	Loko Kē`ē or Waiakapala`e Marsh	7
14.	Introduced species around the wetland area	8
15.	Wild chickens in Park	10
16.	Ironwood and False Kamani	11
17.	Canopy and understory	11
18.	Kē`ē Beach and Kai-kua`au-o-Hā`ena Lagoon	64
19.	Taro Lo`i in Hā`ena State Park	65
20-22.	Evidence of burials on public lands	66
23.	Part of Dune System in HSP	66
24.	Waiakanaloa Cave	67
25.	Waiakapala`e Cave	67
26.	Entrance to Hula Terrace	69
27.	Ke Ahu a Laka	69

28.	Kauluopā`oa Heiau	69
29-31.	Views of Heiau Site	69
32-34.	Views of Lohiau’s House Site covered with vegetation	70
35.	Part of Restored Lo`i System in Hā`ena State Park	73
36.	Remnants of Poi Mill Foundation	74
37.	Kapu Kinimaka Alquiza (Kumu Hula)	77
38.	Tom Hashimoto	78
39.	Clarence Medeiros, Jr.	81
40.	Chipper Wichman	85
41.	F. Bruce Wichman	85
42.	Randy Wichman	87
43.	Kē`ē Beach at the end of the road	91
44-45.	Allerton Estate	92
46-47.	Restored <i>lo`i kalo</i> in Hā`ena State Park	94
48.	Broad-leaf <i>hala</i> off of Kē`ē Beach	95
49.	Hau grows in several places in HSP	96
50.	Coconut trees in HSP	96
51.	Can no longer see heiau from Kē`ē	96
52-54.	Trail signs in Hā`ena State Park.	97
55.	Kalalau-Hanakāpī`ai Trail	97
56.	Part of former fishpond and marshlands	99
57.	Modern `auwai system	99
58-59.	Limahuli and Mānoa Streams	99
60.	Kē`ē Reef sign	100
61.	Kē`ē Reef trespassers	100
62.	Kē`ē Beach	100
63.	Uncle Tom’s throw nets	101

64.	Kē`ē Beach at low tide	105
65.	HSP Comfort Station	106
66.	Ke-Ahu-a-Laka	108
67.	Pu`u Makana	110
68.	Possible fish god stone	111
69.	Mānoa Stream going over road	112
70.	Lohi`au's house site covered with vegetation	115
71.	End of the road turn-around	117
72.	Comfort Station	117
73.	Footpath through dune	117
74.	Fishpond Area	118
75.	Parking Lot in Hā`ena State Park	118
76.	Rockfall	120
77.	Native plant in the Park	136
78.	Kumu Hula and <i>haumana</i> end ceremony on <i>hula pā</i>	167

1.0 INTRODUCTION

At the request of *PBR Hawai'i and Associates, Inc.* and *Hawai'i State Parks*, a Cultural Impact Assessment (CIA) was conducted for *Hā'ena State Park* as part of a larger project, *Hā'ena State Park Master Plan and Environmental Impact Statement* (Job No. F74C664A). This CIA was in accordance with the State of Hawai'i Environmental Council *Guidelines for Assessing Cultural Impacts* [1997] and in compliance with Act 50 SLH 2000 (HB 28 H.D.1) (Appendix A) as it amends the State of Hawai'i Environmental Impact Statement law [Chapter 343, HRS] to include “effects on the cultural practices of the community and State. [It] also amends the definition of ‘significant effect’ to include adverse effects on cultural practices.”

The purpose of this CIA was to gather information about traditional cultural practices, ethnic cultural practices and pre-historic and historic cultural resources that may be affected by the implementation of the development project. The *level of effort* of this study included a broad cultural and historical background review; ethnographic survey (oral histories of six people); and review/analysis of twenty-two past oral histories.

This report is organized into five parts or chapters. Chapter 1 describes the project area in terms of location, in the context of *ahupua`a*, district and island, as well as a generalized description of the natural environment [geology, fauna, flora]. Chapter 2 explains the methods and constraints of this study. Chapter 3 summarizes the review of the traditional and historical literature in the context of the general history of Hawai'i, the island of Kaua'i and the local history of Hā'ena Ahupua`a (Figure 1). Chapter 4 presents the analysis of the ethnographic survey as it pertains to land, water, marine and cultural resources and use in the project area and vicinity. Chapter 5 summarizes the findings of this cultural impact assessment, which is based on the archival and ethnographic research data.

1.1.0 SCOPE OF WORK

The scope-of-work (SOW) [Appendix B] was based on the recommendations in the Environmental Council *Guidelines for Assessing Cultural Impacts* (1997) [Appendix C] and focuses on three cultural resource areas (traditional, historical and archaeological), conducted on two levels: archival research (literature review) and ethnographic survey (oral histories).

The research for this cultural impact assessment (CIA) was conducted within the broader context of the *ahupua`a* (traditional land division) and *moku* (traditional district), as well as the history of the agriculture, fishing and other industries in the area. The *level of effort* of this study included six interviews (oral history) and a broad literature review that included a review and analysis of twenty-two past oral histories.

Research on traditional resources entailed a review of the literature of Hawaiian *mo`olelo* or stories/legends, late nineteenth and early twentieth century ethnographic works and interviews with people who were knowledgeable about the area.

Historic research focused on Land Commission Awards (LCA) and archival material from the following: University of Hawai'i-Manoa Hamilton Library-Hawaiian Collections; Kaua'i Museum Archives; DLNR State Parks reports; reports provided by PBR-Hawai'i (on-line); Internet searches and personal library. Archaeological research entailed a review of reports provided by DLNR State Parks staff.

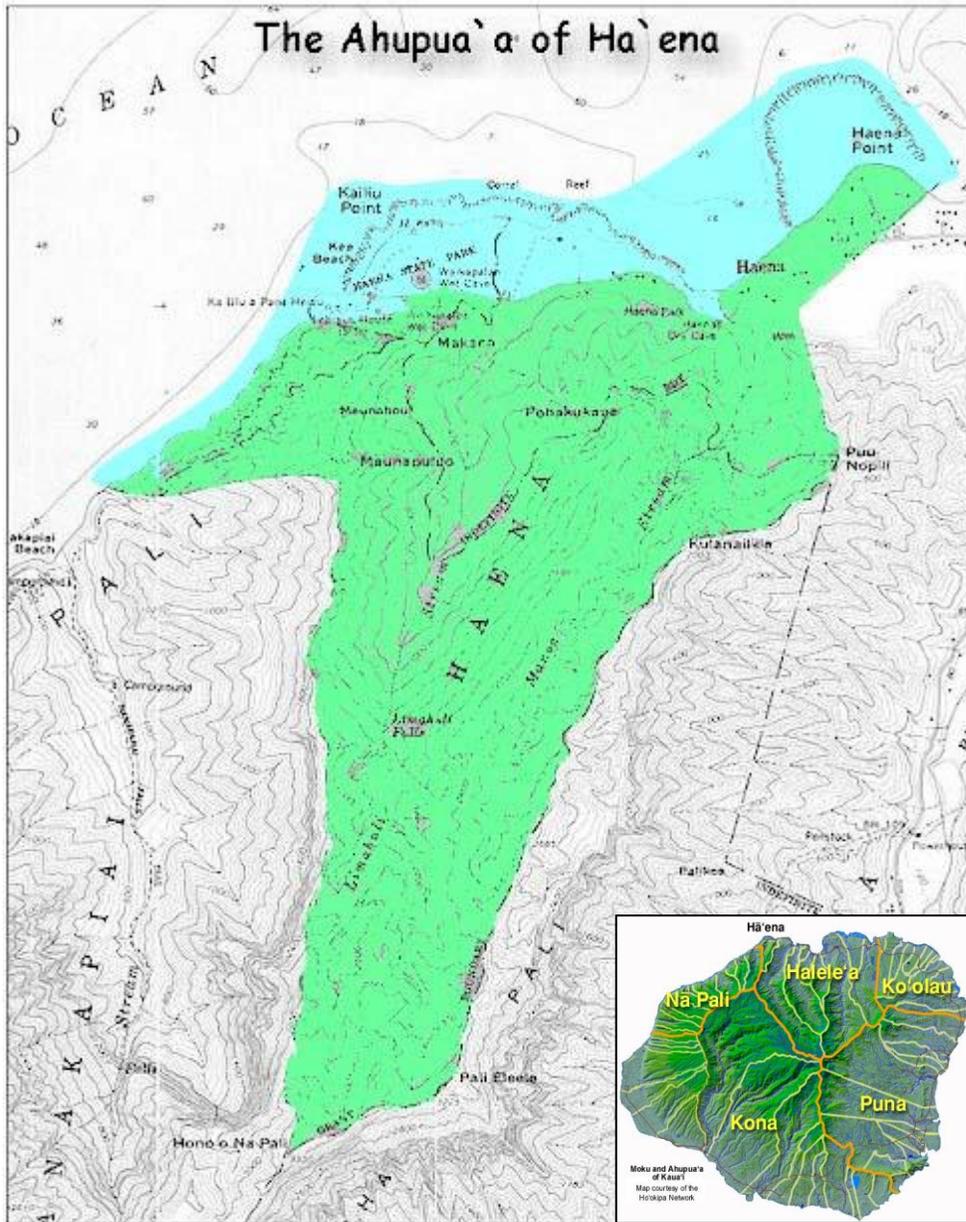


Figure 1. Ahupua`a of Hā`ena and Kaua`i Moku (Pacific Worlds/Stokes 1995)

1.2.0 PROJECT AREA

The project area is comprised of 64 acres within the park boundaries, the adjacent near-shore waters and Ke`e Beach, TMK 5-9-01:22 (por.) and TMK 5-9-08:1. Within the park area, parcel 25 of TMK: 5-9-01 owned by the County of Kaua`i (County) and includes Ka Ulu O Paoa Heiau and Ke Ahu A Laka (Hula Platform) and managed by the State Historic Preservation Division (SHPD). The project area also includes the State Department of Transportation highway within the park area.

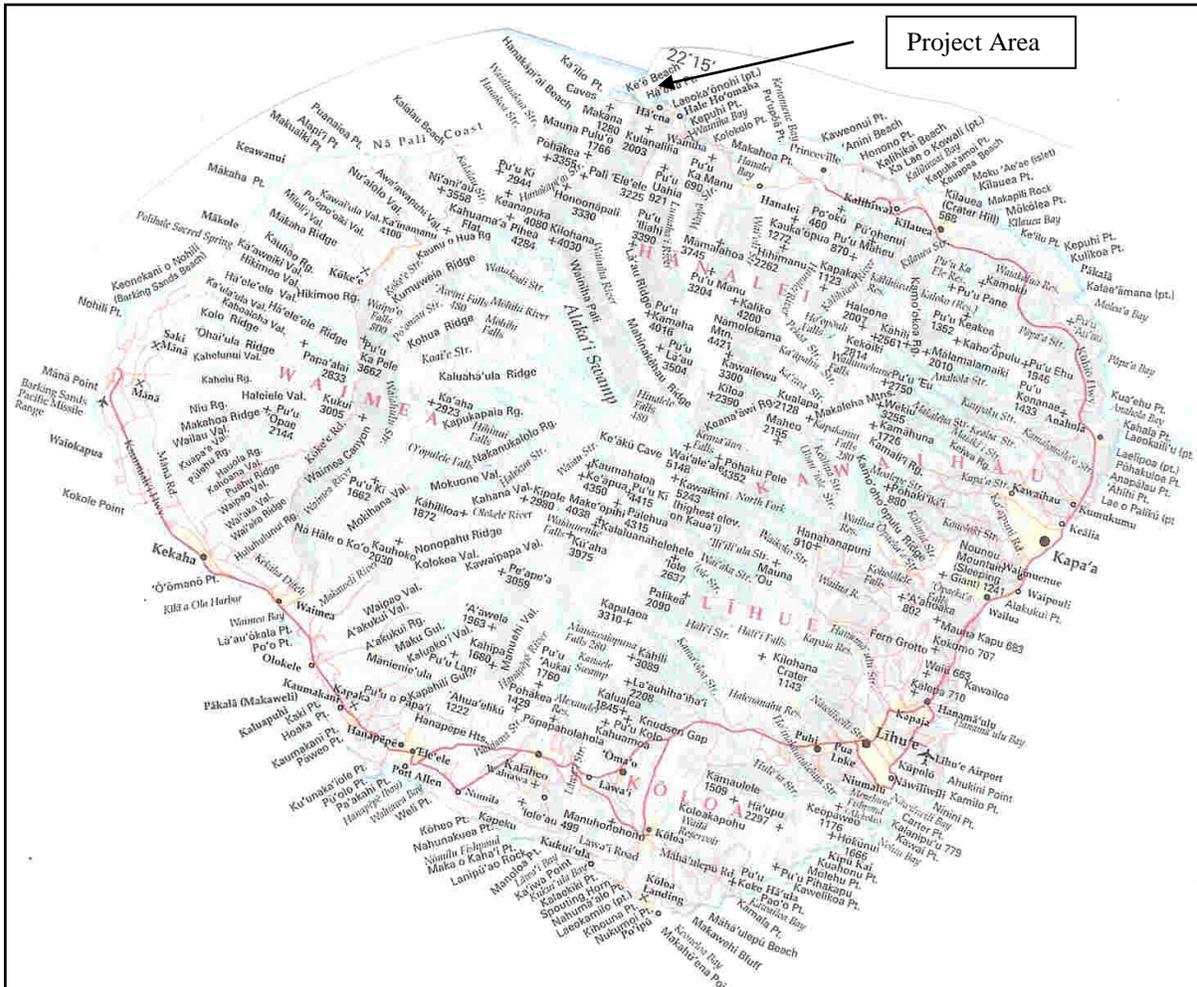


Figure 2. Map of Kaua'i. (adapted from Juvik & Juvik 1998:5).

1.2.1 PROJECT LOCATION

The park boundaries are defined by the Limahuli Stream on the east, the ocean on the north and west boundaries and cliffs on the south boundary. The majority of the park is below 40 feet above sea level, however, portions of the park area that are against the cliffs can be as high as 400 feet above sea level. The Kūhiō Highway (former Government Road and only access) runs east-west, bisects the park and terminates at Kē'ē Beach. Natural features within the park include two wet caves (Waiakapala'e and Waiakanaloa) *ma uka* (mountain) side of the road, and a well defined sand dune. The *ma kai* (ocean) side of the road contains large areas of remnant irrigated taro terraces from pre-contact era through the 1960s - currently being revived - and mixed (introduced and alien) vegetation; portions of this area are marsh or wetlands with sections once former fishponds (now overgrown). Other cultural features within the park proper include remnants of Lohi'au's house, the *hula* platform and *heiau*, and several burials within the sand dunes. Developed areas within the park included a newly constructed restroom facility that includes a shower system; two unimproved parking areas, the Kalalau trail, remnants of the former Brown/Allerton estate, which includes a caretaker's house, remnants of a mill and several historic burials. The majority of the park use includes Kē'ē Beach and fringing reef (see Figure 1), the Kalalau trail, the beach trail through the Allerton estate, access to the *hula* platform (owned by Kaua'i County), the restored taro *lo'i* (pond fields) and access to fishing areas (TKC 2001:I-4).

The following is from the “Hā`ena State Park Master Plan and Draft Environmental Impact Statement” prepared by The Keith Companies –Hawai`i, Inc. (TKC) and Earthplan Planning and Design (July 2001).

The significance of Hā`ena State Park on a statewide scale relates to the cultural, historical, religious and recreational resources found within the park and beyond. From a cultural standpoint the Hā`ena State Park is unique in the sense of containing a large, complete, intact, Hawaiian cultural unit/complex in the regional context of the Hā`ena - Nāpali Coast, including sites associated with agriculture and marine subsistence, religion and habitation. It was a significant gathering place for early Native Hawaiians and continues to be so. The statewide (and national) significance of this Hā`ena Archaeological Complex is confirmed by its inclusion on the State and National register of Historic Sites. Interpretation of these features can offer a valuable educational tool that will enlighten visitors and the community alike of the early Native Hawaiian lifestyle (TKC 2001:I-1).

The Hā`ena State Park is a very significant feature as related to the island of Kaua`i. Located at the extreme northwestern end of the coastal belt-road highway system (Kūhiō Highway). Hā`ena State Park is, for many of the visitors to the island, one of the primary destinations. As is the case with its statewide significance, the Hā`ena State Park is significant island wide for its cultural, historical, religious and recreational resources. Historical features located within the park create a sense of island pride in its Hawaiian heritage value, especially for the North Shore community, whose *hula halau* continues to assist in the maintenance and care of the *hula* platform in exchange for use of the site (TKC 2001:I-2).

1.3.0 ENVIRONMENT

The Hawaiian Islands are geographically extremely isolated – 2,000 miles from North America and 1,000 miles from the nearest Pacific atoll. However, an impressive number of native plants, invertebrates and birds reached these islands by natural means (long-distance dispersal: direct, windborne, or waterborne) thousands of years before any human introductions (Juvik & Juvik 1998:103-104).

According to the Kaua`i ecosystem map (Juvik & Juvik 1998:122-123), the native ecosystems of the project area consisted of lowland dry and mesic forest, woodland and shrubland (terrestrial) and sandy beaches and major fringing reefs (marine). Today, the project area has been greatly transformed by human activity with trace remaining native ecosystem that consists of wet forest/woodland and lowland dry and mesic forest, woodland and shrubland.

1.3.1 Terrestrial Ecosystems in Hā`ena State Park

1.3.1.1 Native Wet Forest and Woodland (Juvik & Juvik 1998:126-127):

Climate/Substrate. Annual rainfall 80-<400 inches without regular dry periods; temperatures warm at low elevation, cool in montane areas. Substrates - very weathered soils on older islands.

Biota. Vegetation – closed-canopy forests of `ōhi`a, sometimes with *koa* or `ōlapa codominant; open-canopy forests or woodlands of `ōhi`a and *uluhe*. Forests of *hala* in coastal lowlands; shrublands of `ōhi`a and ferns; also `ākala and shrublands.

Biota. Fauna – primary habitat of most extant Hawaiian honeycreepers and other forest birds: `apapane most common; great diversity of native invertebrates.

Endangered Species: more than 50 plant species including lobelioids, *ha`iwale*, endemic mints and ferns (*kihi*). Birds including `ō`ū and `ākohekohe.

Cultural Significance: traditional realm of Hawaiian gods (*wao akua*); not for casual human visitation. Source of plants for fiber (*olonā*); weaving (*ie'ie*), clothing (*kapa* from *wauke*), medicines and construction woods. It is also primary zone for bird collection for feather work.

Threats. Feral pigs, feral cats, black and Polynesian rats; alien slugs; introduced plants; clearing for agriculture and grazing; and suburbanization.

1.3.1.2 Lowland Dry and Mesic Forest, Woodland and Shrubland (Juvik & Juvik 1998: 127):

Climate/Substrate. Annual rainfall 20-80 inches; warm to hot with seasonal drought. Soils less weathered than in wet forest.

Biota. Vegetation – plains, lower slopes, dry ridge tops and cliffs support grasslands of *pili* or *kāwele*. Dry or mesic shrublands of *a'alii*, *ākia*, *ko'oko'olau*, *ūlei*, and other shrubs. Dry forests of *ōhi'a*, *koa*, *lama*, *wiliwili* and rarer trees on ridges, rocky slopes and leeward gulches. Mesic forests (now rare) of *ōhi'a*, *koa* or *lama* and rarely *olopua* or *halapepe* occur in gulches and on lower slopes and less disturbed sites.

Biota. Fauna – native birds (*elepaio*, *apapane* and *amakahi*); native insects now depleted.

Endangered Species. Many trees and shrubs including *koki'o* and Kaua'i *hau kuahiwi*; Hawaiian hoary bat greatest abundance in this zone.

Cultural Significance. Forested zone was the realm of Hawaiian gods, especially Kū. Sandalwood exploitation of the early 1880s occurred in lowland mesic forests. *Pili* grasslands, a source of thatch material maintained by fire; medicinal plants and hardwoods were gathered. Some mesic areas were converted from forest to dryland *kalo* and *uala* agriculture.

Threats. Feral goats, feral cats, rats, alien invertebrates, especially ants; invasive alien plants. Many lowland areas were burned and cleared in ancient Hawaiian times; today urbanization and development continue.

1.3.1.3 Coastal Communities (Juvik & Juvik 1998:128-129):

Climate/Substrate. Warm; windward shores receive up to 120 inches annual rainfall; strong winds typical. Substrates include raised coral, basalt cliffs, sandy beaches, basalt and coral boulders, and littoral cones or tuff.

Biota. Vegetation – greatly influenced by proximity to ocean; many salt-tolerant species. Dwarf shrublands of *naupaka-kahakai* most common, *ilima*, *naio*, *hinahina* (uncommon), *ākulikuli*, *aki'aki* grass, or sedge. Coastal forest of *hala* in a few windward sites; wetlands of native sedge now rare.

Biota. Fauna – threatened green sea turtle (*honu lū'au*); shorebirds such as wandering tattler (*ulili*) and ruddy turnstone (*akekeke*) common in winter.

Endangered Species. Hawaiian monk seal, hawksbill turtle very rare; black-necked stilt (*ae'o*) and Hawaiian coot (*alae ke'oke'o*) depend on remaining wetlands. Plants include *ōhai* and dwarf *naupaka*.

Cultural Significance. Coastal areas, the most densely populated lands in ancient times, continue to be important in traditional Hawaiian culture, providing medicines, *lei* materials and other resources.

1.3.2 Marine Ecosystems in Project Area

1.3.2.1 Sandy Beaches (Juvik & Juvik 1998: 113-114):

White sand is primarily from the breakdown of coralline algae and corals. Wave action and biological and chemical erosion determine composition and longevity of beaches. Offshore sand reservoirs connected to beaches often undergo seasonal cycles of erosion, accretion and alongshore drift.

Biota. Vegetation – beach morning glory (*koali*), beach heliotrope, milo and *hau*.

Biota. Fauna – ghost crabs, mitre and auger shells, seabirds, threatened green sea turtle, endangered hawksbill sea turtle, and endangered monk seal use beaches for resting and nesting.

Cultural Significance. Hawaiians used beaches for burials (cemeteries), canoe launch sites and recreational, subsistence and ceremonial purposes. Beach sand and waterworn pebbles were used in the floors of Hawaiian houses.

Threats. Sand mining, degradation by trash, beach erosion caused by shoreline fortifications.

[On the sandy areas along the coastal plain sweet potatoes [*‘uala*] were grown. Formerly many varieties of banana [*mai‘a*] were planted in Limahuli and Mānoa Valleys, as well as many kinds of sugar cane [*ko*] and several varieties of *‘awa*...and while cultivation of coconut (*niu*) was limited in Hawai‘i due to its northerly latitude, on Kaua‘i ‘the favored places’ included Hā‘ena and Hanalei (Handy In Pacific Worlds).]

1.3.2.2 Rocky Beaches (Juvik & Juvik 1998:114):

Shorelines where sand and other sediments are absent due to constant wave action, currents, steep submarine slopes and lack of offshore sand reservoirs.

Conditions/Substrates. Mostly consolidated basalt, but sometimes consolidated limestone (cemented beach rock or raised coral reefs).

Biota. Vegetation – sea lettuce, Sargasso or various algae.

Biota. Fauna – Limpet, periwinkles, littorine snails, rock crabs, gastropods and rock urchin; offshore waters are possible feeding areas for threatened green turtle.

Cultural Significance. Rocky beaches often were important fishing grounds and canoe launching sites for Hawaiians.

Threats. Coastal, urban, resort development.

1.3.2.3 Estuaries (Juvik & Juvik 1998:114-115):

Distribution. Places where fresh and marine waters meet at the coastline (stream mouth).

Conditions/Substrates. Freshwater flowing into the ocean floats on the sea surface because of its lower salt content and density.

Biota. Vegetation – marshes...some seaweeds.

Biota. Fauna – crabs, shrimps, mullets, endemic flagtails, *āholehole*, anchovies, small jacks, barracudas, eels, shorebirds, waterbirds,

Cultural Significance. Sources of fresh water and fish for Hawaiian communities in the past.

Threats. Modification for settlements; pollution by sewage and other discharges.

1.3.2.4 Fringing Reefs (Juvik & Juvik 1998:117-118) (see also Figure 1):

Distribution. These reefs grow, terrace-like, off island shores, with their outer slopes extending to depths of about 165 feet.

Conditions/Substrates. Calcium carbonate skeletons and sediments produced by corals and coralline algae comprise the bulk of reefs. Sand deposits and seaweed common on shallow inner reef flats; living corals and coralline algae predominate at reefs outer edge; deeper slopes are mostly dominated by live corals or old reef rock. Beneath living outer layer of reef organisms, remains of previous reef builders are compacted and cemented into a hard, limestone, wave resistant structure which may be cut through by channels.

Biota. Threatened green sea turtle forage on reef flats; endangered hawksbill turtle feeds where sponges are common.

Cultural Significance. Fishpond development and intensive fishing occurred on reef flats.

Threats. Coastal construction, erosion, sewage discharges, overharvesting of fish, freshwater flooding.

1.4.0 MARSH-WETLAND ENVIRONMENT

Loko (fishpond) Kē`ē, Waiakapala`e Marsh - also called Hā`ena Marsh - is a small fresh water marsh located across Kūhiō Highway from Waiakapala`e Wet Cave. The wetlands appear and disappear depending on precipitation and marsh conditions and probably occur due to heavy rainfall and high water. During wetter years, grass encroached to the wetland and left only a small pooling of water, which is shallow and stagnant. While a dry streambed inlet empties into the northeast corner, there is no perennial stream or river that feeds the marsh and does not appear to be connected to the ocean (TKC 2001:II-33).



Photo 13. Loko Kē`ē or Waiakapala`e Marsh.

1.5.0 GEOLOGY

The island of Kaua`i is a single shield volcano, 552 square miles and the oldest (5.6 million years) of the major Hawaiian Islands. The highly eroded island has spectacular land forms. Landslides have modified the island's north, northeast and possibly east flanks (Juvik & Juvik 1998:41).

The lava flows that produced the majority of this volcano are collectively known as the Nāpali Formation, which is the earliest phase of the Waimea Canyon volcanic series. Later eruptions filled a central caldera...but the Nā Pali coast and Hā`ena State Park area were protected from these later flows by the caldera rim. The Nā Pali coast and Hā`ena State Park area have therefore been subject to tropical weathering and erosion since their initial formation of Kaua`i.... The prolonged erosion has created the dramatic sea cliffs, knife-like ridges and valleys along this portion of the coastline. The Hā`ena *ahupua`a*, which is situated in the Hanalei district at the extreme northeastern end of Nā Pali coast, is backed by high former sea cliffs, which have been cut by two small stream valleys, Mānoa and Limahuli. Portions of the western side of the Limahuli Valley fall within the Hā`ena State Park. The dry cave near the Hā`ena County Park and the two wet caves within Hā`ena State Park are former sea caves carved by wave action. The narrow coastal flat between the cliffs and the beach is the result of alluvial deposition. This alluvial flat is fronted by calcareous beaches and a sand dune system that extends from Kē`ē Beach eastward to Wainiha Bay. The majority of the park falls on this alluvial deposition and encompasses portions of the dune system. Boulder beaches exist along the west side of Kē`ē Beach and the mouth of Limahuli Stream. Offshore is a fringing reef (TKC 2001: I-3).

Calcareous sand beaches are beautifully developed on Kaua`i with the largest between Hā`ena and Lumahai and at Hanalei Bay. Sand is cemented into "beach rock" at places such as Ka Lae o ka `ilio near Hā`ena and contains enough olivine to give it a greenish color (Macdonald et al 1983:470). The Hā`ena dune site estimated (1200-1860AD) (Juvik & Juvik 1998:166-map).

According to Quinn (2010:1) the current view of Kaua`i geology is as follows:

Current thinking is that a probable second large shield volcano built the eastern part of the island and slipped down to create the expansive Līhu`e basin and the windward facing scarp of Mt. Wai`ale`ale. *Kaua`i Geologic History, A Simplified Guide*, by Chuck Blay and Robert Siemers represents an alternate view of the island's geologic history. Alluvial deposits are silts and clay, not sand. Hā`ena is a coastal plain and covering of alluvial deposits over basalt substrate behind the dune. Biogenic reefs, comprised mainly of coral and coralline algae, have grown like a "fringe" around the island. These reefs have provided skeletal matter for fragmentation, transport and deposition at the shoreline to produce sandy beaches.



Photo 14. Introduced species around the wetland area

1.6.0 FLORA

Hā'ena State Park is dominated by introduced species that include 218 flowering plants and nine species of pteridophytes; eleven were Polynesian-introduced species, nine are endemic, fifteen are indigenous to Hawai'i and four are possibly indigenous. Many of the introduced species are ornamentals (TCK 2001:II-34).

1.6.1 Wetland Community

During wet periods, land surrounding Waiakapala'e Marsh is covered with a dense growth of *hau*, guava and *koa haole*. A small patch of *`ape* or arrowhead, a close relative of taro and a food of early Hawaiians, still remains in the wettest, northeast corner. A *hau* thicket borders the wetland to the north, east and west. During the dryer periods, the marsh was observed to be covered with a dense hummocky, two feet high growth of *hono hono* grass. The *`ape* still occupied the northeastern corner, *Halo* grass covered the western tip and a *hau* thicket still bordered the north, east and west (TKC 2001:II-34).

1.6.2 Strand Community

The strand, defined as the zone seaward of the tree line at Hā'ena State Park, does not have much growth...it consists mostly of *pōhuehue*, *kūka`ipua`a*, fireweed, sow thistle, narrow-leaved plantain and seedlings of ironwood and false *kamani*. Beach *naupaka* occurs uncommonly. Few other species are found in this community (TKC 2001:34).

1.6.3 Beach Forest Community

The Hā'ena State Park coastline, especially in sandy areas...consists of false *kamani* and ironwood trees, 30 to 40 feet tall with occasional Java plum inland. The canopy cover is typically 100%, the understory is generally open and dense shade and needles preclude the development of any significant ground cover.... Understory species include vedelia, pothos, four o'clock and sow thistle (TKC 2001:II-34).

1.6.4 Java Plum Forest Community

The Java plum forest is one of the two largest plant communities in Hā'ena State Park. It is found along Limahuli Stream occupying abandoned taro terraces, along the dirt road near the restroom facilities and on the talus along the *ma uka* side of Kūhiō Highway between Waiakanaloa wet cave and the rock shelter. Typically the forest consists of Java plum trees at least 30 feet tall with 50-100% canopy cover.... The density and composition of the understory vary considerably (e.g. Java plum saplings, guava, Boston fern, Christmas berry, basket grass).... Near Limahuli Stream, numerous ornamental species are found. Several are remnants of old plantings; others have become widespread such as gingers, spiral flag and marica (TKC 2001:II-34).

1.6.5 Mixed Forest Community

The mixed forest is the second largest vegetation type and is located in the central portion of Hā'ena State Park, *makai* of Kūhiō Highway, at the west end along the Kalalau Trail and Lohi'au's House and on the east side along Limahuli Stream *mauka* of Kūhiō Highway...it consists of groves of *hau*, Java plum and *kukui*, mango, African tulip, octopus tree, *hala* and strawberry guava.... The Kalalau Trail portion consists largely of *hala*, *kukui*, Java plum, octopus tree and guava that are overgrown with yellow water lemon, *taro* and pothos vines [other species include rose apple, cinnamon, *laua`e*, *`awapuhi-kuahiwi* and *ti*] (TKC 2001:II-35).

1.6.6 Ancient Taro Beds

There are taro beds along the trail from Hā`ena to Kalalau valley which must have been cultivated by the people living at one of the two places (Bennet 1931:9).

1.7.0 FAUNA

In almost all of the elevation zones of the Hawaiian Islands, alien animals such as feral pigs, goats, cattle and horses have damaged native vegetation. Terrestrial fauna in pre-colonized Hawai`i consisted of only one endemic mammal, the hoary bat (*Lasiurus cinereus*), thousands of endemic insects [i.e., damselflies (*Ischnura ramburii* and *Ischnura posita*) found around reservoirs and streams], and about 100 species of endemic birds such as the Hawaiian owl (pueo) and Hawaiian honeycreeper (*Drepanididae spp*) (Berger, 1972:7, Kirch, 1985:28). Early Polynesians introduced animals included the Southeast Asian pig (*Sus scrofa*), jungle fowl or chicken (*Gallus gallus*), dog (*canis j. familiaris*), and the Polynesian rat (*Rattus exulans*). Photo 15. Wild chickens in Park



1.7.1 Stream Fauna

Nineteen species of macro fauna were found in Limahuli Stream...and include ten insects, three crustaceans and five fishes. Of the nineteen, eleven are native to Hawai`i, with ten of those being endemic or occurring naturally only in Hawai`i. Three of these endemic (*opae-kala`ole*, *o`opu-nākea* and *o`opu-nōpili*) are of some economic importance. Two endemic species (*o`opu-nakea* and *o`opu-nopili*) are listed as “threatened” and of special concern. The *o`opu-nakea* is diadromous, meaning it is migratory between fresh and salt water and it is probable that all gobies (*o`opu*) are [endangered]. Of the alien species, the Tahitian prawn is harvested for food. In checking with the Limahuli Gardens, no other exotic species are apparent (TKC 2001:II-31).

1.7.2 Marsh Fauna

Bullfrogs have been heard in the marsh, however, no fish were observed.... Small numbers of Spotted Munia, Common Myna, Spotted and Barred Dove have been seen at Hā`ena Marsh. Other exotic birds (Northern Cardinal, Shama, Japanese White-eye, House Finch) are common in adjacent forested habitat. White-tailed Tropicbirds were seen in the area, though their presence bears no relationship to the wetland. No other waterbirds have been observed and there are no records of wetland birds at Hā`ena Marsh, however, because of proximity to the ocean, it is possible that all five resident native species of waterbirds and the Cattle Egret are temporary visitors (TKC 2001: II-33).

1.7.3 Park Wildlife

Goats Feral goats live in herds primarily on the cliffs of the Nā Pali Coast. Because of the proximity of the Nā Pali Coast to Hā`ena State Park, there is the possibility that goats frequent the park, especially the rugged westerly portion surrounding the *heiau* and the *ma uka* cliff areas...[however] there are no records or evidence of goats in Hā`ena State Park (TKC 2001:II-41).

Pigs Although there is a large population of feral pigs on the island, no feral pigs have been sighted in Hā`ena State Park...[but] feral pigs have been observed along the beginning of the Kalalau Trail, with the only access to that area being through the Park (TKC 2001:II-41).

Bats Kaua`i’s only endemic land mammal is the Hoary bat (*Lasiurus cinereus semotusi*). According to the DLNR-DoFAW, the hoary bat was added to the Federally endangered species list over thirty years ago.... They frequent all low lying coastal areas and DLNR- DoFAW

confirmed that they dwell in caves and treetops of Hā`ena State Park. It is recommended by DLNR- DoFAW that mass clearing of the park be avoided and that forested areas be maintained to preserve the bat habitat (TKC 2001:II-42).

Birds The DLNR- DoFAW confirms that there are no native, resident forest birds below 2000 feet because of avian diseases carried by mosquitoes.... Gallinule and the Koloa Duck have been sighted by DLNR- DoFAW in the Hā`ena State Park.... The indigenous Hawaiian Short-eared Owl (*pueo*) and Black-crowned night heron (*`auku`u*) are present along the coast; the latter is also found along the major streams (TKC 2001: II-42).



Photo 16. Ironwood and False Kamani



Photo 17. Canopy and understory

2.0 METHODS

The Hā`ena State Park Cultural Impact Study/Assessment was conducted between the months of September 2008 to April 2009. The study consisted of three phases: (1) cultural and historical archival research (limited literature review); (2) ethnographic survey (oral history interviews/questionnaires), transcribing interviews, analysis of ethnographic data; and (3) report writing.

2.1.0 Personnel

The personnel consisted of (1) the principal investigator-author- ethnographer who has a Masters degree in Anthropology, with a graduate curriculum (archaeology track) that included anthropology theory, cultural resource management, ethnographic research methods, and public archaeology; an undergraduate curriculum background (archaeology track) that included Hawaiian History, Hawaiian Language, Hawaiian Archaeology, Pacific Islands Religion, Pacific Islands Archaeology, Cultural Anthropology, as well as Geology and Tropical Plant Botany; and ethnographic field experience that includes over 300 interviews to date; and (2) subs, transcribers Carol Kalahiki and Dot Uchima.

2.2.0 Level of Effort

The level of effort for this CIS/A project was an ethnographic survey that consisted of 5-7 interviews and questionnaires; and a broad archival research primarily based on reports of previous studies and limited primary source research in Kaua`i Museum Archives.

2.3.0 Theoretical approach

This study is loosely based on *Grounded Theory*, a qualitative research approach in which “raw data” [transcripts and literature] are analyzed for concepts, categories and propositions. Conceptual labels or codes are generated by topic indicators [i.e., agriculture, flora, burials, fishing]. Categories are generated in a similar manner by forming groupings such as “Land Resources & Use,” “Marine Resources & Use” or “Cultural Resources & Use.” Since this was a semi-focused study, categories were pre-selected as part of the overall research design. However, it is not always the case that these research categories are supported in the data. In the *Grounded Theory* approach, theories about the social process are developed from the data analysis and interpretation process (Haig 1995; Pandit 1996). This step was not part of this cultural impact assessment as the research sample was too small.

2.4.0 Archival Research

It took several weeks of intermittent archival research and reviewing archival material compiled by *Hawai`i State Parks* staff. The majority of the archival research [primary and secondary sources] came from the Kaua`i Museum Archives, State Historic Preservation Division library; State Parks collections, personal library; and Internet searches. Most of the secondary source material included translations of 19th century ethnographic works, historical texts, archaeological reports, and Hawaiian language resources [i.e., proverbs, place names and dictionary].

2.5.0 Ethnographic Consultant (Interviewee) Selection

The selection of the consultants was based on the following criteria (explained further in Chapter 4):

- ❖ Had/has Ties to Project Location (including lineal descendant)
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Referred by *Hā`ena State Park* Staff
- ❖ Referred by NTBG-Limahuli staff

2.6.0 Ethnographic Questionnaires

An ethnographic survey form/questionnaire was developed to accommodate the people who wanted to share information about Hā`ena and vicinity, but who were not slated to be interviewed due to time constraints or other limitations. This form was either mailed to people of “standing” or who expressed an interest in sharing information or distributed at public information meetings. Only two people filled out the questionnaire and mailed it back (insufficient information).

2.7.0 Ethnographic Interview Process

The interview process included a brief verbal overview of the study. Then the ethnographic consultant was provided with an informed consent or agreement to participate form to review, which was drafted for the edification and protection of each consultant (Appendix D). An ethnographic research instrument (Appendix E) was designed to facilitate the interview, a semi-structured and open-ended method of questioning based on the person’s answers to questions (‘talk-story’ style). Each interview was conducted at the convenience (date, place and time) of each consultant. A *makana* or gift was given to each consultant in keeping with traditional reciprocal protocol.

2.8.0 Interview Procedures

Interviews were conducted at Limahuli Hale (1), home (3), or work office (1) at the request of the consultants, using an audio-cassette tape recorder. Notes were also taken as needed, but more attention was given to listening intently to each consultant.

2.9.0 Transcribing/Review Process

The taped interviews were transcribed by hired transcribers using a Sony Dictator Transcriber (BM-87DST) and later edited by the author. Most consultants were emailed a copy of the edited interview transcripts along with a *mahalo* letter that explained the transcript review process, along with a self-addressed, stamped envelope for return of the revised transcripts; one was mailed although the consultant said there was no need to mail copy. This allowed for corrections (i.e., spelling of names, places), as well as a chance to delete any part of the information if so desired. Consultants were also given a “Release” form (Appendix F) to sign when they were satisfied with the transcript information/revisions. One emailed permission to use information without revisions; no one else submitted any release forms.

2.10.0 Ethnographic Analysis Process

The analysis process followed a more traditional method, as a qualitative analysis software program was not necessary. The interview was manually coded for research thematic indicators or categories (i.e., personal information; land, marine and cultural resources and use; site information-traditional and/or historical; and anecdotal stories). For the purpose of this study, it was also not necessary to go beyond the first level of content and thematic analysis, as this was a more focused study. However, sub-themes or sub-categories were developed from the content or threads of each interview [i.e., agriculture, fishing, hula].

2.11.0 Research Problems

Coordinating people’s schedules for interviews was cumbersome. Coordinating tasks was also a problem. However, the primary problems were people not following through with scheduled interviews, and not returning phone calls and emails.

3.0 CULTURAL and HISTORICAL BACKGROUND REVIEW

The Cultural and Historical Background Review entailed a broad search of primary and secondary source literature over time. The majority of the research material for this section came from the State Historic Preservation Division library, Bishop Museum archives; Hawaiian Collections of the University of Hawai'i Hamilton Library (Manoa Campus) and the author's private library. Primary source material included maps, visitor journals, genealogies and other studies. Secondary source material included translations of 19th century ethnographic works, historical texts, indexes, archaeological reports, and Hawaiian language resources (i.e., proverbs, place names and Hawaiian language dictionary). A review of the archival material is presented in this section within the chronological context of the broader history of Greater Hawai'i, the *moku`āina* (island) of Kaua'i and the Hā'ena District. This context will illustrate that Hā'ena was not only a part of the dynamics of Kaua'i, but of greater Hawai'i as well.

3.1.0 Models of Hawaiian Chronology

Models of Hawaiian Chronology such as Cordy (1974/1996), Hommon (1976/1986) or Kirch (1985) provide a temporal view of settlement patterns as well as cultural changes through time, from initial settlement through first recorded contact with the western world. Cordy's (1974) first model of a cultural development sequence looked at Initial Settlement Period, New Adaptation Period and a Complex Chiefdom Period. He has since modified this model (1996). Hommon's (1976) model of sociopolitical development sequence included four phases: Phase I AD 500-1400; Phase II AD 1400-1550; Phase III AD 1550-1650; and Phase IV AD 1650-1778. This model was later modified (1986) to three phases: Phase I AD 400-1400 Exploration and Settlement; Phase II AD 1400-1600 Expansion; and Phase III AD 1600-1778 Consolidation. Kirch (1985) believed that initial settlement occurred much earlier than AD 600. His cultural-historical sequence model has four phases: Phase I Colonization Period (AD 300-600); Phase II Developmental Period (AD 600-1100); Phase III Expansion Period (AD 1100-1650); and Phase IV Proto-Historic Period (AD 1650-1795) (Kirch, 1985:296-308; Kolb, 1991:205).

For this cultural impact study/assessment, Kirch's (1985) model will be used with the following additions: Early Historic Period (AD 1795-1899), Territorial History (AD 1900-1949), and Modern Historic Period (post AD 1950). The reasoning behind Kirch's model is the belief of many aboriginal Hawaiian people that based on oral histories or legends, the migrations of their Polynesian ancestors to Hawai'i took place prior to 700 AD. According to Fornander (1917: IV: II: 406), there are seventy-five generations from Wakea to Kamehameha I who was born around 1753 AD. If just eighteen years were allotted to each generation (typically a generation is twenty years) that would make the time of Hawaiian progenitors Wakea and Papa Haumea (who settled in Nu'uano, O'ahu) approximately 403 AD. [McKinzie (1983:12) gives thirty years per generation.] Yent's (1980) settlement phase for Hā'ena will also be referenced (In Dye 2002:5).

It should be noted that a study by Tuggle & Spriggs (2001) refutes the 'early colonization' supposition. For decades, the consensus among Hawaiian archaeologists was that evidence from Bellows, O'ahu and Ka'u, Hawai'i Island, supported early Polynesian colonization dates of AD 300 to AD 600 (Tuggle 1979; Kirch 1985). However, Tuggle and Spriggs (2001) have since studied new data and re-evaluated past dates and dating methods and have concluded that acceptable early dates fall within 700-1100 AD. These dates appear to coincide with data that eastern Polynesia was settled much later than previously thought (Rolett 1989).

The following overview encapsulates cultural changes over time and highlights significant events and people. More corroborating details follow this overview section with traditional *mo'olelo*, *mele*, *oli*, historic works and various studies.

3.2.0 An Overview of Human Impact, Settlement and Socio-economic Development of Kaua`i in the context of Greater Hawai`i

3.2.1 Colonization Period (300-600 AD)

First voyager dating is scanty at best, however, based on early site dates from Bellows, O`ahu and South Point, Hawai`i, Kirch (1985) estimated that the Colonization Period of the Hawaiian Islands was somewhere between 300-600AD. These first Polynesian voyagers to Hawai`i followed the tracks of migratory birds. They traveled mainly by the stars on a voyage of migration; sixty to a hundred persons could exist for weeks on a large canoe, which could have been a hundred feet in length (Day 1992:3). This feat was “remarkable in that it was done in canoes carved with tools of stone, bone, and coral; lashed with handmade fiber; and navigated without instruments” (Henry 1995: vii).

Reconstructing the cultural sequence for the district of Hā`ena, Kaua`i and greater Hawai`i during the colonization period would involve the ‘founder effect’ and time necessary to adjust and adapt to a new environment. The colonizers were not able to bring all of the gene pool or cultigens from their homeland, so their new culture consisted of what survived the journey, what was remembered and what could be applied to the new environment (Kirch 1985:285-6). Although early Hawaiians were farmers and felt spiritually tied to the ‘*aina* (land) in many ways (Waters, n.d.), when they first arrived they had to modify both their subsistence practices and the land. Faunal remains analyses indicate that early Hawaiian subsistence depended on fishing, gathering, bird hunting (extinct fossil remains, see Olson and James, 1982), as it took time to clear the forests, plant their crops, breed their animals, and construct suitable living quarters.

According to Wichman (2003), Kaua`i was first settled by descendants of Kumu-honua and Lalo-honua - thirty-six generations before Papa was born (Wichman 2003:2) - during the time of Papa and Wakea (second son of Kahiko and Kū-pūlana-kehau) (Wichman 2003:4) who came well before the descendants of Nana`ulu came to Kaua`i . Wichman’s genealogies (2003:117-131) are used as approximate/guiding dates in this report.

Ho`ohoku-i-kalani [daughter of Papa and Wākea (ca A.D. 530)] gave birth to another son [from Wākea] whom they named Hāloa after his dead brother. From Hāloa, it is said, descend all the Polynesians. Kaua`i historians claim that a younger brother of Hāloa discovered and settled on this island. This was Chief Ka-māwae-lua-lani-moku [ca A.D. 555], who traveled to this island with his wife, Kahiki-lau-lani, and her two paddlers Kō-nihinihi and Kō-nahenahe. Because of his good deeds, the great number of his descendants, and the prosperity of his reign, people began to call this island Kau-a`i (*Place of Abundance*).... Whether Ka-māwae-lua-lani-moku and Kahiki-lau-lani ever lived on Kaua`i is unknown. It is more certain that one day, not too many generations after Papa and well before the descendants of Nana`ulu came to Kaua`i, a voyaging canoe commanded by Kū`alu-nui-kini-akua approached the island from the west. Nothing is known of him except his name and that he had a counselor named Pi`i-`ali`i. The genealogy of the first Kaua`i settlers is broken, for they lost their lands and identity after a long war to new, vigorous, and more warlike adventurers.... The most famous connected to two almost mythical groups of people, the Menehune and the Mū (Wichman 2003:5).

The first group to settle on Kaua`i landed at the river mouth of Waimea in the Kona district. What they encountered was an area of abundant water and resources.

Kū`alu-nui-kini-akua stepped ashore at the mouth of Waimea river. It was an ideal place. There was abundant water from the swift rivers and streams that flowed within a protected canyon complex....There was good soil within the canyon valleys.... As the population increased, settlements spread inward into Waimea canyon and its side canyons, into the valleys of Nāpali along the southern coast to Koloa and northward to Wailua and Hanalei (Wichman 2003 5-7).

It was during this period that Kū`alu-nui-paukū-mokumoku was the ruling chief. His first wife had been murdered by his *kahuna nui* who wanted to go back to their homelands so he married Kahāpula, a chiefess born on the slopes of Pe`ape`a overlooking Hanapēpē Valley. When she became pregnant, Kū`alu arranged for her to live in the remote valley of upper Waimea in order to protect their child. During this time Kū`alu-nui-paukū-mokumoku sent back to his homeland for the Menehune who were masters of stonework and engineering and under his direction they built many *heiau*, fishponds and irrigation systems for wetland farming. The Menehune preferred to live on the ridge between Wainiha and Lumahai valleys (Wichman 2003: 7-10). When his son Ola was of age he was brought to his father. Ola later became the ruling chief of Kaua`i and it was during his reign that many other works by the Menehune were constructed. However, years later Menehune Queen Mōhihi decided to take her people back to their homelands as the men were marrying Hawaiian women. They marched along the edge of Napili valleys to the plains of Hā`ena where they sailed away to their homeland (Wichman 2003: 8-12).

3.2.2 Developmental Period (600-1100 AD)

During the Developmental Period, 600-1100 AD, as the founding groups grew, they fissioned into subgroups referred to as ramage, with the senior male of the original ramage as chief of the conical clan, although hierarchical ranking was not just relegated through the patrilineal line of descent (Kirch 1985:31). Bellwood refers to these groups as tribal and related by blood (Bellwood 1978:31). In *Ka Po`e Kahiko* Kamakau refers to Hawaiian ranking in the following passage:

For 28 generations from Hulihonua to Wakea, no man was made chief over another. During the 25 generations from Wakea to Kapawa, various noted deeds are mentioned in the traditions and well-known stories. Kapawa was the first chief to be set up as a ruling chief. This was at Waialua, O`ahu; and from then on the group of Hawaiian Islands became established as chief-ruled kingdoms - Maui from the time of Heleipawa, son of Kapawa and Kaua`i from the time of Luanu`u[*]. In [this] time...records (oral) began to be kept of the chiefs; of the day of birth, the land where each was born, the land where each was born, the places where the placenta (`a`a) and its navel string (*ewe*) were deposited, the place where the navel cord (*piko*) was cut, the famous deeds of each, and the burial place where each was laid (Kamakau 1964:3).

[*Luanu`u (ca A.D. 1380) was the son of Kama-hano and Ka`auea-o-ka-lani; grandson of Ahukini-a-La`a and Ha`i-a-Kama`i`o; great-grandson of La`a-mai-Kahiki, foster son on Mo`ikeha (Wichman 2003:39-41). These people could very well have been living in the later part of this period but more likely the early part of the Expansion Period.] (see Appendix G for Kaua`i Ali`i Aimoku)

Over time other settlers inhabited all the Hawaiian Islands. Many genealogies of Hawaiian *ali`i* indicate that Nana`ulu and `Ulu (ca A.D. 830) were prominent ancient ancestors who settled all over the Pacific islands.

Thirteen generations or more than three hundred years, after Papa-nui-hānau-moku and Wākea, a chief of Tahiti, Ki`i and his wife, Hina-kō`ula, became parents of two sons, Nana`ulu and `Ulu. When they were grown, Ki`i asked his sons to go on a voyage of discovery. All memory of the navigational signposts back to their original homeland were forgotten.... Nana`ulu sailed north in his canoe named *Manō-nui* (Great Shark) and found the islands of Hawai`i. The way from Hawai`i to Tahiti was charted. Voyagers came in increasing numbers (Wichman 2003:21-22).

According to Kalākaua (1887/1990), it is likely that when Nana`ulu first landed in the islands, he did not find anyone else. This may be true if they landed on an island not yet inhabited by those from the north islands such as Kaua`i, Ni`ihau, Necker and Nihoa.

Nanaula, a distinguished chief, was the first to arrive from the southern islands. It is not known whether he discovered the group [Hawai'i] by being blown northward by adverse winds, or in deliberately adventuring far out upon the ocean in search of new lands. In either event, he brought with him his gods, priests, prophets and astrologers, and a considerable body of followers and retainers. He was also provided with dogs, swine and fowls, and the seeds and germs of useful plants for propagation. It is probable that he found the group without human inhabitants.

During that period--probably during the life of Nanaula--other chiefs of less importance arrived with their families and followers either from Tahiti or Samoa. They came in barges and double canoes capable of accommodating from fifty to one hundred persons each. They brought with them not only their priests and gods, but the earliest of Polynesian traditions. It is thought that none of the pioneers of the time of Nanaula ever returned to the southern islands, nor did others immediately follow the first migratory wave that peopled the Hawaiian group (Kalākaua 1887/1990:19-20).

The descendants of `Ulu spread out over the South Pacific. Among them were extraordinary people who lived such wonderful adventures that storytellers had rich material to develop into entertaining sagas [e.g., Māui-kī'iki'i, `Aikanaka-a-Mako`o, Hina-hānau-a-ka-mālama, twins Puna and Hema].... There were so many astonishing ancestors like these that the genealogists added them all into the `Ulu genealogy (Wichman 2003:23).

Changes occurred during this period that brought about a uniquely Hawaiian culture, documented by the material culture found in archaeological sites. These include quadrangular adze, bone fishhook variations, *'ulu maika* (a game piece) stones, *lei niho palaoa* (necklace of bone or ivory and human hair worn by high ranked chiefs) and evidence of shifting cultivation. Kaua'i developed a unique form of poi pounder such as *pōhaku ku'i poi* (ring and stirrup pounders), double-grooved stone club heads, and a broad anvil *kapa* beater (Wichman 2003:6).

On Kaua'i there is evidence of ancient connections with the southern islands of Central Polynesia not found on the other islands of Hawai'i.... Differences are seen in the stone implements that were once used on Kaua'i, in styles of heiau, in language, and in the stories of the Menehune. Long considered a mythical people of Kaua'i, in reality the Menehune were a distinct people of an ancient time. Among the stone implements common to Kaua'i ans were two types of poi pounders restricted almost exclusively to that island.... The two Kaua'i types are the ring and stirrup pounders.... A discovery of significance was made in recent years on the island of Uahuka in the northern Marquesas when an "ancestor" stirrup pounder was discovered there. It is estimated, through radiocarbon dating that it was in use at sometime between A.D 600 and 1300. This type of pounder had been found only on Uahuka and Kaua'i (Joesting 1984:19).

The archaeological evidence indicates that transient fishing camps were already utilizing Kē`ē, Hā`ena prior to AD 1000 (Major and Carpenter 2001:38). According to Yent's (1980) Phase I of Hā`ena, there was transient settlement along the coastal terrace of Kē`ē Beach from about 989 AD. Legends indicate that a chief of Hā`ena, Lohi`au, lived around this time and had several encounters with goddesses of Hawai'i Island; the structural remains of his house still exist.

As Pele and Hi'iaka danced in human form before Lohi'au on the hula platform at Ha'ena, gods and mortal Hawaiians alike could look at the cliffs - Na Pali - running down the coast beyond Kalalau, and at headland after headland, each marking another narrow valley as the wet of the north changed to the dry of the west. Glancing below and east, Lohi'au and his companions could see the blues, whites, and greens of Ha'ena itself, for Ha'ena was fronted by reef and the many blues of the Pacific, by the white coral sand of Ke'e beach, and the green of coastal vegetation, taro, and the cover of the mountainous cliffs immediately beyond. Lohi'au, his ancestors, and his descendants have lived at Ha'ena since perhaps before A.D. 1000 (Griffin 1984: 1).

General archaeological evidence indicates that the “ancestral pattern of corporate descent groups” were still in place at this time (Kirch 1985:302-3). The early culture evolved as the population grew, and many of the changes were related to significant socio-economic changes.

For thirteen or fourteen generations the first occupants of the Hawaiian Islands lived sequestered from the rest of the world, multiplying and spreading throughout the group. They erected temples to their gods, maintained their ancient religion, and yielded obedience to their chiefs. The traditions of the period are so meager as to leave the impression that it was one of uninterrupted peace, little having been preserved beyond the genealogies of the governing chiefs (Kalākau 1887/1990:20).

In about A.D. 1025 or perhaps a little earlier, the people of the group were suddenly aroused from their long dream of six centuries by the arrival of a large party of adventurers from Tahiti. Their chief was Nanamaoa. Their language resembled that of the Hawaiians and their customs and religions were not greatly at variance. They were therefore received with kindness, and in a few years their influence began to be felt throughout the group. They landed at Kohala, Hawai`i, and Nanamaoa soon succeeded in establishing himself as an influential chief. His sons secured possessions on Maui and O`ahu, and on the latter island one of them--Nanakaoko--instituted the sacred place called Kūkaniloko, in the district of Ewa, where it was the desire of future chiefs that their sons should be born.... This became the sacred birth-place of princes', as `Īao, in Wailuku valley, on the island of Maui, became their *taboo* spot of internment. It was at Kūkaniloko that Kapawa, the son of Nanakaoko, was born. His principal seat of power was probably on Hawai`i, although he retained possessions on Maui and O`ahu (Kalākau 1888/1990:70-71).

But stronger leaders were soon to follow from the south. Among the first was the high-priest Pā`ao, from Samoa [some say it was Society Islands]. He arrived during the reign of Kapawa, the grandson of Nanamaoa, or immediately after his death. The people were in an unsettled condition politically, and Pā`ao, grasping the situation, either sent or returned in person to Samoa for Pili, a distinguished chief of that island. Arriving with a large following, Pili assumed the sovereignty of the island of Hawai`i and founded a new dynasty. Pā`ao became his high priest, and somewhat disturbed the religious practices of the people by the introduction of new rites [*luakini* or human sacrifice] and two or three new gods [Kūka`ilimoku] (Kalākau 1887/1990:20-21).

Kamakau (1991) says that there were seventeen generations during which Hawai`i Island was without chiefs--some eight hundred years. “The lack of a high chief was the reason for seeking a chief in Kahiki, and that is perhaps how Pili became the chief of Hawai`i” (island) (Kamakau 1991:101-102).

The Pā`ao/Pili influence created a major shift in “religion” and socio-economic patterns. Pā`ao brought with him the Kū practice of human sacrifice, used in monumental *luakini heiau* or war temples. Pili started a line of *ali`i nui* that would continue to the Kamehameha “dynasty.” The evolution of the *luakini heiau* is difficult to place archaeologically, and although the arrival of Pā`ao may have been a real event; the uniqueness and complexity of *heiau* were most likely a local (Hawaiian) development (Kolb 1989:3).

Two voyaging canoes set out from Tahiti fifteen generations after Nana`ulu and arrived on O`ahu and Kaua`i. Maweke and Paumakua settled peacefully on O`ahu and quickly became ruling chiefs of a district of that island (Wichman 2003:23).

[According to Kalākau (1887/1990)] The next arrivals of note [after Nanamaoa] from the southern islands were the two Paumakua families, one of which settled in O`ahu and Kaua`i and the other in Hawai`i and Maui.... The Paumakua family, which became so influential in Hawai`i and Maui, arrived during the early part of the reign of Pili, in about A.D. 1090. A large party accompanied the family, and they brought with them their gods, priests, astrologers and prophets. They first landed and secured possessions on Maui, but the sons and other relatives of Paumakua were brave and ambitious, and soon by conquest and marriage secured an almost sovereign footing both in Maui and Hawai`i (Kalākau 1888/1990:71-72).

At the same time, Puna-nui-ka-`āina, whose genealogy has not survived, arrived on Kaua`i, having come, most likely, from the Marquesas Islands. Puna-nui-ka-`āina arrived when the chief with the deadly riddles, Ka-iki-pa`a-nānea, was ruler of Waimea. The newcomer chose to settle along the banks of the Wailua River. This land came to be called Puna. There were now two chiefdoms on Kaua`i, Puna and Kona (Wichman 2003:23).

Newcomers were soon changing the socio-political structure of the island polities. There were attempts by some of the prominent families to join forces, but to no avail. Kalākaua (1888/1990) explains:

At that time Kamauaua, a powerful chief of the ancient native line of Nanaula, held sway over the island of Moloka`i. He proudly traced his ancestry to the first migration in the sixth century, and regarded with aversion and well-founded alarm the new migratory tide which for years past had been casting upon the shores of the islands a flood of alien adventurers, whose warlike and aggressive chiefs steadily possessed themselves of the fairest portions of the group. He had sought to form a league of native chiefs against these dangerous encroachments; but the wily invaders, with new gods to awe the native nobility, had, through intermarriage and strategy rather than force, become the virtual rulers of Hawai`i, Maui, O`ahu, and Kaua`i, and he had abandoned all hope of seeing them supplanted. Moloka`i alone remained exclusively under native control, and its resolute old chief had from their infancy instilled into his sons a hatred of the southern spoilers and a resolution to resist their aggressions to the bitter end (Kalākaua 1888/1990:71-72).

3.2.3 Expansion Period (1100-1650 AD)

The Expansion Period, 1100-1650 AD, is significant for a number of reasons. Communication between the Hawaiian groups and southern groups suddenly ceases in the latter part of this period and oral histories don't offer any explanations. With the exception of Moloka`i and a portion of O`ahu who were of the Kamauaua and Maweke (ca 1230 AD) families from the Nana`ulu lines, all the others were of the southern chiefs and their descendants (Kalākaua 1887/1990:21-22). Most of the "ecologically favorable zones," the windward and coastal areas of all major islands, were now settled, and the more marginal leeward areas were being developed.

Archaeological evidence indicates that Hā`ena had permanent settlements and larger populations that utilized marine and inland resources by the 1200s (Yent's Phase II); permanent habitations were supported by wetland agriculture from this period to well into the 1700s (Major and Carpenter 2001:38; Yent 1980).

Legends reveal that during the 12th century, several Hua chiefs reigned on Maui who would later be connected to Kaua`i chiefs. Huanuikalalailai is the grandfather of Haho [Haho is the son of Paumakua (ca 1255 AD) who is buried in `Īao; Haho also founded the *Aha-ali`i* (Kalākaua 1888/1990:84-85)]; Haho is the grandfather of the famous Hāna twins Hanala`anui and Hanala`aiki who become the progenitors of the *ali`i nui* of Hawai`i Island, Maui, Moloka`i, Lāna`i, as well as O`ahu and Kaua`i (McKinzie 1983: xx).

Oral histories or *mo`ōlelo* of a southern adventurer winning the heart of a chiefess takes place on Kaua`i in the early part of this period, when Hina`a-ulu-a, daughter of Puna`ai-koā-i`i (son of Puna-kai`ōlohia and grandson of Puna-nui-ka-ia-`āina, the first Puna chief of Wailua, Kaua`i), chooses newcomer Mo`ikeha (ca 1280 AD) over other local suitors. Puna`ai-koā-i`i, in order to be fair designs a contest where the suitors must swim to the island of Ka`ula off the southwest of Kaua`i, to retrieve a *lei paloa*. Mo`ikeha's genealogy indicated that he came from the Nana`ulu line down to Maweke. Maweke was a chief of a voyaging canoe from the south (Kahiki) who arrived in the islands two generations earlier and settled on O`ahu. Another advantage of Mo`ikeha was that his companion was La`a-maomao, owner of a calabash that kept all the winds of the world. Mo`ikeha's brother `Olopana married a chiefess from Kohala. Mo`ikeha's wife, Hina`a-ulu-a gave birth to her three sons at the *heiau* Holoholokū, constructed

for Mo`ikeha by orders of his father-in-law Puna-`ai-koā-i`i. From then on all *ali`i nui* on Kaua`i were born at the birthing stones there (Wichman 2003:24-29).

During the early part of this period (ca 1305 AD) the three sons of Mo`ikeha were settled on three different islands, O`ahu, Hawai`i and Kaua`i.

Ho`okamali`i, the oldest, moved to O`ahu to become the ruling chief of the Kona district and settled on the plains of `Ewa. Kila went to Waipi`o on Hawai`i... Haulani-nui-ai-ākea remained on Kaua`i, where on Mo`ikeha's death, he became *ali`i nui* [Mo`ikeha's bones were taken to Ra`iātea by La`a-mai-Kahiki, his foster son]. Haulani-nui-ai-ākea proved to be an unsatisfactory *ali`i nui*. Other Kaua`i chiefs, under the leadership of Ke-oloewa-a-Kamaua, deposed their unfit ruler. Ke-oloewa-a-Kamaua was a Moloka`i chief married to one of Maweke's granddaughters... Haulani-nui-ai-ākea was easily overthrown. When Ke-oloewa-a-Kamaua refused the throne, Kila was asked to come to Kaua`i and take over as *ali`i nui*...his heart was not on Kaua`i. He placed the highest ranking *ali`i* in the family, the beautiful Ka`ili-lau-o-ke-koa, as paramount chief, returned to his canoe and sailed to Ra`iātea to remain the rest of his life (Wichman 2003:35).

The advisors of Ka`ili-lau-o-ke-koa wanted her to marry Ke-li`i-koa, the Kona (Kaua`i) chief, but she declined. A lot of intrigue followed this decision along with attempted murder. This led to several centuries of war between the Kona and Puna chiefdoms. But it was during her reign that Ka`ili-lau-o-ke-koa organized the women of Wailua to fight in the battle instigated by the Kona chief Ke-li`i-koa, who was eventually killed by Ka`ili-lau-o-ke-koa with her *pīkoi* (tripping club). Sadly, Ka`ili-lau-o-ke-koa died later without any heirs. The chiefdom was offered to Ahukini-a-La`a (ca 1305-1355 AD), the oldest son of La`a-mai-Kahiki (ca 1305 AD); followed by his son Kama-hano (ca 1330-1380 AD), then his son Lu`anu`u (ca 1355-1405 AD) (Wichman 2003:36-41).

Lu`anu`u (ca 1355-1405 AD), grandson of Ahukini-La`a (ca. 1305-1355 AD), was named after the grandfather of Ki`i, father of `Ulu and Nana`ulu. He was a good chief and was greatly admired in spite of the continuing wars with Kona - references to him indicate a close relationship to Kona. During the time of Lu`anu`u there was a great warrior named Palila, son of Ka-lua-o-pālena and Maihi-iki. He was taken at birth and raised by his grandmother Hina in a sacred temple of Alana-pō where he was trained very well. Later he helped his father defeat Kona chief Ka-maka-o-ka-lani on the plains of Koloa. Shortly after, a messenger from the ruling chief of O`ahu arrived asking for Palila's help. Palila had many adventures on O`ahu and Hawai`i and later became the ruling chief of Hilo (Wichman 2003: 44-47).

Kūkona (ca 1380-1430 AD) [son of Lu`anu`u] inherited an island at war and left it united as one kingdom. From then on, the legends of the Kona kingdom were seldom told and the genealogies of the first settlers were forgotten... Kūkona's *ali`i wahine* was Lau-puapua-ma`a and they had twin sons, Mano-ka-lani-pō (ca 1405 AD) and Palekaluhi. When Kūkona became *ali`i nui* (ca 1405 AD) of Puna, the Kona chief was Makali`i-nui-ku-a-ka-wai-ea. He had been at the royal court of O`ahu for many years and several times had fought in battles against Kama-pua`a... Makali`i-nui-ku-a-ka-wai-ea had been sent by Kama-pua`a to the royal court with the bad news of defeat. Eventually Makali`i-nui-ku-a-ka-wai-ea returned home to Waimea and organized his own force. Makali`i-nui-ku-a-ka-wai-ea's army included the father and older brother of Kama-pua`a (Wichman 2003:47-48).

Kona and Puna forces met once more in battle in Koloa. After a stalemate the two kingdoms merged with Kūkona as the *ali`i nui* (ca 1405 AD). To insure the success of this situation, Nae-kapu-lani, the daughter of Kona's Makali`i-nui-ku-a-ka-wai-ea was married to Mano-ka-lani-pō (ca 1405-1455 AD), son of Puna's Kūkona.

The archaeological evidence indicates that during this time (1400s) in Hā`ena, the use of inland irrigated agriculture reflects intensification; beach habitation declines, but activity areas persist on the dunes

(Major and Carpenter 2001:38). Yent's (1980) Phase III of Hā`ena (ca 1400 AD) are permanent settlements on the coastal terrace and alluvial plain with the development of an intensive irrigated agricultural complex that supports a subsistence economy that still includes marine resources with added domesticated mammals (Dye 2002:5).

A legend (Skinner 1902:212-216) tells about a Japanese vessel wrecking on Maui in the 1200s (according to Wichman's dates it was in the 1400s). The captain and his sister marry into *ali`i nui* families, but what is most significant about this story is the metal sword that the Captain had. During this period the *ali`i nui* of Hawai`i Island was Kalaunui [Ka-lau-nui-o-Hua] who had subdued Maui [Ka-malu-o-Hua] and Moloka`i [Ka-haku-o-Hua] and on O`ahu [Hua-i-pou-leilei] a great fight ensued. In the battle the Captain fought bravely with his sword, but was finally struck down by a warrior named Kaulu, son of Waahia, a seer of great renown. Rather than turn the sword over to the Hawai`i king, Kaulu buried it on the spot. He later retrieved it and put it into his mother's (Waahia) care before the Hawai`i contingency headed for battle on Kaua`i [where Kūkona (ca A.D. 1380-1430) was the ruling chief].

The Hawai`i warriors were overcome and defeated [by Kūkona] before they could even land their canoes by the sling stones and javelins of the Kaua`i warriors. The Hawai`i king Ka-lau-nui was taken prisoner and the kings of Maui, Moloka`i and O`ahu who were hostages of Ka-lau-nui were set free. Kaulu escaped with a remnant force only to be accused by the queen of cowardice. In the negotiations for the release of Kalaunui, the queen offered several things: a fleet of canoes with many spears; twenty feather cloaks with stone axes, ivory and whalebone; but these were all rejected. The last resort was to offer her daughter in matrimony to the king of Kaua`i. This too was rejected. After three years and unsuccessfully trying to get an army together, the queen was ready to give up. This is when Waahia asked for an audience at court. She explained that she alone could rescue the king, but the court had to grant whatever her wish was when they returned. They agreed and Wa`ahia left Hawai`i Island with a single oarsman for Kaua`i. They arrived during Makahiki festivities and Wa`ahia got an audience in court. Her offer was the Japanese sword "that was harder than stone, that broke spears like reeds, that gave its owner supreme fortune and supreme command." The offer was accepted. Before the release of Kalaunui, Wa`ahia had him agree that his release was contingent on him giving his daughter to her son in marriage. This too was agreed on [see also Wichman 2003:49-52].

Once Kaua`i was united as one kingdom and was free from any threat of invasion from its windward neighbors, attention was focused on the development of a solid political system based on land division. The paramount chief ruled the entire island, owned all the land, and had the power of life and death over the people, *ali`i* and *maka`āinana* alike. To help him govern, the *ali`i nui* chose a *kalāimoku* (prime minister, land manager) to advise him on all practical and civil matters. The royal establishment was kept at Wailua, although there was also a permanent home at Waimea.... Kaua`i was divided into six *moku* (districts), which were governed by an *ali`i`aimoku*, each carefully chosen for his loyalty and close relationship to the ruling chief. The largest district was Kona, the former kingdom centered at Waimea, followed by Puna (Wichman 2003:53-54).

The genealogy of Kaua`i *ali`i* was considered the most ancient and impeccable in all the Hawaiian islands. *Ali`i* from other islands were eager to introduce the Kaua`i bloodline into their own.... A chiefess would live with a Kaua`i chief for a time, bear one or more children, then send the chief on his way, leaving his bloodline and genealogy to mingle with those of her own family on Maui and Hawai`i. Marriage to the O`ahu families was commonplace for Kaua`i chiefesses. It was a peaceful kingdom that Mano-ka-lani-pō inherited and helped to create. He ruled over the Golden Age of Kaua`i history (Wichman 2003:55).

This was also the period of the greatest population growth, the development of large irrigation field system projects, and dry land farming. The uniquely Hawaiian invention, the *loko* or fishpond aquaculture, was developed in the fifteenth century or the latter half of this period (Kirch 1985: 303).

Monumental *heiau* building flourished in this Period, as “religion” became more complex. Other monumental building included irrigation ditches or *auwai* such as the Pi`ilani *Auwai* in Lahaina, Maui and the Menehune Ditch in Waimea, Kaua`i.

During the last 200 years of the Expansion Period, the concept of *ahupua`a* was established, as well as class stratification, territorial groupings, powerful chiefs and “*mo`i*” or king (Kirch 1985:303-6). Most prominent during this period was Liloa and Umi of Hawai`i Island; Kawaokalole, Pi`ilani and his children Lono-a-Pi`ilani, Pi`ikea and Kiha-a-Pi`ilani of Maui; Kakuhihewa and Ku`alii of O`ahu; and Kalanikukama, Kamakapu and the beginning of the Kawelo line of *ali`i nui* on Kaua`i.

Legends mention a few times where foreigners ship-wrecked or landed on the shores of various Hawaiian Islands. One story takes place during the reign of Kealiiokaloa, son of `Umi-a-Liloa, who reigned about 1525-30 AD on Hawai`i Island. A vessel was wrecked at Ke`ei, South Kona at a place now called Kulou, the captain and his sister reached shore in safety. They intermarried with the natives. Centuries later it was learned that on October 31, 1527, three vessels fitted out by Spaniard Cortez, conqueror of Mexico, left Zacatula for the Moluccas. About 1,000 leagues from port they were separated by a severe storm and two smaller vessels never made it to their destination. Later in 1555 the Spanish navigator Juan Gaetano discovered these islands; and ancient manuscript chart in Spanish archives indicates a group of islands in the same latitude as the Hawaiian Islands, but over ten degrees longitude too far east. In June 1743, a British warship captured a Spanish galleon near the Philippine Islands and found a manuscript chart on board with the same group of islands charted the same as the 1555 chart in the archives (Wisecarver 1993:11).

Mo`olelo about events that took place in the early to mid 1600s were revealing in that they illustrate that many of the battles of this period were relatively quickly contained by the opposing *ali`i* [see *History of Kualii* (Kualii ca. 1630-1660s) in Fornander 1917:IV: II: 364-434]. These stories also illustrate the on-going inter-relationships between the people of the various islands. In the *History of Kualii*, the exploits of Kualii (great-great grandson of Kakuhihewa (ca. 1580 AD, *ali`i nui* of O`ahu) take him to every island and he eventually unites all the islands “from Hawai`i to Ni`ihau” (Fornander 1917: IV: II: 406).

3.2.4 Proto-Historic Period (1650-1795 AD)

The Proto-Historic Period, 1650-1795 AD, appears to be marked with both intensification and stress. Yent`s (1980) Phase IV of Hā`ena – historic contact period - indicates a decrease in the population and a reduced occupation of Hā`ena ca 1700-1800. Wet taro was grown in a terraced system on the alluvial plain irrigated by Limahuli Stream and sweet potatoes were grown on the coastal terrace (Handy & Handy 1972:429 In Dye 2002:5).

Many wars took place during this time between intra-island chiefdoms and inter-island kingdoms. However, it was during this period that the *Royal Kolowalu Statute* or Kualii`i`s Law was enforced. Kualii Kuniaakea Kuikealaikauaokalani (ca 1655?-1730 AD) lived for a long time, was said to sometimes have supernatural powers, and was the first to “unite” all the islands. Kū-ali`i acquired Kaua`i (ca 1680 AD) after the deaths of cousins [Kawelo had ceded Kaua`i to Kū-ali`i should they both die in battle there. Kū-ali`i was a descendant of the Kawelo line on his grandmother`s side.] Kū-ali`i went to Kaua`i and declared himself *ali`i nui* and installed his son Pele-iō-hōlani (ca 1680-1755+ AD) as governor (Wichman 2003:89).

It (Kualii`s Law) was strict, unvarying and always just. It was for the care and preservation of life; it was for the aged men and women to lie down in the road with safety; it was to help the husbandmen and the fishermen; to entertain (morally) strangers, and feed the hungry with food. If a man says, “I am hungry for food,” feed (him) with food, lest he hungers and claims his rights by swearing the *Kolowalu* law by his mouth, whereby that food becomes free, so that the owner

thereof cannot withhold it; it is forfeited by law. It is better to compensate.... A transgressor or one who is about to die, is, under the application of this law exonerated of his death or other penalty...(Fornander 1917: IV: II: 432).

Kū-ali`i, *ali`i nui* of O`ahu, died at Kailua in Ko`olaupoko in 1730 AD, supposedly at the age of one hundred and seventy five.

When Pele-iō-hōlani left Kaua`i to pursue his destiny as the future ruler of the O`ahu kingdom, he left his daughter Ka`apuwai as governor of Kaua`i. She was the first chiefess since Ka`ili-lau-o-ke-koa, some centuries before, to become paramount ruler. She was married to Ka`ume-he-iwā, a high chief of Kaua`i. They were both descended from Ka-lani-kukuma, and their marriage joined the junior and senior genealogical lines that stemmed from their common ancestor, thus giving their daughter Ka-maka-hele a stronger *mana* than either of her parents (Wichman 2003:92).

In 1736, Maui *ali`i nui* Kekaulike died. He chose his *nī`aupi`o* son Kamehameha-nui to be his heir, though Ka`uhi`aimoku-a-Kama was the oldest he was of a slightly lower rank.

Ke-kaulike had many children by his wives (*wahine*) and female retainers (*haia wahine*). Ka-uhi`aimoku-a-Kama by Kaha-walu was the first born; Manu-ha`a-ipo, Ke-hau-hiwa-moku and Ka`eo [kulani] were the children of Holau; Kamehameha-nui, Ka-lola, Ka-hekili and Ku-ho`oheihai-pahu, of Ke-ku`i-apo-iwa-nui; Na-mahana and Ke-kua-manoha` of Ha`alo`u.... When Ke-kau-like heard that the ruling chief of Hawai`i was at Kohala on his way to war against Maui, he was afraid and fled to Wailuku in his double war canoe named Ke-aka-milo. He sailed with his wives and children...his officers, war leaders, chiefs, and fighting men, including warriors, spearmen, and counselors.... The fleet landed at Kapa`ahu at the pit of `Aihako`ko in Kula. Here on the shore the chiefs prepared a litter for Ke-kau-like and bore him upland to Haleki`i in Kukahua. There Ke-kau-like died, and the sound of lamentation for the dead arose. Then fearing the arrival of Alapa`i bent on war, the chiefs cut the flesh from the bones of Ke-kau-like in order to lighten the load in carrying the body to `Īao (for burial) (Kamakau 1992:69).

Alapa`i sailed from Kohala on Hawai`i with a great company of chiefs of Hawai`i, his war leaders, warriors, and the district chiefs of the island...but when he landed at Mokulau in Kaupō and heard that Ke-kau-like was dying, he gave up all thought of war and wished only to meet Ke-kau-like and his (half) sister Ke-ku`i-apo-iwa-nui. He heard that Kamehameha-nui had been chosen ruler over Maui and he had no desire to make war upon his sister`s child (Kamakau 1992:70).

In 1737 and 1738 a couple of great battles took place in the districts of Lahaina and Kā`anapali. Kauhi`aimoku-a-Kama (Kauhi), oldest son of Ke-kau-like rebelled against his younger brother, Kamehameha-nui. "Near the house of David Malo is a breadfruit tree on which the first victim of the battle was laid. There the fighting men of Kamehameha-nui were slaughtered." This prompted Kamehameha-nui to flee to his uncle`s canoe, big island *ali`i nui* Alapa`i-nui-a-Ka-uaua (Alapa`i), who took him to Hawai`i island where they spent a year preparing for war. Alapa`i was the half-brother of Kamehameha-nui`s mother (Kamakau 1992:73-74).

When Ka-uhi heard that Alapa`i was heading back to Maui, he enlisted the help of his uncle, Pele-iō-hōlani, Kaua`i *ali`i nui*, ruling chief of O`ahu, son of Kū-ali`i and cousin of Alapa`i. Alapa`i attacked Maui (1738 AD), drying up the streams of Kaua`ula, Kanaha and Mahoma near Lahainaluna, destroying the taro patches. His men kept guard over the streams of Olowalu, Ukumehame, Wailuku and Honokawai (sic). "When Pele-iō-hōlani heard that Alapa`i was in Lahaina he gathered all his forces at Honokahua and at Honolulu. At Honokawai (sic) an engagement took place between the two armies, and the forces of Alapa`i were slaughtered and fled to Keawawa." Pele-iō-hōlani had 640 men to Alapa`i's 8,440. The cousins once again came face to face in Pu`unene and decided to once more opt for peace between the families. Kamehamehanui ruled Maui in peace; Pele-iō-hōlani retired to Moloka`i, and Alapa`i went back to rule Hawai`i (Kamakau 1992:74).

About 1755 AD Kaua`i's rule went to Ka-maka-helei, granddaughter of Pele-iō-hōlani.

Ka`apuwai died before her father [Pele-iō-hōlani], and the government of Kaua`i passed to Ka-maka-helei...[who] owed allegiance to her grandfather Pele-i`ō-hōlani.... Her first husband was a Kaua`i chief, Kiha, and with him she had three children: first a daughter, Lele-māhoa-lani, then a son, Keawe, and finally another daughter, Ka-lau-i-pihana. Then Pele-i`ō-hōlani sent his grandson Ka-neoneo to Kaua`i to ensure the island would remain loyal to him. Ka-neoneo and Ka-maka-helei were first cousins, and soon Ka-maka-helei put Kiha aside and took Ka-neoneo for her husband (Wichman 2003:92-93).

A few years later, around 1759 AD, High Chief Kalani`opu`u from the Island of Hawai`i made war on East Maui and conquered Hāna from *ali`i nui* Kamehameha-nui, brother of Kalola and Kahekili. Kalani`opu`u took control of Hāna's prominent Pu`u Kau`iki as his fortress. He appointed one his chiefs, Puna, as "governor" of Hāna and Kīpahulu (Kamakau 1992:81-82). Kamehameha-nui relinquished Hāna and lived in peace in West Maui with his wife and half-sister, Namahanaikaleleonalani. In 1766 the peaceful Maui *ali`i nui* died. After ruling Maui for 29 years, Kamehamehanui was taken ill at Kawaipapa, Hāna on a journey about the island. While still in Hāna Kamehamehanui ceded his lands to his younger brother Kahekilini`ahumanu (Kahekili), a fierce warrior and "manipulator" (Kamakau, 1992:82-84; Kame`eleihiwa 1992:47).

But according to Kalākaua (1990:353) Kamehamehanui "died very suddenly at Wailuku, which had been his favorite place of residence." During the period of mourning for him, his successor and younger brother, Kahekili "removed his court to Lahaina." It was while there that they were visited by an *ali`i* from Hawai`i Island. The visitor was Ke`eaumoku, son of Keawe-poepoe, who was the son of Lonoikahaupu (sovereign of Kona, Kaua`i) and Kalanikauleleaiwi (half sister/wife of Keawe, once *moi* of Hawai`i Island). Years before, after the death of his uncle Alapa`inui [Hawai`i Island *moi*], in 1754, Ke`eaumoku was discontent with the rule of his cousin Keaweopala so he joined forces with Kalani`ōpu`u of Ka`ū and defeated Keaweopala in Kona, making Kalani`ōpu`u, grandson of Keawe, the new *moi* of Hawai`i Island. Ke`eaumoku fortified himself in Kohala and later (1765) incurred the wrath of Kalani`ōpu`u and was attacked by him. Ke`eaumoku escaped and spent some time on Lāna`i before heading to Maui just after the death of Kamehamehanui. To the displeasure of Kahekili, Ke`eaumoku promptly won the heart of Namahana [I], the widow of his brother (Kalākaua 1888/1990:353-356), and also his half-sister [Kekaulike was their father, but they had different mothers]. After the couple settled in Waihe`e (Namahana's lands), Kahekili decided to re-locate his court to Wailuku.

With the help of his nephew Kahahana, who was also a land-holder of Waihe`e, Kahekili contrived to find cause to battle Ke`eaumoku. To this end he was successful, causing Ke`eaumoku, Namahana, her mother, two brothers and a considerable following of chiefs and retainers to flee to Moloka`i. This did not stop Kahekili who invaded Moloka`i with a large force, and once again defeated Ke`eaumoku. Barely escaping, Ke`eaumoku, Namahana and their entourage fled to Hāna which was still under the control of Hawai`i Island. There he was forgiven by Kalani`ōpu`u and given shelter by Mahihelelima, governor of the Hāna district (Kalākaua 1888/1990:357-358). While in Hāna, Namahana (I) gave birth to Ka`ahumanu in 1768 (Kalākaua 1888/1990:359) in a cave at the base of Pu`u Kauiki; she would later play a pivotal role in the history of Hawai`i.

During this period the socio-political intrigue continued to affect all islands including Kaua`i.

On O`ahu, Kūmahana, who was Pele-i`ō-hōlani's regent, proved himself to be an entirely unsatisfactory ruler. The O`ahu chiefs rebelled against him and sent Kūmahana, his wives, and children into exile on Kaua`i. Pele-i`ō-hōlani returned posthaste from his skirmishes against Kahekili on Maui to renew his claim to O`ahu. Kahekili...took this opportunity to lead his forces once again against those of Pele-i`ō-hōlani. After several battles, Kahekili was victorious. To

consolidate his rule, he married his sister Kalola to Ka-lani-`opu`u of Hawai`i in the hopes that he would either help by sending men and arms or at least, remain indifferent to the situation.... From O`ahu, Pele-i`ō-hōlani sent Ka-neoneo to join him to help stem Kahekili.... This left Ka-maka-helei vulnerable. Although she was the nominal ruler of Kaua`i, her uncle Kūmahana began to make his moves to take over her government (Wichman 2003:93).

Kahekili...was quick to realize the opportunity this presented to neutralize Kaua`i. He sent his young half-brother Ka`eo-kū-lani to Kaua`i to woo Ka-maka-helei. Ka`eo-kū-lani was successful...since she was nine years older than Ka`eo-kū-lani, she did not expect to bear any more children, and her oldest son, Keawe, was named heir to the kingdom.... By this time, all of Maui, Moloka`i and Lāna`i were under the rule of Kahekili who had succeeded in taking them from Pele-i`ō-hōlani. He was gearing up for an invasion of O`ahu where Pele-i`ō-hōlani, now a very old man, had turned over the government to his grandson Ka-neoneo (Wichman 2003:93-94).

In 1775 Kalani`opu`u, son of Ka-lani-nui-I-a-mamao (whom the *Kumulipo* was composed for) and his forces in Hāna raided and severely destroyed the neighboring Kaupō district, before continuing several more raids on the islands of Moloka`i, Lāna`i, Kaho`olawe and parts of West Maui. He returned again in 1776 and for several years later, raiding and treating the *maka`āinana* cruelly.

The Alapa, the fierce fighting men of Kalani`ōpu`u, were defeated; only two men escaped. The chiefs and fighting men of Kalani`ōpu`u wanted to continue; “tomorrow we will drink the waters of Wailuku and rest in the shade of Hekuawa.” Ka-hekili prepared for the “great battle” which took place on the sand hills between Waikapu and Wailuku; Ka-hahana, now ruling chief of O`ahu and Moloka`i came to his aid.

Kahekili stopped that war and made peace at the request of his sister Ka-lola, but a few years later Kalani`ōpu`u once again sailed to ravage the lands of Maui and Lāna`i. It was during this war that Kamehameha I, nephew of Ka-lani-`ōpu`u was noticed as a great and brave warrior by both sides.

In January 1778 Cook landed in Waimea, Kaua`i and the culture of old Hawai`i began its spiraling change (Day 1992). Fishermen off of Koloa, Kaua`i first saw the ship *Discovery* and rushed to tell Kaua`i *ali`i nui* Ka-maka-helei and Ka`eo-kū-lani. The *kahuna nui* Kū`ohu declared “that can be nothing else than the *heiau* of the god Lono. In the center is the tower of the demi-god Ke-o-lewa, and there in the back is the place of sacrifice at the altar” (Wichman 2003:94; see also Kamakau 1961:92-96). However, after several days of observation the *kahuna* concluded that these were not gods, but men. He said they were like the two white priests who had come to the islands when Paumakua was living and they were like the *haole* Kū-ali`i had seen on his travels less than a hundred years earlier (Wichman 2003:94). According to Captain Clerke, he was visited by a young chief named Kaneoneo; up to this time “no chief had come to see either Clerke or Cook” (Beaglehole 1967:38 In Kikuchi et al 1978:8). According to Wichman (2003) and Kamakau (1961:93-96) Ka-neoneo was now on O`ahu, replaced by Ka`eo-kū-lani as husband of Ka-maka-helei, granddaughter of Pele-i`ō-hōlani.

[Ka-maka-helei] sent three men on board to see what this strange ship really was and to assess those on board. These three were *kahuna* Kū`ohu, wearing his *lei palaoa* (necklace of woven human hair holding a hook of carved whale ivory), chief Kāne-a-ka-ho`owaha, and chief Kī`i-kīkī who was Ka`eo-kū-lani’s trusted man who had come with him from Maui.... Captain Cook gave Kū`ohu a dagger, a gift beyond price. It was the first gift from Western civilization to Hawai`i, and it was considered an omen.... Kī`i-kīkī reported back to Ka`eo-kū-lani and described the dagger. Ka-pupu`u, one of the guards surrounding Ka`eo-kū-lani...went out to the ship and saw quantities of iron things just lying about on deck. He grabbed as many pieces as he could and threw them into his canoe. One of the ship’s guards raised his rifle and shot Ka-pupu`u dead. He was the first Hawaiian to die by a bullet....

Some chiefs thought that Captain Cook should be put to death for killing Ka-pupu`u but the

kahuna Kū'ohu said "No they were not to blame...Kapupu'u was to blame, for he went to steal even though our *ali'i nui* had forbidden it." The following day Captain Cook came ashore for the first time. His longboat landed at the mouth of the Waimea River, on the beach of Luhi beside Lā'au-`ōkala point. He was greeted by a huge crowd of people pushing and shoving to get a look at this...living god come among them. People had come from Nāpali, Mānā, and Kīpū like a rushing stream during the night.

Captain Cook wandered about Waimea for a time before returning to his ship.... Ka-maka-helei presented gifts to Cook: hogs, chickens, bananas, taro, sweet potatoes, sugarcane, yams, fine mats, and tapa cloth. In return Cook presented them with cloth, iron, a sword, knives, bead necklaces, and mirrors. Then Ka-maka-helei offered Cook her own daughter, Lele-mahoe-lani. According to the Kaua'i source of this story, she spent the night on board with Cook. She left the following morning laden with presents (Wichman 2003:95-96).

Cook also gave the chiefs some goats (Beaglehole 1974:677 In Mills 1996:72), sheep and a new breed of pigs (Joesting 1984:199). After visiting Hawai'i Island Cook left Hawai'i for several months, but returned later in the year. Kalani'ōpu'u was fighting Kahekili's forces in Wailua, Maui on November 19, 1778 when Cook's ship was sighted on his return trip to the islands. Kalani'ōpu'u visited Cook on the *Resolution*, while Kahekili visited Clerke on the *Discovery* (Kuykendall and Day 1976:16). When Cook sailed into Kealahou Bay on January 17, 1779, Kalani'ōpu'u was still fighting Kahekili on Maui. At this time Kahekili's brother, Kaeo was ruling chief of Kaua'i [co-ruler with Ka-maka-helei, granddaughter of Pele-i'ō-hōlani]; Kahekili's nephew Ka-hahana of O'ahu and Moloka'i; Kalani'ōpu'u of Hawai'i and Hāna [eastern Maui]; and Kahekili of western Maui, Lāna'i and Kaho'olawe (Kamakau, 1992:84-86, 92, 97-98). On January 25th Kalani'ōpu'u visited Cook again at Kealahou Bay, presenting him with several feather cloaks. By February Cook's scheme to kidnap Kalani'ōpu'u as a hostage were thwarted and Cook was killed following a skirmish over a stolen cutter (Kuykendall and Day 1976:18). His ships and crew visited Kaua'i once more (1799) after Cook's death. A battle had taken place the day before and warriors had been killed. It was also evident that venereal disease had spread throughout the island as a result of their first visit to the island (King 1967: part 2:585-586 In Mills 1996:78).

On Kaua'i:

In 1780, Ka-maka-helei gave birth to another son, Ka-umu-ali'i. The situation on Maui grew uncomfortable for Kahekili. He sent a message to his brother Ka-'eo-kū-lani to return to Maui. Ka-'eo-kū-lani brought his two trusted counselors, Kī'i-kīkī and Kai-'awa with him. Ka-umu-ali'i, his son with Ka-maka-helei, was declared heir to Kaua'i, passing over his older half-brother, Keawe (Wichman 2003:96-97).

The warring between the Hawai'i and Maui forces continued. On his way to Kona from Ka'ū, Kalani'ōpu'u was taken ill. He went instead to Ka'iliki'i at Waiō'ahukini in Pakini where he died in January 1782. In 1781 a few months before the death of Kalani'ōpu'u, when Kahekili heard how ill Kalani'ōpu'u was, he split his forces and sent them through the south-eastern Kaupō Gap and the north-eastern Ko'olau Gap into Hāna. After damming and diverting the supply of spring water to Pu'u Kau'iki, the Hawai'i chiefs were finally defeated, and the Maui *ali'i nui* regained control of Hāna in 1782 (Kamakau, 1992:84-86; 110, 115-116; Fornander 1900: Vol II 146-7, 150, 216).

But what became of Ke'eumoku and his family [wife Namahana and daughter Ka'ahumanu], whose home for years had been the hills of Hāna? Learning of the meditated invasion of the district, and unwilling to trust himself to the mercy of Kahekili, Ke'eumoku fled with his family to the almost barren island of Kaho'olawe, where he lived in seclusion until after the fall of Kauwīki and death of Kalani'ōpu'u, when he boldly returned to Hawai'i, quietly settled on his old and inalienable estates at Kapalilua, in South Kona, and awaited the development of events, which he perceived were rapidly and irresistibly tending toward wide-spread revolution and disorder. For

more than fifteen years he had heard the clash of arms only at a distance, and he yearned for the shouts of battle and the music of marching columns (Kalākaua 1888/1990:361).

Kahekili reclaimed Hāna, then through war and trickery went on to gain control of all the islands except Hawai`i (Kamakau 1992:116, 128-141).

The O`ahu chief [Ka-hahana, nephew and foster son of Kahekili] was living in Nu`uanu Valley above Honolulu when he received word that Ka-hekili had landed on the beaches with a large fleet of war canoes and was gathering his warriors about him for an attack on the defenders of O`ahu. In January 1783, a decisive battle was fought. Ka`hekili's wife, Kau-wahine, who was also a noted fighter, took part in this battle.... Confusion seized the ranks; the warriors of Ka-hahana were dispersed while he and his wife fled to the forest. Thus, O`ahu and Moloka`i were taken by Ka-hekili.... [However] fighting erupted on his home island of Maui among minor chiefs... [along with] the growing threat from Hawai`i.... Kahekili's son and designated heir, Ka-lani-kū-pule, was dispatched to Wailuku to prepare for the coming attack. Ka-lani-kū-pule took with him Maui's war leaders and Ka-hekili's best warriors, the battle-scarred veterans of the war on O`ahu (Speakman 2001:40-41).

In early 1790 when Captain George Vancouver made his first stop in the Hawaiian Islands he was told that Kalani`ōpu`u was dead; Hawai`i was ruled by Keoua Kuahu`ula (half-brother of Kiwala`ō), his uncle Keawe-mau-hili, and Keoua's cousin, Kamehameha (Day 1984:77). Vancouver went on to trade with Kalanikūpule in Waikīkī. He then found that the ruling chief of Kaua`i, Ka-umu-ali`i, was a mere child; his father Ka`eo was on Maui with Kahekili. Vancouver also noted a decrease in the population and the number of chiefs since the arrival of Cook (Kamakau 1992: 162-163), but foreigners continued to arrive.

In spite of the on-going battles, the foreign explorers and merchants were not deterred; foreign vessels continued to come to the islands.

By 1790 several other foreign ships also visited the islands, helping to establish them as a "familiar resort for the fur traders" and as a "port of call and wintering place -- for those engaged in the more general trade which grew up between Asia and the west coast of North and South America." These voyagers included English Captains Portlock, Dixon, and Meares and French naval vessels under the command of La Perouse.... Because of their excellent harbors and strategic location nearly equidistant from the coasts of the Orient and North America, the Hawaiian Islands quickly became a primary stop on the Pacific trade routes. These islands contained more cultivated land than most of the other Pacific islands, forming "an oasis in the ocean desert" (Greene 1993: Chap II).

By 1790 Kamehameha I had gained enough control of the island of Hawai`i from his uncles and cousins that he could leave to join the war parties on Maui. His canoe fleet "beached at Hāna and extended from Hamoa to Kawaipapa" to battle Kalanikūpule, son of Kahekili (who now ruled from O`ahu). After several battles along the East Maui coast, Kamehameha's forces reached Wailuku where the "great battle" took place. This would be the beginning of the end of independent ruling chiefs because of the inequity of battle strategy and weaponry. Kamehameha had brought a cannon from the *Eleanora* along with her captain, Isaac Davis, and crewmember John Young, who were now his *aikāne punahele* (favorites) and advisors (Kamakau 1992:147-148). This battle of 1790 was known as the *Battle of Kepaniwai* where the bodies of fallen warriors dammed `Īao Stream in Wailuku or "water of destruction" (Engelbreton 2000:2).

While Kamehameha was at Wailuku with his followers he heard of Ka-lola's being on Moloka`i with her daughters and granddaughter and he sent word by Kikane for her not to proceed to O`ahu as he was coming to escort her to Hawai`i. He sailed with a great company, among them Ke`eaumoku, Keawe-a-heulu, Ka-me`e-ia-moku, and Ka-manawa, the brothers of Ka-lola, and landed at Kaunakakai. They met Ka-lola at Kalama`ula and, when Kamehameha saw how ill she

was and of an incurable disease according to kahuna's diagnosis, he asked, "Since you are so ill and perhaps about to die, will you permit me to take my royal daughter and my sisters [Ke-opu-o-lani, her mother Ke-ku'i-apo-iwa and aunt Ka-lani-hau-io-kikilo] to Hawai'i to rule as chiefs?" Kalola answered, "If I die, the girl and the sisters are yours." Then Kamehameha and all the chiefs waited until the death of Ka-lola [widow of Ka-lani-`ōpu`u; sister of Kahekili and highest ranking *ali`i*] (Kamakau 1992:149).

While Kamehameha was on Moloka`i waiting for the passing of Kalola, *kapu* chiefess of Maui, he sent two messengers to O`ahu; one to Kahekili and one to find the Kaua`i *kahuna* Kapoukahi of the *kahuna* order Hulihonua, as he was skilled in the art of reading omens and signs. It was he who advised that if Kamehameha wanted to rule over all the islands that he should build a great *heiau* at Pu`ukohola at Kawaihae (Kamakau 1992:149-150). The messenger to Kahekili threw down two *maika* stones, a black one and a white one. Kahekili asked if Kamehameha was coming to O`ahu to wage war and the messenger said yes. Kahekili then asked him where he would land. The messenger told Kahekili of the landing places that were advised and who advised Kamehameha. After commenting on each suggestion, Kahekili imparted a message for Kamehameha:

Go back and tell Kamehameha to return to Hawai`i and watch, and when the black tapa covers Kahekili and the black pig rests at his nose, then is the time to cast stones. Then, when the light is snuffed out at Kahiki that is the time to come and take the land (Kamakau 1992:150).

While on Moloka`i Kamehameha heard that his cousin Keoua Kuahu`ula, Ka`ū chief, had waged war on other chiefs of Hawai`i Island and had killed Keawe-ma`u-hili, the Hilo chief who had aided Kamehameha in the Maui battle, in spite of an agreement with Keoua that he wouldn't "fight the sons of Kahekili." Keoua took over Hilo then went on to Waipi`o where he destroyed the fishponds and plundered the taro patches and robbed the people from Waipi`o to Waimea, then went on to ravage Kohala. Kamehameha returned to Hawai`i Island from Moloka`i and proceeded to wage war on Keoua. Several battles later, both sides could not gain an upper hand. Although Keoua's warriors seized the muskets of Kamehameha, they didn't have the powder to make them work. It took an act of nature or the goddess Pele to turn the tide as Keoua's army was annihilated by a volcano eruption (Kamakau 1992:151-152).

In the meantime, Ka`eo-kū-lani, ruling chief of Kaua`i and brother of Kahekili, heard what happened to his nephew Kalanikūpule on Maui and how they narrowly escaped death. He heard "how the waters of `Īao had been choked with the bodies of the slain in this war." He was so upset that he decided to wage war against Kamehameha (Kamakau 1992:148, 159). The shift in style of warfare that Kamehameha started during the *Battle of Kepaniwai* in Wailuku, Maui continued.

[Ka`eo-ku-lani] set out with [nephew] Pe`ape`a, son of Kamehameha-nui, his counselor of war, Ki`ikiki`i, Kai`awa, and chiefs, warriors, and paddlers, all well armed with muskets and weapons of all kinds, and with his two man-eating dogs. (He also took with him) Maka`eha and Mr. Mare Amara [foreigner], a man skillful in the use of arms who acted as his gunner (Kamakau 1992:159).

On O`ahu Ka`eo met up with his brother Kahekili, ruling chief of O`ahu, Maui, Moloka`i and Lāna`i and persuaded Kahekili to join him in the war against Kamehameha. Kahekili left his son Kalanikūpule in charge of O`ahu and left for Moloka`i.

The war party landed at Kaunakakai on Moloka`i, and when the Kaua`i chief saw for the first time, by the ovens they had left, the size of the camp which Kamehameha had occupied he said, "Where a big squid digs itself a hole, there crab shells are heaped at the opening." Upon their reaching Maui...the army camped at Wailuku and of Waiehu the Kaua`i chief remarked, "Here is the land of the warrior to whom Kamehameha owes his kingdom (alluding to Ke`eaumoku whose wife Namahana, brought him the land of Waiehu)... Waiehu fell to Ki`iki`i and it was, alas! The

Kaua`i people who ate the poi of Waiehu.... Kahekili gave some of the land of Maui to the ruling chief of Kaua`i to be divided among his men.... This caused discontent among the chiefs of Maui, who had thus to lose some of their land, and they rose against the Kaua`i chief. A battle was fought at Paukukalo adjoining Waiehu while some of the people were out surfing (Kamakau 1992:159-160).

It is not clear what happened right after that battle because what follows is Kahekili leaving Maui with his warriors from Kaupō; while Ka`eo sails for Hawai`i with his warriors from Hāna. However, they both land in Waipi`o and Ka`eo keeps his vow and “wantonly destroyed everything in Waipi`o” including the sacred places and the tabu threshold of Liloa...not even Keoua who has passed through there the year before and destroyed the land and the food, had made such wanton destruction” (Kamakau 1992:160). Kahekili in the meantime goes on to Halawa in Kohala where fighting occurs, then sails from Halawa and joins Ka`eo in Waipi`o. When Kamehameha hears about Ka`eo and Kahekili, he sails with John Young and Isaac Davis and meets up with Ka`eo and Kahekili at Waimanu cliffs. The battle of 1791 called *Kepuwaha`ula*, was a stand-off with loss to both sides. Kahekili left and returned to Maui (Kamakau 1992:161-162).

Kamehameha decided to take the advice of the Kaua`i *kahuna* Kapoukahi and build a *heiau* at Pu`ukohola. Kamehameha personally helped to construct the *heiau* Pu`u Koholā in the summer of 1791, to assure his victory over his cousin, Keoua Kuahu`ula, son of his father’s older brother. Messengers were sent to Keoua to ask him to come to the *heiau* so that there would be peace between the cousins. Keoua left Ka`ū with a fleet of twenty-seven canoes. As he sailed into Kawaihae Bay at Mailekini, Ke`eaumoku thrust a spear at Keoua, which he dodged, snatched and thrust back. Suddenly muskets were fired from the shore, leaving Keoua and all the others from his canoe dead. The rest of Keoua’s warriors were spared when Kamehameha declared the law of the broken paddle [*Mamalahoa*] (Day 1984:77; Kamakau 1992:154-157).

Vancouver returned to Hawai`i Island in February 1793 to find all the chiefs wanting guns and powder. Instead he gave Kamehameha a bull and heifer from California and asked that all the chiefs stop fighting. In March he sailed to Lahaina and saw Kahekili who was now an old man. He also asked Kahekili to stop the fighting. Kahekili said that “it was not right for the chiefs of Hawai`i to raid Maui and rob and pillage without cause.” He told Vancouver he should stay and guard him against further wars. Vancouver went on to O`ahu to see Kalanikūpule, then to Kaua`i before going to North America. It was the last time Vancouver saw Kahekili who died later that year at the age of eighty-seven, after becoming ill and returning to Waikīkī, O`ahu. His bones were carried by his twin brothers Ka-me`e-ia-moku and Kamanawa and hidden in a secret cave in Kaloko, North Kona. His gods were Ku-ke-olo-ewa, Kuho`one`enu`u, Kalai-pahoa, Ololupe, Kameha`ikana, Kala-mai-nu`u, Kiha-wahine, Haumea and Wali-nu`u (Kamakau 1992:164-166).

On Vancouver’s third visit to the islands in 1794, Kamehameha I was ruling chief of Hawai`i; Ka`eo was ruling chief of Maui, Moloka`i and Lāna`i; Kalanikūpule of O`ahu and Ka-umu-alī`i of Kaua`i. Then Ka`eo got tired of Maui and wanted to go back to Kaua`i. Not knowing what his uncle’s plans were, Kalanikūpule prepared for war. A few skirmishes and reconciliations took place that year on O`ahu, but as Ka`eo prepared to embark to Kaua`i from West O`ahu he discovered a conspiracy among some of his chiefs, principally his two counselors Ki-Kīkī and Kai`awa, who were planning to throw him overboard in mid-ocean. He decided it was better to die in battle, then alone in the ocean so he dismantled his canoe and proceeded to make war on Kalanikūpule. Ka`eo won a couple of skirmishes, but in the end was defeated in `Aiea by Kalanikūpule who was aided by foreign vessels in Pearl Harbor, guarding the shores with guns and cannons. Ka`eo died in mid-December 1794 (Kamakau 1992:168-169).

The captain and some of his crew of the foreign vessels were then tricked and killed. Kalanikūpule

confiscated the vessels and munitions with the intention of sailing to Hawai`i to overtake Kamehameha. Just one day out they all got seasick and had to return to Waikīkī with Kalanikūpule and his wife still on board. The foreigners sailed off during the night, but put Kalanikūpule and his wife aboard a canoe and let them go back to O`ahu. The foreigners then sailed for Hawai`i Island to tell Kamehameha what happened and to give him all the munitions on board (Kamakau 1992:170-171).

Demographic trends during the Proto-Historic Period indicate a population reduction in some areas, yet show increases in others, with relatively little change in material culture. There was a continued trend in craft and status material, intensification of agriculture, *ali`i* (chief) controlled aquaculture, upland residential sites, and oral records [*mo`olelo*] from that period were rich in information. The Ku cult, *luakini heiau*, and the *kapu* (restriction or regulation) system were at their peak, although Western influence was altering the cultural fabric of the islands (Kirch 1985:308, Kent 1983:13). By 1794 American, English, Irish, Portuguese, Genoese, and Chinese foreigners were living in the islands (Day 1992:23-25). Between 1778 and 1794 at least 21 ships from various countries had visited Kaua`i for provisions and to trade (Mills 1996:68).

3.2.5 Early Historic Period (1795-1900 AD)

The Early Historic Period (1795-1900 AD) is marked by very significant events. Kamehameha left Hawai`i Island in early 1795 and landed in Lahaina, taking over all the food patches and cane fields before leaving for Moloka`i where the “whole coast from Kawela to Kalama`ula was covered by canoes. There on Moloka`i he awaited for the proper time to sail for O`ahu, where the chiefs and warriors of Kalanikūpule were slaughtered.... In the *Battle of Nu`uanu*, O`ahu, Moloka`i, and Lāna`i were conquered” (Kamakau 1992:170-171). Kamehameha took Keku`iapoiwa Liliha and Kalanikauiaka`alaneo to O`ahu to witness this battle of Nu`uanu Pali and the defeat of O`ahu. It was during this trip that Kalanikauiaka`alaneo was given the name Ke`ōpūolani (Klieger 1998:21).

During this Early Historic Period, “between one hundred and two hundred foreigners lived in the islands.... Hardly a ship touched without leaving a deserter or two behind.... A white man automatically ranked as a chief, although he could not own land in fee simple or build a permanent house...[and] they took Hawaiian wives” (Day 1992:25).

In Hā`ena during the 1700-1800s, according to archaeological evidence, the population declines and intensive occupation ends (Major and Carpenter 2001:38). Although evidence of habitation at the back and east side of Kē`ē Bay is rather intense and in historic times visitors referred to a “village” at this location (Emory 1929; In Major and Carpenter 2001:39).

In 1802 and 1803, Kamehameha I and his court resided in Lahaina where he had a two-story brick house built (Alexander 1953:63). Lahaina became the capitol of the islands (except for Kaua`i). This was short-lived, however, as Kamehameha I moved to Honolulu in 1803 (Klieger 1998:22). In 1802 on the island of Lāna`i a Chinese man named Wong Tze Chun is believed to have been the first person to mill sugar cane (WSC 1962:7); he came to Hawai`i as part of the sandalwood industry. In 1803 the first horses landed in Hawai`i from California (WSC 1962:7).

Hawai`i's culture and economy continued to change radically as capitalism and industry established a firm foothold. In 1810, Kaua`i *ali`i nui* Ka-umu-ali`i ceded his kingdom of Kaua`i, Ni`ihau, Lehua and Ka`ula to Kamehameha (see more C-3) although Ka-umu-ali`i continued to have autonomy over the island. At this time the sandalwood trade in Hawai`i was flourishing; the Fijian and Marquesan supply of sandalwood was exhausted. Sandalwood came under the personal control of Kamehameha I, who had become “a fervent consumer of high-priced western goods.” The sandalwood industry was thriving to the point where the subsistence levels declined, as farmers and fishermen spent most of their time logging,

causing famine to set in (Kent 1983:17-20). Hawai`i became known as “Tan Heong Shan” or the “sandalwood mountains” to entrepreneurs of Southern China, who first came as early as 1794 in search of this prized wood (WSC 1962:41).

Although white men from various countries stayed over in temporary houses, it wasn't until 1816 when a large structure (80 x 100 meters) was constructed, primarily under the supervision of employees of the Russian-American Company (RAC), on the eastern banks of the Waimea River; it was known as *Hippo* or *Fort Elizabeth*—made of stone and adobe apparently with the help of Kaumuali`i's wives and over 300 “native Hawaiians” (Mills 1996:145). Before its completion the employees of the RAC were expelled from the island; the fort was then completed by Kaumuali`i, who had “acquired one of the most important symbols of European power” (Mills 1996:149, 151). However, Kamehameha continued to exercise his suzerainty by collecting tribute from Kaua`i in the form of sandalwood, hogs and vegetables (Mills 1996:153).

On May 8, 1819, Kamehameha I died at Kamakahonu, Kailua, Hawai`i Island. Following his death, his son and heir Liholiho banished the *kapu* system at the advice of his queen mother Keōpūolani and queen regent Ka`ahumanu (Kamakau, 1992:210, 222). On October 1819, seventeen Protestant missionaries set sail from Boston to Hawai`i. The missionaries arrived in Kailua-Kona on March 30, 1820, to a markedly changed culture; one with a “religious” void and a growing appetite for western products. They brought George Humehume, the 21-year old son of Kaumuali`i, who had been living in the United States since he was six or seven—sent there by his father so he could receive an education (Mills 1996:155). Humehume finally returned to Waimea, Kaua`i in May, 1820 where his father Kaumuali`i and the queen Debra Kapule, primarily resided. Kaumuali`i gave Humehume the district of Waimea, including *Hippo* (Damon 1925:205-206, In Mills 1996:160). Shortly after arriving Humehume married Betty, a daughter of Isaac Davis whom he met on Hawai`i Island (Mills 1996:163).

The missionaries quickly started missions on all of the islands, at the objection of the trading community (Mills 1996:158). In 1820 Lahaina was proclaimed the capital of Hawai`i; this lasted until 1845 (Wisecarver 1983:18) when the court moved to Honolulu. Ka`ahumanu, the *kuhina nui* of Kamehameha II (Liholiho) was not automatically a convert to Christianity, however, when she finally embraced it, it was with tremendous zeal. Missionary Bingham (1847:162) wrote an entry in his journal in 1822:

Kaahumanu with husband made tour of windward islands with a large retinue, including sister Namahana [II], her brother-in-law Laanui...and while on this pleasure-seeking tour, searched out and destroyed many idols. On the 4th of June, she sent for Kalaipahoa, the so-called poison deity, and caused it to be publicly burnt, with nine other images. On the 26th of the same month, one hundred and two idols, collected from different parts of Hawai`i, where they had been hidden ‘in the holes of the rocks and caves of the earth,’... [were] committed to flames.

In 1821 Liholiho paid a visit to Kaua`i, intending to resolve the issue of his sovereignty over all the islands. Kaumuali`i met Liholiho (his cousin) at Waimea, making a pledge to him the same as he had done to his father; he offered Liholiho the fort, his vessels, his munitions and even the island. Liholiho told him to keep the island. But Liholiho did take one of Kaumuali`i's wives. After spending a couple of months on the island, Liholiho invited Kaumuali`i onto his ship. When they had settled on board, Liholiho gave his men a signal to set sail, thus “kidnapping” Kaumuali`i. Shortly after arriving back on O`ahu, Ka`ahumanu married her cousin, Kaumuali`i (Mills 1996:171-172) [her mother Namahana was the half-sister of his father Ka`eo]. Ka`ahumanu, then married one of Kaumuali`i's sons, cementing her position of power. Kaumuali`i died a few years later in 1824 (Mills 1996:173) never being allowed to see his Kaua`i family again.

In August 1824, after Kaumuali`i's death, a skirmish took place at Fort Elizabeth that included his oldest son George Humehume who was married to a daughter of Isaac Davis. He wanted revenge and felt that

his father had been poisoned. Kalanimoku had arrived to check on Kaua`i and was faced with some opposition. He sent back to O`ahu for reinforcements; they came led by Maui governor Hoapili, a former warrior and counselor to Kamehameha I from Hawai`i Island, whose warriors were more experienced and had more weapons. The rebel warriors, including George Humehume, held a position overlooking Hanapēpē Valley. They were subsequently outnumbered and defeated by the forces of Hoapili. George, with his wife and infant daughter fled to the mountains on horseback. They were later captured and shipped off to O`ahu, where he died two years later at age twenty-nine. Most of Kaua`i *ali`i* were dispossessed of their lands and sent to other islands and the Kaua`i lands were divided among the Hawai`i Island chiefs who appointed their own *konohiki* or land managers [e.g. Moku`ohai]. The *maka`āinana* on the lands were treated as conquered rebels (Joesting 1984:104-111).

In the 1820s and 1830's other industries such as whaling, merchandising and sugar crept into Hawai`i. "For the first time Hawaiian masses were drawn to a cash economy as workers and producers." By 1825 most of the powerful chiefs/chiefs' had become Protestant Christians. The first sugar plantation was established on Kaua`i in 1836 (Kent 1983:22, 23, 29). The 1840s heralded other changes as well. The Hawaiian government, with the aid of the missionaries, encouraged the sugar industry as well as other enterprises such coffee, cotton, rice, potatoes, and silk worms (Speakman 2001: 93).

In the mid-1840s a political act of the Hawaiian Kingdom government would change forever, the land tenure system in Hawai`i and have far-reaching effects. The historic land transformation process was an evolution of concepts brought about by fear, growing concerns of takeovers, and western influence regarding land possession. King Kamehameha III, in his mid-thirties, was persuaded by his *kuhina nui* and other advisors to take a course that would assure personal rights to land. One-third of all lands in the kingdom would be retained by the king; another one-third would go to *ali`i* as designated by the king; and the last one-third would be set aside for the *maka`āinana* or the people who looked after the land [native tenants or *kuleana* lands]. In 1846 he appointed a Board of Commissioners, commonly known as the Land Commissioners, to "confirm or reject all claims to land arising previously to the 10th day of December, 1845." Notices were frequently posted in *The Polynesian* (Moffat and Kirkpatrick, 1995). However, the legislature did not acknowledge this act until June 7, 1848 (Chinen 1958:16; Moffat and Kirkpatrick 1995:48-49), known today as *The Great Mahele*. In 1850, the Kingdom government passed laws allowing foreigners to purchase fee simple lands (Speakman 2001:91).

In 1846 there were only eleven mills in Hawai`i manufacturing sugar and molasses; two on Kaua`i, three on Hawai`i Island and six on Maui (WSC 1962:10). The whaling industry was at its peak between 1846 and 1860 with almost 600 ships reaching Hawai`i ports in one year. But the late 1850s saw a decline in the whaling industry with the discovery of oil in Pennsylvania, the Civil War, and the sinking of at least forty whale ships by the Union to block the harbors; as well as the early freeze in the Bering Strait in 1871 which trapped thirty-three ships. Although the crews escaped, five hundred Hawaiian sailors returned home penniless (Speakman 2001:88-89).

Disease had a devastating effect on the population and the landscape, killing *ali`i* and *maka`āinana* alike; measles epidemics in 1848 and 1849, were followed by the horrendous smallpox epidemic in 1852-1853. Ten thousand people are said to have died of this disease in Hawai`i (Kamakau, 1992:411, 418). John Papa `Ūi in *Fragments of Hawaiian History* (1984) talks about the impact of this disease and as *kahu* or guardian of several young *ali`i*, he had to take several of them off of O`ahu island. They just kept sailing from island to island and usually were not allowed to land as O`ahu was thought to be the source of the smallpox.

Historic land records indicate that by 1850, there were several households scattered among the Hā`ena *lo`i*, a pattern that may have developed when *lo`i* were in fallow periods. A photograph ca 1910 shows a Hawaiian family and their house located in the midst of the Kē`ē *lo`i* (Major and Carpenter 2001:39).

By 1858 at least 2,119 foreigners lived in Hawai`i. Many were merchants who traded with whalers, while the missionaries lived in various locations throughout the islands. The foreigners also included one hundred and eighty Chinese contract laborers from Hong Kong (Speakman 2001:109). Some “foreigners engaged in agricultural pursuits with the idea of reaping a profit from the land, in contrast with the Hawaiians, who carried on...subsistence agriculture” (Coulter 1971:11).

The U. S. Civil War of the 1860s brought about a boost for the sugar industry in Hawai`i as sugar plantations in the South were boycotted or destroyed (Speakman 2001:91-96). The rise in the number of plantations brought about a radical change in both the population in general, and the number and ratio of foreigners to native Hawaiians. As more and more labor was needed to accommodate the expanding industry, plantations sought laborers from several countries.

Statistics...show that far from being unsuited to plantation labor, or considered inefficient workers, Hawaiian labor was considered the best obtainable by many planters. As late as 1869 some plantations employed Hawaiian labor exclusively.... ‘The true reason why there is a dearth of Hawaiian labor is the increase of the planting interests from some 2,000,000 of pounds in nine or ten years to 18 or 20,000,000, requiring from eight to ten times as many men now as then.’ This source found more Hawaiians employed in such labor than ever before, and statistics for that year (1873) showed that out of 3,786 laborers employed on thirty-five plantations, 2,627 were Hawaiian men and 364 were Hawaiian women.... Nevertheless, the population decline was palpable and became a matter of public concern for the kings and their advisors, of the Hawaiian legislature, and of the sugar planters.... Immigration of labor from China and Japan [filled] the population and labor gap...it was from these two countries that the largest contingents of immigrants came, though supplemented by Caucasians, including Portuguese, and Filipinos, Koreans, Puerto Ricans, Germans, Pacific Islanders and many others.... In that period the population rose from 55,500 in 1876 to 154,000 in 1900. The following table shows the changes in percentages (Speakman 2001:107-108):

Table 1. Ethnic Demographics of Hawai`i

	1876	1900
Hawaiian & Part-Hawaiian	89.2%	26.0%
Caucasian	6.3%	17.5%
Oriental	4.5%	56.5%

The Overthrow of the Hawaiian Kingdom government in 1893 and the subsequent annexation to the United States in 1898 (Daws 1974:289-290) heralded even more radical changes to the Hawaiian culture and to the local landscapes.

3.2.6 Territorial History Period (1900-1949 AD)

In 1900 Hawai`i had a population totaling 154,000 of whom only 29,799 were pure Hawaiians, 7,857 part-Hawaiians and the rest of 116,244 consisting of many other races (Wisecarver 1983:13). This period saw Native Hawaiians running for Congress (Daws 1974 297); and much of the lands being sold in fee simple. The Organic Act was effective on June 14, 1900 and Hawai`i became a Territory of the United States; in 1901 the first Territorial Legislature convened and passed the first income tax law (WSC 1962:26). In the 1940s, World War II also had some lasting influence on lives and industries as young men left the islands by the hundreds, for the front lines abroad.

While the population of Hā`ena decreased between 1700-1800 and the land further modified by the 1946 tsunami, Hā`ena continued to be occupied until decades into the Modern History Period.

If the volcanic glass dates are correct and considering the several projects along the beach, Ha`ena saw Hawaiian beach front cottages until the early decades (c. A.D. 1930) of the present century,

and in fact intensive occupation until the raid and destruction of "Taylor Camp" in A.D. 1977 (Riley and Clark 1979, Riley and Ibsen-Riley 1979). Sporadic occupation on the beach continues, perhaps not unlike the earliest, some one thousand years ago... Beach excavations and the Land Commission Awards testimonies (c. 1850) verify that Ha'ena was never abandoned (Griffin 1984:3).

3.2.7 Modern History Period (1950-)

Post World War II brought about an influx of people and industries to Hawai'i, allowing the tourism industry and offshoot enterprises to flourish. Along with the rise of the tourism industry, and competing sugar markets abroad, the sugar companies saw a sharpening decline in business (the Sugar Acts of 1934 and 1937, and ILWU Strike of 1946 didn't help). 1950 marked the introduction of radiocarbon analysis which shifted the focus of study in archaeology to excavation as a primary method of data recovery, with a research focus on settlement patterns, subsistence, land and marine use. The 1950s and 1960s were the bleakest years for the sugar industry and it was becoming apparent that the sugar industry was beyond salvage (Kent 1983:107-108). More changes were soon to take place on the landscapes of Hawai'i.

In the 1960s, various federal and state environmental and historic preservation laws and regulations were passed, mandating surveys and impact studies of the landscape, prior to development. In 2000 Hawai'i Legislature passed an EIS amendment resolution which the governor signed as Act 50. This legislation has broadened the scope of environmental impact studies to include cultural impact studies to assure that traditional Hawaiian and other ethnic cultural practices are not adversely impacted, as vacant sugar fields give way to the ever-growing populations and expanding tourist and real-estate industries.

3.3.0 Traditional Literature

The ethnographic works of the late 19th and early 20th century contribute a wealth of information that comprise the traditional literature--the *mo'olelo*, *oli*, and *mele*--as well as glimpses into snippets of time, and a part of the Hawaiian culture relatively forgotten. The genealogies handed down by oral tradition and later recorded for posterity, not only give a glimpse into the depth of the Hawaiian culture of old, they provide a permanent record of the links of notable Hawaiian family lines. The *mo'olelo* or legends allow *ka po'e kahiko*, the people of old, the *kupuna* or ancestor, to come alive, as their personalities, loves, and struggles are revealed. The *oli* (chants) and the *mele* (songs) not only give clues about the past, special people, and *wahi pana* or legendary places, they substantiate the magnitude of the language skills of *nā kupuna kahiko* (the people of old).

3.3.1 Genealogies

Po'e ku'auhau or genealogy *kahuna* (masters) were very important people in the days of old. They not only kept the genealogical histories of chiefs "but of *kahunas*, seers, land experts, diviners, and the ancestry of commoners and slaves.... An expert genealogist was a favorite with a chief." During the time of 'Umi (ca 1500-1600s) genealogies became *kapu* (restricted) to commoners, which is why there "were few who understood the art; but some genealogists survived to the time of Kamehameha and even down to the arrival of the missionaries" (Kamakau 1992:242).

Surviving genealogies illustrate that the ruling families of each island were interrelated quite extensively. The chiefs of O'ahu, Kaua'i, Hawai'i, Maui and Moloka'i had common ancestries. Families branched out, but conjoined several times in succeeding generations (Kamakau in McKinzie, 1983: xxv). Not only were the chiefs or *ali'i* related to each other, they were also related to the commoners. In *Ruling Chiefs*, Kamakau states that "there is no country person who did not have a chiefly ancestor" Kamakau (1992:4). In the following passage Kamakau (1992) explains how some of the *ali'i* were connected.

It is said that the chiefs of Hawai‘i island were from Maui and from O‘ahu and Moloka‘i between the times of ‘Aikanaka and Hānala‘anui. Thus ‘Aikanaka was the chief of Koali and Mu‘olea in Hāna; Hema, the chief of Ka‘uiki in Hāna; Kaha‘i, the chief of ‘‘Īao in Wailuku; Wahieloa, the chief of Papauluana in Kīpahulu. Laka the chief was born at ‘Alae in Kīpahulu, Maui; he ruled in Ko‘olaupoko, O‘ahu; the site of his house, Hale‘ula, was at Waikane, O‘ahu. Lu‘anu‘u was born at Waimea, Kaua‘i, and ruled that kingdom. Kamea was from Waikele, ‘Ewa, O‘ahu; Pohukaina was from Kahuku; Pau, that is Ka-pau-nui-kua-‘ōlohe, was from Kea‘au in Wai‘anae. Hua was from Lahaina, Maui...this is Hua the son of Kapua‘i-manakū [Pohukaina] whose *heiau* was Luakona, near to Kapō‘ulu. Huanuiikalāla‘ila‘i [son of Pau, that is Kapaunuiakua‘ōlohe] was born at Kawelo in Honolulu; Paumakua-a-Lonoho‘onewa was born at Kua-‘a-‘ohe, Ko‘olaupoko, and rules there; Haho was born by the *kawa*, the leaping place, of Kua‘ikua at the stream of Kua‘ikua in Wahiaiwā. Palena [-i-Haho] was born on the hill of Ka‘uiki in Hāna, at the site Hānanaikū; he ruled and died on O‘ahu; his remains and also his stone are at Ka-lua-o-Palena in Kalihi on O‘ahu. Hānala‘a-nui and Hānala‘a-iki were the twin sons of Hī-ka-wai-nui and Palena; they were born at Kahinihini‘ula, at Mokae and Hāmoa, and a certain *moku‘āina* land was named after these boys. Lana-ka-wai [son of Hānala‘a-nui] was born at the *kawa* of Kua‘ikua in Wahiaiwā, O‘ahu (Kamakau, 1991:101).

Malo (1971) also wrote about the connection between the *maka‘āinana* and the chiefs. “Commoners and *ali‘i* were all descended from the same ancestor, Wakea and Papa” (Malo, 1971:52). This is evident in the genealogies. Genealogies were very important to the chiefs, because ranking was very important. The genealogies not only indicated rank, they ascertained a link to the gods. The following excerpt explains the idea and importance of rank and the role of genealogies:

Position in old Hawai‘i, both social and political, depended in the first instance upon rank, and rank upon blood descent—hence the importance of genealogy as proof of high ancestry. Grades of rank were distinguished and divine honors paid to those chiefs alone who could show such an accumulation of inherited sacredness as to class with the gods among men...a child inherited from both parents.... The stories of usurping chiefs show how a successful inferior might seek intermarriage with a chiefess of rank in order that his heir might be in a better position to succeed his parent as ruling chief...a virgin wife must be taken in order to be sure of child’s paternity—hence the careful guarding of a highborn girl’s virginity (Beckwith 1990:11).

One could defend and/or prove their rank by knowing or having one’s genealogist recite one’s genealogy. For the *kanaka maoli*, genealogies were the indispensable proof of personal status. Chiefs traced their genealogies through the main lines of ‘Ulu, Nana‘ulu, and Pili, which all converged at Wakea and Papa (Barrere, 1969:24). Two well-known genealogy chants are the *Kumuhonua* and the *Kumulipo* [ten main genealogy chants are known today (Josephides 2010)].

3.3.1.1 Kumuhonua

The *Kumuhonua*, first published by Fornander in 1878 in *The Polynesian Race* Vol. I was based on information from Kamakau and Kepelino. Kumuhonua, the man, was of the Nanaulu line, and the older brother of Olopana and Mo‘ikeha (McKinzie 1986:14-15). However, the birth chant *Kumuhonua* has been a subject of controversy (Barrere, 1969: i). Some of the *Kumuhonua* legends were recorded by Kamakau and Kepelino between the years 1865 and 1869, however, the ‘genealogy’ of the *Kumuhonua*, published by Fornander, was given to him “to provide credibility to the legends...this ‘genealogy’ (was) constructed from previously existing genealogies--the *Ōlolo* (*Kumuhonua*) and the *Paliku* (*Hulihonua*) which are found in the *Kumulipo* chant (see Beckwith 1951:230-234) and interpolations of their own invention” (Barrere, 1969:1).

3.3.1.2 Kumulipo

A better example is the famous creation chant *The Kumulipo*. Feher (1969) has several notable Hawaiian scholars write passages in his *Kumulipo: Hawaiian Hymn of Creation-Visual Perspectives* by Joseph

Feher. In the *Introduction* Momi Naughton states “The Kumulipo belongs to a category of sacred chants known as *pule ho‘ola‘a ali‘i*, ‘prayer to sanctify the chief,’ which was recited to honor a new-born chief (Feher, 1969:1).

In her passage, Edith McKinzie states:

“The *Kumulipo* is a historical genealogical chant that was composed by the court historians of King Keaweikekahiali‘iokamoku of the island of Hawai‘i about 1700 AD in honor of his first born son Kalani-nui-‘I-a-mamao. This important chant honors his birth and shows the genealogical descent of both the *ali‘i* (chiefs) and the *maka‘ānana* (commoners) from the gods, in particular Wakea” (Feher, 1969:1).

3.3.1.3 Hawaiian Genealogies

Edith McKinzie completed the first volume of *Hawaiian Genealogies* in 1983, based on genealogy articles translated from 19th Century Hawaiian newspapers such as *Ka Nonanona* and *Ka Nūpepe Kū‘oko‘a* in the late 19th century and early 20th century. These articles were in response to a call to preserve the Hawaiian heritage. Some of the information came from Malo’s (1838) *Hawaiian History*, and in Fornander’s (1880), *The Polynesian Race* (Book I) (McKinzie, 1983:1).

Using thirty years to account for one generation, McKinzie determined that Wakea was born in 190 AD; Umi-a-Liloa in 1450 AD; Keawekehahialiiokamoku in 1650 AD, Kalanihūiikupuapaikalanui Keoua in 1710 AD; and Kamehameha I in 1740 AD” (McKinzie, 1983:12). Volume Two of *Hawaiian Genealogies* was published in 1986 and consists of information extracted from genealogical lists published in thirteen Hawaiian language newspapers from 1858 to 1920. It compliments genealogies found in other works, such as Fornander’s (1880) *An Account of the Polynesian Race...* and David Malo’s *Hawaiian Antiquities* (McKinzie, 1986: v).

The following excerpt is from Kamakau’s article in *Ka Nūpepe Kū‘oko‘a* October 7, 1865, and was translated by McKinzie (1986). It illustrates some of the mid-19th century sentiment regarding genealogies:

To the commoners, a genealogy was of no value because their parents forbad (sic) it lest comparisons should occur and country children be born and rise up as chiefs. Therefore, the children of the commoners were not taught beyond father, mother, and perhaps grandparents.... To us, the people of this time, there is no value of this thing of a chiefly lineage; we have no great interest in it. But in our thoughts it is of great value. We have entered into discussion of it; the chiefs valued the chiefs and ancestors; and we also value our knowledge of it. Because it was forbidden to the commoners, they were not to know this. However, due to the rise of wisdom and skill of the children of the commoners, therefore, all of the ranking privileges were no longer restricted; it was only lifted. What remains of the ancestors is something of value (McKinzie 1986:18-19).

3.3.2 Mo‘olelo

Legends, stories or *mo‘olelo* are a great cultural resource as well as entertaining. Leib and Day (1979) state in their annotated bibliography of Hawaiian legends, that legends “are a kind of rough history.” They noted Luamala’s idea of the value of legend and myth in the serious study of a culture and her following quote. “To a specialist in mythology, a myth incident or episode is as objective a unit as an axe, and the differences and similarities of these units can be observed equally clearly and scientifically.” The following definitions of terminology, including the Hawaiian classification of prose tales--*mo‘olelo* or *ka‘ao*, come from their work (Leib and Day 1979: xii, 1):

<i>Folklore</i>	a rather inclusive term, covering the beliefs, proverbs, customs, and literature (both prose and poetry) of a people
<i>Ka'ao</i>	“pure fiction”
<i>Legend</i>	deals with human beings and used interchangeably with ‘myth’... because the collectors and translators of the tales often failed to make the strict distinction
<i>Mo'olelo</i>	deals with historical matters and somewhat didactic in purpose... included tales of the gods, as well as tales of historical personages... many have recurring patterns, plots, and types of characters
<i>Myth</i>	a story of the doings of godlike beings
<i>Tradition</i>	used to refer to that which is handed down orally in the way of folklore

3.3.2.1 History of Mo'olelo Collecting

According to Leib and Day (1979) a substantial number of legends were collected and written in Hawaiian, during the century following Cook's arrival in Hawai'i. A few accounts of the mythology were printed in the journals of missionaries and travelers, and a few of the Hawaiian lore were printed in languages other than English.

3.3.2.2 Legends involving Hā`ena (HSPLS 1989: v1 and other sources)

Pōhaku-loa, long stone of Kaua`i	<u>In</u> Armitage, <i>Ghosts Dog and other Hawaiian Legends</i> . [RH 398.2, A p. 136]
The Fire Goddess	<u>In</u> Colum, <i>Legends of Hawai`i</i> . [RH 398.2 C p. 25-37]
Pele and Hi`iaka	<u>In</u> Emerson, <i>Pele and Hi`iaka</i> [RH 398.2 E]
The History of Moikeha	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> V1 [RH 507 B4M v4 p. 112-159]
Story of Lonoikamakahiki	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v1 [RH 507 B4M, v4 pp 256-363]
Legend of Kuapaka`a	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v2 [RH 507 B4M, v5 pp 78-135] (HSPLS-v1 1989:207).
Tradition of Kamapua`a	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v5 [RH 507 B4M, v4 pp 314-363]
The Maile	<u>In</u> Fornander, <i>Fornander Collection of Hawaiian Antiquities and Folklore</i> v2 [RH 507 B4M, v4 pp 614-619]
The shark gods of Ka`ū	<u>In</u> Green, <i>Folk-tales from Hawai`i</i> [RH 398.2 G pp105-107]
The story of Lā`ieikawai	<u>In</u> Kalākaua, <i>Legends and myths of Hawai`i</i> [RH 398.2 K pp 455-480]
The phantom goat of Honopu	<u>In</u> Knudsen, <i>Teller of Hawaiian Tales</i> [RH 398.2 K pp 82-85]
The love of a chief	<u>In</u> Knudsen, <i>Teller of Hawaiian Tales</i> [RH 398.2 K pp 99-102]
Na Ōahi O Kaua`i	<u>In</u> Knudsen, <i>Teller of Hawaiian Tales</i> [RH 398.2 K pp 143-146]

Lā`ie i ka wai	<i>The Hawaiian Romance of Lā`ieokawai</i> [RH 398.2 L]
Moikeha	<i>The Hawaiian Romance of Lā`ieokawai</i> [RH 398.2 L pp 363-364]
The love of a chief	<u>In</u> Lawrence, <i>Stories of the Volcano Goddess</i> [RH 398.2 L pp13-26]
Kawelo's parentage	<u>In</u> <i>Legend of Kawelo</i> [RH 398.2 L pp 4-17]
Pele and Lohi`au	<u>In</u> Nakuina, <i>Hawai`i, its People, their Legends</i> [RH 398.2 N p 26]
How the Menehune saved their fish	<u>In</u> Pukui, <i>Tales of the Menehune</i> [RH 398.2 P pp12-13]
The Goddess Pele	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 1-14]
The stones of Kane	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 36]
The Menehunes	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 36-54]
The story of Ola	<u>In</u> Rice, <i>Hawaiian Legends</i> [pg 54-56]
Legends resembling Old Testament history	<u>In</u> Thrum, <i>Hawaiian Folk Tales</i> [RH 398.2 T pp 15-30]
Kila, the undaunted	<u>In</u> Thrum, <i>More Hawaiian Folk Tales</i> [RH 398.2 T pp 20-45]
Pele's long sleep	<u>In</u> Westervelt, <i>Hawaiian Legends of Volcanoes</i> [RH 398.2 W pp 72-86]
Lohi`au	<u>In</u> Westervelt, <i>Hawaiian Legends of Volcanoes</i> [pp126-138]
Laukaieie	<u>In</u> Westervelt, <i>Legends of Gods and Ghosts</i> [RH 398.2 W pp 36-48]
Ka-wai-o-Palai	<u>In</u> Wichman, <i>More Kaua`i Tales</i> [pp 105-111]
Nā Kia Manu a me Nā Mai`a	<u>In</u> Wichman, <i>More Kaua`i Tales</i> [pp 125-131]

3.3.3 Mo`ōlelo and Genealogy of Ali`i nui of Kaua`i

In the legends or *mo`olelo* collected by Fornander, Kamakau, Knudsen, Wichman and others, we can get a glimpse into the lives of some of the first settlers and *ali`i nui* or ruling chiefs of Kaua`i. Kaua`i was first settled by descendants of Kumu-honua and Lalo-honua thirty-six generations before Papa was born (Wichman 2003:2). The history of the Kaua`i *ali`i* begins in Waimea where according to Wichman (2003) the first settlers to Kaua`i landed generations before. From many of these *ali`i* one can understand why the genealogy of Hawai`i's chiefs and people on all the major Hawaiian islands share common ancestries. To reproduce any legend completely would take too long, therefore only excerpts are generally used for the following ancestors and descendants of the first *ali`i* of Kaua`i, who are said to be descendants of Papa and Wakea (second son of Kahiko and Kū-pūlana-kehau) (Wichman 2004:3) and their daughter Ho`ohoku-i-kalani.

3.3.3.1 Papa and Wākea Progenitors of Kaua`i Chiefs

Papa and Wākea or Wākea and their daughter Ho`ohoku-i-ka-lani are said to be the progenitors of all Polynesians, however the islands were already populated when they arrived and settled in Nu`uanu,

O`ahu. Hāloa is the name given to both sons of Wākea and Ho`ohoku-i-ka-lani. Kaua`i historians claim that a younger brother of Hāloa, Chief Ka-māwae-lua-lani-moku, son of Papa and Wākea, discovered and settled the island.

Ka-māwae-lua-lani-moku & Kahiki-lau-lani Chief *Ka-māwae-lua-lani-moku*...traveled to this island with his wife, *Kahiki-lau-lani*, and her two paddlers *Kō-nihinihi* and *Kō-nahenahe*. Because of his great deeds, the great number of his descendants, and the prosperity of his reign, people called the island Kau-a`i (“*place of abundance*”).... Kaua`i is also the name of the youngest son of ancient voyager Hawai`i-loa. His wife was Wai`ale`ale, and her name was given to the lake beside the highest peak of the island. The word *Kaua`i* itself is older than Hawai`i-loa; its true meaning is lost in the mists of the cosmic night from which Kaua`i's ruling chiefs descended (Wichman 2003:5).

Whether *Ka-māwae-lua-lani-moku* and *Kahiki-lau-lani* ever lived on Kaua`i is unknown. It is certain that one day, not too many generations after Papa and well before the descendants of Nana`ulu came to Kaua`i, a voyaging canoe commanded by *Kū`alu-nui-kini-ākea* [also spelled *Kū`alu-nui-kini-ākea*] approached the island from the west. Nothing is known of him except his name and that he had a son...and a counselor *Pi`i-ali`i* (Wichman 2003:5).

Kū`alu-nui-kini-ākea and Kalaimoku Pi`i-ali`i The first known settler to Kaua`i, *Kū`alu-nui-kini-ākea*, chose Waimea Valley for his new home. The shallow sea between Kaua`i and Ni`ihau teemed with fish, the river delivered fresh water and food, and even the climate was warm, ideal for growing crops, and comfortable to a people who wore a minimum of clothing.... The first settlers worshipped Kāne, god of sun and fresh water, and thus all living things. The few *kānāwai* (laws) concerned the preservation of agriculture and marine resources. All ceremonies in the *heiau* (temple) were simple and the audience participated in all the rites. *Heiau* were built so that all priestly ceremonies could be seen by the assembled people who participated in the rites. From the beginning, there was a lack of distinction among the Kaua`i *ali`i* (chiefs). The rank of the mother determined in large part the rank of her child (Wichman 1998:6-7).

Kū`alu-nui-paukū-mokumoku & the Menehune *Kū`alu-nui-paukū-mokumoku* followed his father *Kū`alu-nui-kini-ākea* as *ali`i nui*. He sent back to his homeland for a people called *Menehune*, who were masters of stonework and engineering. The *Menehune* were an energetic, short but broad-shouldered, muscular people. They were organized in divisions based on their skills and work duties and were completely obedient to their leaders. They worked as a team and if a project was interrupted for any reason, they abandoned it and never returned to finish it. Under *Kū`alu-nui-paukū-mokumoku*, many *heiau*, fishponds, and irrigation systems for wet-land farming were built. These *Menehune* explored the island from one side to the other and left stories of their adventures in place-names that still remain (Wichman 1998:8).

Kū`alu-nui-paukū-mokumoku, Ola and Kalaimoku Pi`i The son of *Kū`alu-nui-paukū-mokumoku* was Ola. He opened the land between the ridges and the sea to agriculture. The land was considerably higher than the river, and separating the rich bottomland from freshwater was the cliff **Pali-uli**, “green cliff,” which rose directly from the riverbed.... Ola gathered the *Menehune* and asked that an irrigation ditch be built around Pali-uli (Wichman 1998:8).... The ditch was called *Kīkī-a-Ola*, “container acquired by Ola.” The new farmland was named after their ancient homeland, *Pe`e Kaua`i*, “hidden Kaua`i” (Wichman 1998:9).

Like his ancestor Hawai`i-loa, Ola also contended with cannibalism. For several nights in a row, Ola and Pi`i noticed a bonfire flickering on the shores of Ni`ihau where no one lived. He asked his friend *Ka-hao-o-ka-moku*, who was about to set off on a fishing expedition to Ka`ula islet, to stop by Ni`ihau and find out who was there. Two days later Kāne-opa, the head *lawai`a* (fisherman) of the expedition, returned alone with a harrowing tale. As they landed on Ni`ihau, the fishing party had been greeted by a man who offered them food, shelter, and women. This unknown man had then shown them into a house where, tired from fishing, one by one they fell

asleep, all except Kāne-ōpa who was suspicious by nature and who had not liked the stranger's manner (Wichman 2003:13-14).

Kāne-ōpa was the only one to survive; he went back to Kaua'i and told Ola and Pi'i about the cannibals of Ni'ihau. They devised a plan and went back. Their plan worked and the cannibals were killed. "No mention of Ola's marriage or direct descendants has survived" (Wichman 2003:14).

3.3.3.2 Waimea and Wainiha Alliance

Kā-la-kāne-hina and Lohipono Sometime after Ola, *Kā-la-kāne-hina* became the *ali'i nui*. He lived at Lā'au-ōkala, the eastern point of the Waimea river outlet. He married Lohipono, a chiefess of Wainiha valley. She left her infant son *Kāne-a-Lohi* with her brother *Ka-lālā-pōpō'ulu*, a bird catcher who brought up his nephew in the mountains and trained him in the art of catching birds whose feathers were greatly prized (Wichman 2003:14).

Kāne-a-Lohi Kāne-a-Lohi exasperated his uncle a great deal, for he refused to eat most kinds of food and always demanded the flesh of small birds. To feed this prodigious appetitive *Ka-lālā-pōpō'ulu* moved to the cliffs above Halulu waterfall on the very edge of the immense cliffs of Wai'ale'ale. Here *uwa'u* (dark-rumped petrel) nested in deep holes dug into the sides of the cliffs. Each morning the *uwa'u* flew out to sea and each evening they flew home to their caves. The young...are good to eat (Wichman 2003:14).

A giant, *Ka-wai-pe'e*, from Pe'ape'a above Hanapēpē liked destroying the nests and killing the birds and throwing them away. *Kāne-a-Lohi* and his uncle set a trap for the giant and killed him as he came after a distressed bird. However, the Waimea chief *Kā-la-kāne-hina* also heard that men were eating his favorite *kapu* birds and set out for the mountains to catch and kill them. But *Kāne-a-Lohi* and his uncle destroyed his army and would have killed him too. But *Kā-la-kāne-hina* called out "Save me, in the name of your mother, Lohipono. I am your father." *Kā-la-kāne-hina* returned to Waimea and built a house and invited his son. They suspected a trap when all the chiefs' men were sitting in a circle next to the wall while the mat in the middle of the room sagged. *Kāne-a-Lohi* barred the door and a rush to get out the chief and his men fell into the hold. *Kāne-a-Lohi* then set the house on fire. *Kāne-a-Lohi* became *ali'i nui* for a short time, married and had a son *Ka-lau-lehua*. He later took his mother and son back to the mountains he loved (Wichman 2003:15-16).

Ka-lau-lehua *Ka-lau-lehua* later became *ali'i nui*. For reasons not mentioned in the legends, *Ka-lau-lehua* wanted to dig a ditch leading from Wai'ale'ale to the cliff's edge so that the pond would be the headwaters of the Wailua River. *Ka-lau-lehua* sailed to the mythical island of *Kāne-huna-moku* to fetch the *Mū-ai-mai'a* (banana-eating people). He tricked four Mū men and three Mū women into coming with him from their homeland to build his ditch. They refused and asked to be returned home. *Ka-lau-lehua* wouldn't help them, instead he imposed a *kapu* forcing them to live in the Alaka'i swamp. They planted bananas wherever they found a suitable spot and slowly they grew in numbers. They were a shy people and even though they lived in the same area as the Menehune, they avoided them too, but watched unhappily as the Menehune sailed away from Kaua'i. The Mū had lost their knowledge of the stars that could lead them back to their homeland (Wichman 2003:16-17).

Ka-iki-pa'a-nānea Several generations later [after *Ka-lau-lehua*], *Ka-iki-pa'a-nānea*... became the *ali'i nui* of Kaua'i. His headquarters was on the small plateau on the eastern side of the Waimea river mouth. *Ka-iki-pa'a-nānea* had two major passions: sports and riddles. He was a champion wrestler and boxer who always tried to kill his opponent. Everyone feared and hated him...only his personal servant, *Kūkae'a* was ever in his company.... Worst still when every chiefess on Kaua'i refused to marry him after the death of his wife, *Ka-iki-pa'a-nānea* sent his messengers to O'ahu, ordering them to bring him a wife (Wichman 2003:17-18).

3.3.3.3 Puna Chieftdom and Interisland Ali`i Nui Connections

Ka-iki-pa`a-nānea's men kidnapped Mākolea who was surfing at Waikīkī and took her back to Kaua`i where she too refused to marry him. So he locked her up until a time when she would agree. Mākolea was already married to a Maui warrior Ke-paka`ili`ula. He sailed to Kaua`i and befriended Kūkae`a. Eventually Kūkae`a gave him the answers to the riddles. Ke-paka`ili`ula challenged Ka-iki-pa`a-nānea to a boxing match, which he won and answered the riddles correctly. He then seized Ka-iki-pa`a-nānea and tossed him into a firepot. Earlier Ka-iki-pa`a-nānea had been so preoccupied with his riddles and athletics that he had allowed an ocean-traveler from Marquesas, Puna-nui-ka-ia-`āina to settle with his entourage on the banks of the Wailua river where the Menehune had constructed their temples. Now there were two chiefdoms on Kaua`i - Puna and Kona (Wichman 2003:18-19).

Nana`ulu and `Ulu More than three hundred years after Papa-nui-hānau-moku and Wākea, a chief from Tahiti, Ki`i and his wife Hina-kō`ula, became parents of two sons, Nana`ulu and `Ulu. When they were grown Ki`i asked them to go on voyages of discovery.... Nana`ulu sailed north in his canoe named Manō-nui (Great Shark) and found the islands of Hawai`i...voyagers came in increasing numbers. Meanwhile the descendants of `Ulu spread out over the South Pacific. Among them were extraordinary people who lived such wonderful adventures that storytellers had rich material to develop into entertaining sagas [e.g., Maui, `Aikanaka-a-Mako`o, Puna & Hema, Kaha`i & Wahieloa and Laka].... There were so many astonishing ancestors like these that the genealogists added them all into the `Ulu genealogy. Today there seems no way to reconcile the short Nana`ulu and very long `Ulu genealogies (Wichman 2003:20, 23).

Puna-nui-ka-ia-`āina and Puna-kai-`olohia Two voyaging canoes set out from Tahiti fifteen generations after Nana`ulu and arrived on O`ahu and Kaua`i. *Maweke* and *Paumakua* settled peacefully on O`ahu and quickly became ruling chiefs of a district of that island. At that same time, Puna-nui-ka-ia-`āina, whose genealogy has not survived, arrived on Kaua`i, having come, most likely from the Marquesas Islands. Puna-nui-ka-ia-`āina arrived when the chief with the deadly riddles, Ka-iki-pa`a-nānea, was ruler of Waimea.... Puna-kai-`olohia followed his father... as leader of his people along the banks of Wailua. Nothing is known of him or his reign, except that he had a son [**Puna-`ai-koā-i`i**].... Puna-`ai-koā-i`i had only one child, his daughter, Hina-`a-ulu-ā...they called her Ho`oipo-malanai (*sweetheart of the gentle breeze*) (Wichman 2003:23-24).

Puna-`ai-koā-i`i, Hina-`a-ulu-ā and Mo`ikeha Puna-`ai-koā-i`i (Puna) urged his daughter to marry, but she couldn't choose from the many suitors who came to court her from many islands - they were all equal to her. Finally Puna and his *kahuna nui* devised a plan--a contest of strength and speed. A *lei palaoa* would be taken to Ka`ula island and the first chief to retrieve it would win her hand. All were pleased with the contest rules. Then on the evening of the contest a stranger arrived in a voyaging canoe on the shores and said he was Mo`ikeha and asked to participate in the contest. The competing chiefs said as long as he could recite his genealogy and that it was equal to theirs. Mo`ikeha chanted his own genealogy: "Nana`ulu the husband, Ulukou the wife...Kekupahaikala the husband, Maihikea the wife; Maweke the husband, Naiolaukea the wife...Muli`ele-ali`i the father, Wehelani the mother; Mo`ikeha the man, Hina-a-`ulu-ā the wife." Everyone enjoyed the boast and the chiefs agreed to his participation (Wichman 2003:23-24).

The names of these chief's names and places of residence is slightly different according to Kamakau's (1991) version:

The chiefs of Kaua`i who lived at Kapa`a while Mo`ikeha was living there were **Puna-nui-kai-anaina, Puna-kai-`olohe,** and **Puna-`ai-koa`e.** A beautiful daughter of the Puna chiefs, Ho`oipo-i-ka-malani - also called Hina-`au-lua - lived at Waimahanalua because of the excellence of the surf of Makaīwa there Mo`ikeha took her to wife, and they were united in a lasting union. When their oldest son was born Mo`ikeha gave him the name Ho`okamali`i for the skin of `Olopana

[Mo`ikeha's older brother]. Their second son he named Haulani-nui-ai-ākea for the eyes of `Olopana, and their third son he named Kila for Lu`ukia, the wife of `Olopana (Kamakau 1991:106).

Mo`ikeha, La`amaomao and Haulani-nui-ai-ākea Mo`ikeha's companion was La`a-maomao, his foster son and owner of a large calabash which contained all the winds of the world. Mo`ikeha was able to use the winds and beat the other contestants and win the hand of Hina-`a-ulu-ā. Later Mo`ikeha's youngest son went back to Raiatea to bring La`a-maomao to see Mo`ikeha before he died. La`a [also called La`a-mai-Kahiki because he came from Kahiki] went to O`ahu where he sired three sons by three different chiefesses at the requests of the *kahuna* of Kualoa, as La`a was a descendant of Paumakua and they were afraid this line was dying out.

According to Kamakau (1991) "La`a-mai-Kahiki became an ancestral chief of chiefs and commoners of O`ahu and also for Hawai`i and Kaua`i. You will find his chiefly descendants in the *mo`o kū`auhau* of Nana`ulu, Puna-i-mua, and Hanala`a-nui" (Kamakau 1991:110).

Mo`ikeha's three sons went different routes; the oldest son Ho`okamali`i became the ruling chief of Kona, O`ahu; the second son Kila went to Waipi`o on the Big Island [Kila later went to Kahiki]; and the youngest son Haulani-nui-ai-ākea stayed on Kaua`i where he became the *ali`i nui* after the death of Mo`ikeha (Wichman 2003:23-35).

3.3.3.4 Kona and Puna Conflict

Haulani-nui-ai-ākea, Ke-oloewa-a-Kamaua and Ka`ili-lau-o-ke-koa Haulani-nui-ai-ākea was not a good chief so he was dethroned by Ke-oloewa-a-Kamaua a Moloka`i chief married to one of Maweke's granddaughters. However Ke-oloewa-a-Kamaua refused the throne and Kila was sent for in Raiatea, but he too refused wishing to stay with his [foster] brother La`a-mai-Kahiki. Ka`ili-lau-o-ke-koa, a granddaughter of Mo`ikeha was asked to rule and to marry *Ke-li`i-koa*, a Kona, Kaua`i chief. However, she fell in love with someone else of Puna, Kaua`i. This created a riff between Puna and Kona. Ka`ili-lau-o-ke-koa's husband died after a few years and Ke-li`i-koa invaded Puna and the two armies fought at Kuamo`o ridge. With the help of the women, the Kona chief was killed and the army defeated. Ka`ili-lau-o-ke-koa died childless and the chiefdom of Puna was offered to Ahukini-a-La`a, a son of La`a-mai-Kahiki (Wichman 2003:36-39).

Ahukini-a-La`a, Kama-hano and Lu`anu`u Ahukini-a-La`a...and Ha`i-a-Kama`i`o had a son, Kama-hano. Kama-hano lived with Ka-`auea-o-ka-lani...they had a son, Lu`anu`u. It was at this time that the first warrior hero of Kaua`i appeared. The war between Kona and Puna flared up (Wichman 2003:40-42).

Akua-pehu-`ale Akua-pehu-`ale of Kona swept ashore at Wailua and the surprised Puna chiefs fled for the uplands. Akua-pehu-`ale was considered a *kupua*, a supernatural being who could take two forms...that of a man and that of a giant sea monster. He was greatly feared and hated even by the men on his side. Once he vanquished the Puna forces he settled at the seashore (Wichman 2003:42).

Ke-`āhua, Ka-uhao, Lepe-a-moa and Ka-u`i-lani One of the exiled [Puna] chiefs, Ke-`āhua, found refuge in a remote valley in the Wailua uplands, which today bears his wife's name, Ka-uhao, daughter of Hono`uliuli and Ka-pā-lama of O`ahu. Their first child was Lepe-a-moa, a *kupua*, who could take the form of a beautiful woman or a ...feathered chicken. She was taken at birth to be raised by her O`ahu grandparents. Shortly after their defeat, Ka-uhao gave birth to a son...named Ka-u`i-lani (Wichman 2003:42).

When Ka-u`i-lani grew up he became a great warrior and defeated Akua-pehu`ale. After the victory feast he led the Puna people back down to the mouth of Wailua (Wailua-nui-hōano) river. He later sailed for O`ahu to find his sister, Lepe-a-moa whom he had never seen (Wichman 2003:42-44).

Lu`anu`u and Palila Lu`anu`u, grandson of Ahukini-La`a, was named after the grandfather of Ki`i, father of `Ulu and Nana`ulu. He was a good chief and was greatly admired in spite of the continuing wars with Kona - references to him indicate a close relationship to Kona. During the time of Lu`anu`u there was a great warrior named Palila, son of Ka-lua-o-pālena and Maihi-iki. He was taken at birth and raised by his grandmother Hina in a sacred temple of Alana-pō where he was trained very well. Later he helped his father defeat Kona chief Ka-maka-o-ka-lani on the plains of Kōloa. Shortly after, a messenger from the ruling chief of O`ahu arrived asking for Palila's help. Palila had many adventures on O`ahu and Hawai`i and later became the ruling chief of Hilo (Wichman 2003: 44-47).

3.3.3.5 Merge of Puna and Kona Chiefdoms

Kūkona, Makali`i-nui-ku-a-ka-wai-ea, Mano-ka-lani-pō and Palekaluhi Kūkona [son of Lu`anu`u] inherited an island at war and left it united as one kingdom. From then on, the legends of the Kona kingdom were seldom told and the genealogies of the first settlers were forgotten.... Kūkona's *ali`i wahine* was Lau-puapua-ma`a and they had twin sons, Mano-ka-lani-pō and Palekaluhi. When Kūkona became *ali`i nui* of Puna, the Kona chief was Makali`i-nui-ku-a-ka-wai-ea. He had been at the royal court of O`ahu for many years and several times had fought in battles against Kama-pua`a.... Makali`i-nui-ku-a-ka-wai-ea had been sent by Kama-pua`a to the royal court with the bad news of defeat. Eventually Makali`i-nui-ku-a-ka-wai-ea returned home to Waimea and organized his own force. Makali`i-nui-ku-a-ka-wai-ea's army included the father and older brother of Kama-pua`a (Wichman 2003:47-48).

Kama-pua`a, Limaloa, Kūkona and Makali`i-nui-ku-a-ka-wai-ea The Kona and Puna armies met at Kōloa Gap and the war became a stalemate until Limaloa and Kama-pua`a joined the Puna army. Limaloa was a giant and had become friends with Kama-pua`a when he first came to Kaua`i. Kama-pua`a dared Limaloa and Kūkona to join him in one-to-one combat against any Kona champions. Kahiki`ula of Kona was the first to step forward and was struck down by Kūkona, but as he was going to give the finishing blow Kama-pua`a stopped him and said he would finish the job and to go and look for other opponents. Instead of killing the man, he whispered to Kahiki`ula, who was his father, to go back to his family in Kalalau. Limaloa was engaging another warrior, Kahiki-honua-kele, whom Kama-pua`a recognized as his older brother. When Limaloa struck him down, Kama-pua`a told Limaloa he would finish up. Instead he whispered the same thing to his brother. Then Kama-pua`a faced Makali`i-nui-ku-a-ka-wai-ea who did not recognize his former enemy. Kama-pua`a chanted a list of all the warriors he ever defeated and when he was done Makali`i-nui-ku-a-ka-wai-ea replied that he was defeated (Wichman 2003: 48-49).

Puna and Kona merger The two kingdoms were merged into one with Kūkona as the *ali`i nui*. To cement the new situation, Nae-kapu-lani, the daughter of Makali`i-nui-ku-a-ka-wai-ea, was married to Kūkona's son Mano-ka-lani-pō. Meanwhile, on the island of Hawai`i, Ka-lau-nui-o-Hua dreamed that his hand was possessed by the god Kāne-nui-akea...he dreamed that he would become the ruler of all the islands (Wichman 2003:49).

Kūkona and peace in the islands Ka-lau-nui-o-Hua successfully defeated Maui's Ka-malu-o-Hua, Moloka`i's Ka-haku-o-Hua and O`ahu's Hua-i-pou-leilei. He took the three chiefs with him on his invasion of Kaua`i where they landed at Māhāulepu, Pā`ā and Weliweli with no opposition. What he didn't know was that Kūkona knew of the invasion as the guardian watchers of Hā`upu had seen the fleet as it left O`ahu. Kūkona ordered everyone to leave their homes, take all their food with them, and go to the center of the island. He had all of his warriors hide among the trees on all the ridges overlooking

Māhāulepu to Lāwa`i. He also ordered every canoe on the island to gather at Hanapēpē Bay. Kūkona surrounded the invaders by land and by sea. By nightfall Kūkona had all the rulers of the major islands as his prisoners. He took his prisoners on a tour of the island and while taking a nap had a dream that three of the four rulers tried to plot his death, but Ka-malu-o-Hua of Maui rejected the plan saying that Kūkona had been good to them instead of killing them all and taking over all the islands. Kūkona woke up to discover that his dream was true, but instead of putting them to death he said he only wanted peace. He freed the rulers except for Ka-lau-nui-o-Hua whom he kept for ransom, and made them swear that they or their descendants would never invade Kaua`i again. Kūkona ordered the *heiau Ka-unu-o-Hua* built near Alaka`i swamp and it was here that the rulers all swore to uphold their promise not to invade Kaua`i. This peace was called *Ka-lai-loa-ia-Kamaluohua* (The Long Peace of Kamaluohua), which lasted over five hundred years. The royal court was kept at Wailua, but a permanent home was also maintained at Waimea (Wichman 2003: 49-52).

3.3.3.6 Ali`i Nui and Hā`ena Connections

Golden Age of Mano-ka-lani-pō and Nae-kapu-lani The reign of Mano-ka-lani-pō was considered the “Golden Age” because it was so peaceful that warriors became athletes and people lived to an old age. Mano-ka-lani-pō and Nae-kapu-lani had three sons: Kau-maka-a-Mano, Nā-pu`u-a-Mano and Ka-ha`i-a-Mano. During the reign of Mano-ka-lani-pō, he eventually allowed the *Mū-`ai-mai`a* people to return to their homeland, Kāne-huna-moku, which was seen by their *kilo kilo* offshore of Miloli`i valley. They left Kaua`i as the *Menehune* before them had done, from Hā`ena. Also during his reign, three goddess sisters came to Kaua`i from the west after visiting Nihoa, Necker and Ni`ihau, in huge voyaging canoes from their homeland in Sāmoa; Kapō-`ula-kinau, who was the first to arrive on Kaua`i, followed by Pele and Hi`iaka-i-ka-poli-o-Pele. Kapō-`ula-kinau married off some of her women attendants to the men of Kaua`i, such as Limaloa the giant and Kau-maka-a-Mano, son of Mano-ka-lani-pō, then she left Kaua`i in search of a husband for herself. Pele also landed at Mānā, seeking a new home and safety from her sister Nā-maka-o-ka-ha`i. As Pele toured the island she met Kama-pua`a and they traded insults. Kama-pua`a tried to rape Pele, but she was saved by her sister Kapō-`ula-kinau. Pele then went on to Kē`ē, Hā`ena where she met Lohi`au, the brother of Limaloa [warrior who fought alongside Kū-kona and Kamapua`a against Kona forces], and fell in love with him (Wichman 2003: 55-59).

Kau-maka-a-Mano Kau-maka-a-Mano reigned after his father Mano-ka-lani-pō died. He married Kapō-inu-kai and they had only one child, Ka-haku-a-Kāne. Nothing was known of the other sons of Mano-ka-lani-pō, Nā-pu`u-a-Mano and Ka-ha`i-a-Mano. Ka-haku-a-Kāne was named after one of the four sons of Mo`ikeha, the voyager from Ra`iātea (Wichman 2003: 59-61).

3.3.3.7 More Ali`i Nui Interisland Travels and Marriages

Ka-haku-a-Kāne Ka-haku-a-Kāne, like so many of his ancestors, made a grand tour of the windward islands. He was...*ali`i nui* of Kaua`i and had an impeccable genealogy. When he reached Maui, Kapō-nae-nae, sister of the ruler, the first Kahekili married him [Kahekili I was married to Haukanuimakamaka or Haukanimaka, a Kaua`i chiefess and was father of Kawaokaohela and Keleanuinohoanaapiapi who married the O`ahu *ali`i* Kalona, son of Ma`ilikukahi; Kahekili I was the grandfather of Pi`ilani]. They had two children, Kahekili-a-Kāne and Kū-o-nā-mau-a-ino. When Kahekili-a-Kāne’s granddaughter married Lono-a-Pi`i, the *ali`i nui* of Maui at that time, Maui chiefs were able to connect themselves to the ancient Kaua`i line leading backwards to La`a-mai-Kahiki. When Ka-haku-a-Kāne left Maui and returned to Kaua`i, he married Mano-kai-ko`o, like himself a grandchild of Mano-ka-lani-pō. They had a son, Kū-walu-paukū-moku (Wichman 2003: 61-62).

Kū-walu-paukū-moku His name indicates that the genealogy of the Kona kingdom had not been lost before this time. He was named after an ancestor, the son of Kū-walu-kini-akua, the first

settler on Kaua`i. This Kū-walu genealogy had been joined to that of La-a-mai-Kahiki when Kū-walu-paukū-moku's great-grandfather Mano-ka-lani-pō married Nae-kapu-lani, daughter of Makali`i-nui-kū-a-ka-wai-ea, last ruling chief of Kona. Kū-walu-paukū-moku was a good, wise, and liberal ruler...married Hame-a-Waha`ula, a chiefess whose genealogy has been lost... Waha`ula was the first *heiau* built by Samoan priest Pā`ao after he made his first landfall in the district of Puna on Hawai`i island.... Pā`ao left his homeland and brought his god Waha`ula to Hawai`i.... Within Waha`ula's enclosure was a sacred grove of trees said to contain one or more specimens of every tree growing on all the Hawaiian Islands. One of these trees was a *hame*, a medium-size tree with grapelike clusters of sour, but edible fruit used to dye tapa; its hard wood was used for anvils for beating *olonā* fiber (Wichman 2003: 62-63).

Ka-haku-maka-paweo and Ka-haku-a-kukua`ena There are no legends concerning the quiet and peaceful rule of Ka-haku-maka-paweo.... His wife was Ka-haku-a-kukua`ena, of whom nothing is known, although the name indicates they must have been closely related. They had three sons: Kaile-lalāhai, `A`a-nui-kani-a-weke, and Ka-lani-kukuma. Nothing is known of the two older brothers (Wichman 2003: 63).

Ka-lani-kukuma, Kū-a-Nu`uanu and Pāka`a During the time of Ka-lani-kukuma, two Kaua`i heroes, Pāka`a and Pikoi-a`Alalā lived, and their adventures became popular tales of the storytellers. When Keawe-nui-a`Umi, son of `Umi-a-Liloa of Hawai`i, was born he was placed in the care of Kū-a-Nu`uanu who was entrusted as the *kahu* (guardian) to raise and educate the royal youngster.... Kū-a-Nu`uanu became the close advisor of his chief.... After many years, Kū-a-Nu`uanu toured all the islands, leaving his charge behind. Kū-a-Nu`uanu eventually came to Kapa`a where he met La`a-maomao, a descendant of the navigator of the same name who had helped Mo`ikeha, the traveler from Ra`iātea, win his wife many years before. La`a-maomao had inherited the calabash of winds as well as the name of her ancestor. Kū-a-Nu`uanu and La`a-maomao settled down on a bluff overlooking the sea between Kapa`a and Ke`ālia. After six months, word came from Hawai`i that Keawe-nui-a`Umi wanted Kū-a-Nu`uanu to return and take up his duties once again. Before he left Kapa`a, Kū-a-Nu`uanu gave his pregnant wife a white *malo* and a cape woven of *kalukalu*, a grass that grew only at Kapa`a.... After Kū-a-Nu`uanu left, La`a-maomao and her brother Ma`ilou, a bird catcher, raised her son. His name was Pāka`a.... When Kū-a-Nu`uanu died, Pāka`a took his place as the favorite friend of Keawe-nui-a`Umi (Wichman 2003: 63-64).

Ka-haku-maka-lina and `Ili-hiwa-lani The wife of Ka-lani-kukuma was Kapo-lei-a-kuila, a direct descendant of Haulani-nui-ai-ākea, the oldest son of the seafaring Mo`ikeha. This union of the two lines after ten generations increased the *mana* and aristocratic rank of their two sons, Ka-haku-maka-lina and `Ili-hiwa-lani. Ka-haku-maka-lina became the *ali`i nui* after his father, but within a few generations, the *ali`i* of Kaua`i successfully searched for a ruler among the descendants of `Ili-hiwa-lani. Unknown and unannounced to...Ka-haku-maka-lina, a well-known chief of Hawai`i island, Lono-i-ka-maka-hiki, arrived on Kaua`i. He had just defeated Kama-lālā-walu of Maui....Lono-i-ka-maka-hiki landed at Waimea.... [Later] Ka-haku-maka-lina made a grand tour of the windward islands. Everywhere he was greeted warmly. When he reached the island of Hawai`i, he was feted by `Akahi-`ili-kapu, a daughter of `Umi-a-Liloa. When it was time for him to return home `Akahi-`ili-kapu sailed to Wailua with Ka-haku-maka-lina. There she gave birth to two children, Ke-li`i-ohiohi, a son, and Koihalauwailaua, a daughter. `Akahi-`ili-kapu returned to Hawai`i with her children, and eventually they married into the Hawai`i *ali`i* line, thus adding the Kaua`i genealogical *mana* to the descendants of `Umi-a-Liloa. (Wichman 2003: 67-70).

Kama-kapu, Kā-kuhi-hewa and Ka-hā-malu-`ihi Ka-haku-maka-lina also married Ka-haku-mai`a, a Kaua`i chiefess, whose name indicates that she too was a descendant of Ka-haku-maka-paweo. They had a son, Kama-kapu. [Kama-kapu married Pā-wahine and they had Kawelo-mahamaha-`i`a.] When Kama-kapu became *ali`i nui* of Kaua`i, the ruler of O`ahu was Kā-kuhi-hewa, who had earned a fierce reputation as a warrior, statesman, and keeper of the most glorious court in all the islands. By this time he was an old man. For his fourth wife, he chose a young Kaua`i chiefess, Ka-hā-malu-`ihi. She had an impeccable genealogy descending, on her mother's side, from `Ili-hiwa-lani, second son of Ka-lani-kukuma. From her father, Kawelo-`ehu, she was a direct descendant of Ahukini-a-La`a, this

giving her a double-looped genealogy, making her *mana* the strongest on Kaua`i. She owned three powerful *kumukānāwai*.... Ka-hā-malu-`ihi came from the sacred sands of Waimea...and her lands there became a *pu`uhonua* (place of refuge) for those who had broken her laws (Wichman 2003: 70-71).

3.3.3.8 Kaua`i - O`ahu Ali`i Nui Merge

Ka-hā-malu-`ihi and Kūali`i Kā-kuhi-hewa died shortly after his marriage to Ka-hā-malu-`ihi, then she married Kāne-kapu-a-Kā-kuhi-hewa, his son. They had Ka-ho`owaha-o-ka-lani. Her great-grandson Kūali`i later became *ali`i nui* of O`ahu (Wichman 2003: 71) and Kaua`i.

Kawelo-mahamaha-`i`a and Ka-pōhina-o-ka-poko It was Kawelo-mahamaha-`i`a, son of Kama-kapu and Pā-wahine, who made the fateful decision to create once again a child who bore the *ni`aupi`o* rank..... Kawelo-mahamaha-`i`a and his wife Ka-pōhina-o-ka-poko had six children. Their last two were a boy, Kawelo-maka-lua, and a girl, Ka-`āwihi-a-ka-lani, both still young and still virgin.... As soon as it was possible, the youngsters were mated (Wichman 2003: 73).

Kawelo-pe`e-koa, Kawelo-`ai-kanaka and Kawelo-lei-makua When Ka-`āwihi-a-ka-lani felt the first pangs of labor she was taken to the sacred enclosure of Holoholokū [birthing stone in Wailua, built by Puna chief for Mo`ikeha's first child]. Ka-`āwihi-a-ka-lani had twins; her first born, Kawelo-pe`e-koa was taken by the priests to be raised in seclusion as the supreme *ali`i kapu*. The second born was Kawelo-`ai-kanaka, who was raised to be a ruler. As the children grew, the island prospered under Kawelo-mahamaha-`i`a's rule and peace prevailed. Kaua`i became an island of plenty and its hospitality was renown throughout the islands. Kawelo-mahamaha-`i`a had two *luakini heiau* constructed in Anahola where human sacrifices were offered. Rumors began to grow that Kawelo-mahamaha-`i`a was part shark and as deaths continued and sacrifices grew, fear turned into anger. One day as Kawelo-mahamaha-`i`a traveled back from Anahola he was stoned to death. Kawelo-maka-lua, father of the twins, was a thoughtful and considerate ruler in contrast to his father, Kawelo-mahamaha-`i`a and his son, Kawelo-`ai-kanaka, but he didn't live long as a ruling chief. Kawelo-`ai-kanaka or `Aikanaka was afforded awesome power because of his *ni`aupi`o* rank, but his cousin Kawelo-lei-makua (Kawelo) was not impressed. The rivalry between the cousins continued until Kawelo and his younger brother Ka-malama decided to leave Kaua`i and join relatives on O`ahu. They settled on land given them at Halemanu where they often crossed the pass [Kolekole] into Wai`anae to enjoy the ocean. While on O`ahu Kawelo trained in many arts. One day Kawelo had a vision of his parents under duress. The following day two men from Kaua`i brought him a message saying that his cousin `Ai-kanaka had stripped his parents of everything and thrown them from the top of the mountain where they had sought refuge (Wichman 2003: 73-78).

Kawelo and Kāne-wahine-iki-aoha Kawelo borrowed a war canoe and twenty-four warriors from O`ahu ruling chief Ka-ihi-kapu who waived payment and sailed to Kaua`i with his wife Kāne-wahine-iki-aoha, his brother, his two foster sons, his uncles who had delivered the message, twelve Ulu warriors and his war god Kāne-ika-pua-lena. A great battle ensued and all the champions of `Ai-kanaka were killed and he fled. Kawelo had avenged his parents and now Kaua`i belonged him. He divided the island between his wife, brother, and his foster sons. His brother Ka-malama presided over the Kona district and Kawelo the Puna district with the help of one foster son, Ka-`ele-hā-o-Puna. Peace came to Kaua`i again (Wichman 2003: 78-84).

`Ai-kanaka and Kawelo One day Ka-`ele-hā-o-Puna decided to visit Mānā. He arrived at Wahiawa in the evening and was invited to spend the night. His host had another guest, none other than `Aikanaka who had gone into hiding at Kō`ula valley. `Ai-kanaka immediately recognized Ka-`ele-hā-o-Puna and invited him to spend the night in the company of his daughter Kawelo-`eha. Ka-`ele-hā-o-Puna fell in love with Kawelo-`eha and the two were quickly married. Ka-`ele-hā-o-Puna had little to give `Ai-kanaka for his kindness and eventually gave him information that Kawelo did not learn to defend himself against an attack by stones. Huge cairns of stones were piled on the plains of Wahiawa. Kawelo heard

rumors and asked his brother Ka-malama to investigate. His brother did, an altercation broke out and Kamalama was killed by Ka`ele-hā-o-Puna stabbing him in his back. Upon hearing this news of his brother's death, Kawelo sent for his other foster son and his wife, but left before they arrived. He met up with Ka`ele-hā-o-Puna and `Ai-kanaka who stoned him. He recovered three times, but the fourth time he laid stunned, assumed dead. His body was wrapped in banana stalks and taken to Maulili *heiau* in Kōloa to be sacrificed the next morning. The guardians of the *heiau* were Kawelo's sister and her husband. During the night they revived him and when `Aikanaka came to the *heiau* he was killed by Kawelo. However, he spared his foster son Ka`ele-hā-o-Puna. His wife and other foster son arrived with their forces and killed the fleeing warriors of `Aikanaka. They gathered the body of Ka-malama and demanded the death of Ka`ele-hā-o-Puna. Kawelo still refused until he was shown that his brother had been stabbed in the back. He killed Ka`ele-hā-o-Puna with one blow. The legends are not clear at what happened to Kawelo; one possibility was that he had been thrown off the cliff at Hanapēpē by his men who feared his obsession to go after all of `Ai-kanaka's relatives. However, not much time had passed between the death of `Ai-kanaka and the arrival of Kūali`i as *ali`i nui* of Kaua`i, breaking the direct line of twelve generations of ruling chiefs from father to son beginning with Ahukini-a-La`a (Wichman 2003: 84-86).

3.3.3.9 End of Kaua`i Direct Line Rule

Kū-ali`i and Pele-io-holani In order to get warriors and a canoe, Kawelo had agreed to cede Kaua`i to Kū-ali`i in case both he and `Ai-kanaka should die in the impending war. Kū-ali`i had as good a claim on Kaua`i as any other *ali`i* as his grandmother was Kawelo-lau-huki, daughter of Kawelo-mahamaha-i`a. He had inherited the *kumukānāwai* of his great-grandmother Ka-hā-malu-`uhi who had been wife to both Kā-kuhi-hewa and his son Kāne-kapu-a-Kā-kuhi-hewa. As a young man Kū-ali`i went to Kaua`i to gather *kaui* wood for weapons and a war club and Kawelo-lei-makua (Kawelo) had been his guide. When Kū-ali`i, who was now ruling chief of O`ahu, heard that `Ai-kanaka had been killed by Kawelo and he himself killed, Kū-ali`i rushed to Kaua`i to declare himself the *ali`i nui*. He installed his son Pele-io-holani as governor. Under Kū-ali`i Kaua`i supplied men and arms to the wars that spread over the windward islands as Kū-ali`i and his son Pele-io-holani established a multi-island kingdom with Kū-ali`i *ali`i nui* of Moloka`i, Lāna`i, and Maui. Kū-ali`i lived to a very old age [some say 175] and at his death his oldest son, Ka-pi`o-ho`okā-lani became ruling chief of O`ahu and Pele-io-holani of Kaua`i (Wichman 2003: 89-90).

Pele-io-holani, Ka-naha-o-kalani and Ka`apuwai Ka-pi`o-ho`okā-lani immediately invaded Moloka`i. Alapa`i-nui heard this and went to Moloka`i to avenge his relatives there and killed Ka-pi`o-ho`okā-lani whose army fled back to O`ahu where his son Ka-naha-o-kalani was now ruling chief. He sent a message to Kaua`i to ask his uncle Pele-io-holani for help. Pele-io-holani left his daughter Ka`apuwai in charge while he was gone. The impending war on O`ahu was averted as the cousins Alapa`i-nui and Pele-io-holani decided to settle peacefully. Pele-io-holani remained on O`ahu as ruling chief and his daughter remained as governor of Kaua`i. Ka`apuwai was married to Ka`ume-he-iwā -- they were both descendants of Ka-lani-kukuma, giving their daughter Ka-maka-helei stronger *mana* than her parents. Ka`apuwai died before Pele-io-holani and the government went to her daughter Ka-maka-helei (Wichman 2003: 91-92).

3.3.3.10 O`ahu-Kaua`i-Maui Ali`i Nui

Ka-maka-helei, Kiha, Ka-neoneo and Ka`eo-kū-lani Ka-maka-helei ruled Kaua`i with allegiance to her grandfather Pele-io-holani. She married a Kaua`i chief Kiha and they had three children: two daughters, Lele-māhoa-lani and Ka-lua-i-pihana and a son Keawe. Pele-io-holani sent his grandson Ka-neoneo to Kaua`i to check on things and Ka-maka-helei put aside Kiha for Ka-neoneo; they had a daughter Ka-pua`a-moku. Kiha fled to Ni`ihau and gathered a small army and raided Kaua`i. He was

subsequently killed. Pele-io-holani sent for his grandson to help him with problems with Kahekili [II], leaving Ka-maka-helei vulnerable against her uncle Kūmuhana. Seizing this opportunity Kahekili sent his brother Ka`eo-kū-lani to Kaua`i to neutralize the kingdom and woo Ka-maka-helei, who named her son Keawe her heir. It was during this period that Captain Cook landed at Waimea in 1778. Ka-maka-helei presented Cook with gifts of hogs, chickens, bananas, taro, sweet potatoes, sugarcane, yams, fine mats, and tapa cloth. In return Cook presented her with cloth, iron, a sword, knives, bead necklaces and mirrors. Then Ka-maka-helei offered Cook her daughter Lele-māhoa-lani (Wichman 2003: 92-96).

Ka-maka-helei, Ka`eo-kū-lani and Ka-umu-ali`i Ka-maka-helei gave birth to a son, Ka-umu-ali`i in 1780 and shortly after, Kahekili sent for his brother Ka`eo-kū-lani to help with problems on Maui. His son Ka-umu-ali`i was declared heir to Kaua`i with Inamo`o as regent. Kahekili died on O`ahu in 1793 and Maui, Moloka`i and Lana`i came under the rule of Ka`eo-kū-lani, who ruled for a year before becoming homesick for Kaua`i. On his way back he stopped on O`ahu. His nephew, Kalani-kū-pule, thought he was invading O`ahu and a battle ensued. The battle was called off and Ka`eo-kū-lani continued on his journey to Kaua`i. While in Wai`anae he discovered that his counselors were plotting to throw him overboard in mid-channel and return to O`ahu to conquer the island. Ka`eo-kū-lani decided to go into battle with them against Kalani-kū-pule rather than die alone at sea. Ka`eo-kū-lani was killed in `Aiea in 1794 by rounds of gunfire from two foreign ships hired by Kalani-kū-pule; only the two treasonous counselors escaped back to Kaua`i. The following year Kamehameha I invaded O`ahu and Kalani-kū-pule ended up as a sacrifice to Kamehameha's war god (Wichman 2003: 96-98).

Ka-umu-ali`i and Keawe Ka-maka-helei's oldest son Keawe attacked Wailua and captured his younger half-brother Ka-umu-ali`i, who was made a privileged prisoner free to wander Wailua, but couldn't leave without Keawe. Keawe then declared himself *ali`i nui* of Kaua`i. Joining Keawe was Ki`i-kīkī, one of the treasonous counselors and *konohiki* of Wainiha. Ki`i-kīkī's brother Kāne-`ehu was *konohiki* of Hanapēpē. Keawe did well for a year. He collected all the muskets, guns and ammunition on the island as a symbol of power and put his trust in the brothers Ki`i-kīkī and Kāne-`ehu, as no one had returned from O`ahu to warn him of their treachery. They convinced him to take a tour around the island and meet his subjects. In Kapa`a Keawe went to bathe in the famous pool *Kupa-nihi*. While there Ki`i-kīkī got a rifle and shot Keawe. Kāne-`ehu advised his brother to return to Wailua and kill Ka-umu-ali`i, but Ki`i-kīkī refused saying he could control the young chief. Ki`i-kīkī took all the guns and went to Polihale, while Kāne-`ehu went back to Hanapēpē (Wichman 2003: 99).

Ka-umu-ali`i, Nā-kaikua`ana and Kamehameha Although now free from his brother Keawe and his regent Inamo`o, Ka-umu-ali`i knew that Ki`i-kīkī and Kāne-`ehu were very dangerous, so he turned to Nā-kaikua`ana, a member of his court and a close friend of Ki`i-kīkī. Ka-umu-ali`i bribed Nā-kaikua`ana with his wives. After some time Nā-kaikua`ana realized that he could also be in danger of losing his life so he swore allegiance to Ka-umu-ali`i. To prove his loyalty he offered a plan to regain the guns. When Ki`i-kīkī was out surfing one day at Ka-ua, Makaweli, Nā-kaikua`ana seized the guns. Ki`i-kīkī hurried to Hanapēpē to his brother; both of them fled to `Ewa, O`ahu, but Nā-kaikua`ana followed them and killed the brothers. However, Nā-kaikua`ana returned to Kaua`i with disturbing news; Kamehameha, now ruler of the windward islands was preparing to invade Kaua`i. After two failed attempts, Kamehameha sent a message to the young chief to recognize him as sovereign. Ka-umu-ali`i realized that it was a matter of time and he didn't have the resources to beat Kamehameha, so he accepted. However, he refused the many invitations to go to O`ahu and make a public oath fearing the same fate as Keōua. After many more invitations an order came that he could not refuse. Ka-umu-ali`i left Kaua`i to meet Kamehameha on O`ahu. Kamehameha turned down the offer of the lands of Kaua`i and invited him to land where he was royally entertained. A few days later, members of Kamehameha's court invited Ka-umu-ali`i to a feast. On the way there he stopped to visit Isaac Davis who warned him that they were plotting to kill him there. Ka-umu-ali`i changed his plans. Before leaving he stopped by to see

Kamehameha and Ka-lani-moku who told Ka-umu-ali`i to “take care of the chief Liholiho who belongs to you and to your cousin Ka`ahu-manu. Liholiho shall be the heir” (Wichman 2003: 99-104).

Ka-umu-ali`i, Liholiho and Ka`ahu-manu Ka-umu-ali`i could only agree - he went to O`ahu as a ruler and returned to Kaua`i as a vassal, but he saved his kingdom from a bloodbath. Shortly after returning to Kaua`i he received word that Isaac Davis had himself been poisoned. The young chief’s world was continuously changing as more and more ships came - whalers, merchants, including sandalwood merchants, and traders. The traders built a trading post at Waimea and a fort shortly after. With his new-found income, Ka-umu-ali`i purchased guns, ammunition and ships with hopes of some day getting out of the stranglehold of Kamehameha. This was never to be; in 1819 Kamehameha died and his son Liholiho and Queen Ka`ahumanu as his regent, took over.

They radically and forever changed the social structure of the Hawaiian society by extinguishing the *kapu* system. The following year Calvin Congregational missionaries arrived in Hawai`i to a society with a structural/religious void, as well as Humehume, oldest son of Ka-umu-ali`i who had been given up as lost. He had been placed in the care of a Yankee captain when he was seven, to be educated. The captain died and Humehume was turned out into the streets. He was later sent to the Congregational school in Cornwall, Connecticut where several other Hawaiian youth were. When the first missionaries left, they took Humehume (George) with them. Humehume and the missionaries were welcomed by Ka-umu-ali`i who gave the missionaries land to build a church and school; Ka-umu-ali`i was later converted.

In 1821 after spending over a month enjoying Kaua`i hospitality, Liholiho invited Ka-umu-ali`i to his brig for dinner. He quietly gave the order to set sail with Ka-umu-ali`i as his prisoner. Later that year he was “compelled” to marry his cousin Ka`ahumanu; she also married his son and heir. From then on the Kaua`i chiefs were kept at her side. In 1824, as Ka-umu-ali`i lay dying, his family were allowed to come to O`ahu, but they were not allowed to see him before he died. He was taken in state to Maui where he was buried next to Ke-ōpū-o-lani [also his cousin], sacred queen of Kamehameha. (Wichman 2003:104-110); he was the last king of Kaua`i.

3.3.4 `Ōlelo No`eau

`Ōlelo no`eau or proverbial/traditional sayings usually had several layers of meanings. They reflected the wisdom, observations, poetry and humor of old Hawai`i. Some of them referenced people, events or places. The following `ōlelo no`eau were compiled by Pukui between 1910 and 1960 with both translations and an explanation of their meaning (Williamson, et al. in Pukui, 1983:vii), which are often more *kaona* (hidden or double meaning) than obvious; they refer to places or *ali`i nui* associated with places and people of Hā`ena and other places in the vicinity.

<i>‘Ōlelo no`eau:</i>	<i>Kilioe wahine i uka.</i>
Translation:	Kilioe, woman of the upland.
Meaning:	Kilioe was a <i>wahine mo`o</i> (lizard woman) famed in chants and songs of the <i>ali`i</i> . She belonged to Kaua`i and it was she who tried to prevent Hi`iaka from taking the body of Lohi`au from a cave at Hā`ena (#1799, p 193).

<i>‘Ōlelo no`eau:</i>	<i>‘Ō`ili pulelo ke ahi o Kāmaile.</i>
Translation:	The fire of Kāmaile rises in triumph.
Meaning:	Said of one who is victorious over obstacles, this is the first line of a chant composed for Kamehameha II. In olden days, firebrands hurled from the cliffs at Hā`ena, Kaua`i, made a spectacular sight (#2392, p 261).

<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Nui ka hanu o Limahuli i na Lehua o Lulu`upali.</i> Heavily-sighed Limahuli falls over the Lehua blossoms of Lulu`upali. Said of a person in love who sighs over a sweetheart (#2347, p 255).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Na Lehua o Lulu`upali</i> The lehua blossoms of Lulu`upali Famed in songs of Kaua`i were the Lehua blossoms of Lulu`upali (#2251, p 246).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka laua`e `ala o Kalalau</i> Fragrant laua`e ferns of Kalalau Makana and Kalalau on Kaua`i were noted for the growth and fragrance of <i>laua`e</i> (#1433, p 155).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka pali `ōahi o Makana</i> The firebrand-hurling of the cliff of Makana <i>Pāpala</i> or <i>hau</i> wood was cut, thoroughly dried and carried up the hillside to where an <i>imu</i> lay ready to be lighted. When dusk descended, the <i>imu</i> was lighted and the logs placed in it. When the blowing of the wind was just right, the lighted log was hurled into the wind and borne seaward, high over the heads of the spectators, before dropping into the sea (#1532, p 165).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka poli laua`e o Makana</i> Makana, whose bosom is adorned with <i>laua`e</i> ferns. Famed in songs and chants are the fragrant <i>laua`e</i> ferns of Makana, Kaua`i (#1542, p 166).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Laua`e o Makana</i> The <i>laua`e</i> fern of Makana. Famed in songs and chants is the <i>laua`e</i> that grows everywhere at Makana on Kaua`i . When crushed it has a scent similar to that of the <i>maile</i> and is often used with the pandanus fruit in making <i>lei</i> (#1949, p 210).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ke ahi lele o Kāmaile</i> The soaring fire of Kāmaile This refers to the firebrands hurled off the cliffs at Napali, Kaua`i (#1669, p 180).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Na hala o Naue `au i ke kai.</i> The <i>hala</i> trees of Naue swim out to sea. The <i>hala</i> trees of Naue, Kaua`i seem to reach out to sea. This expression is used in songs and chants (#1212, p 242).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Ka ua Makako`i o Halele`a</i> The adz-edged rain of Halele`a. A rain so cold that it feels like the sharp edge of an adz on the skin. Refers to Halele`a, Kaua`i (#1586, p 172).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation: Meaning:</p>	<p><i>Kaua`i a Manokalanipo</i> Kaua`i of Manokalanipo Manokalanipo was a chief of Kaua`i in ancient times (#1556, p 168).</p>
<p><i>‘Ōlelo no ‘eau:</i> Translation:</p>	<p><i>Ka moku kā`ili lā o Manokalanipo</i> The sun-snatching island of Manokalanipo</p>

Meaning:	Kaua`i, the northwestern most island of the group, beyond which the sun vanishes at dusk. Manokalanipo was an ancient ruler of Kaua`i (#1488, p 161).
‘ <i>Ōlelo no ‘eau:</i>	‘ <i>Akāhi a komo ke anu ia`u, ua nahā ka hale e malu ai.</i>
Translation:	Cold now penetrates me, for the house that shelters is broken.
Meaning:	Fear enters when protection is gone. Said by `Aikanaka of Kaua`i when two of his war leaders were destroyed by Kawelo (#90, p 12).
‘ <i>Ōlelo no ‘eau:</i>	<i>Ka ipo laua`e o Makana.</i>
Translation:	The beloved <i>laua`e</i> of Makana. (Refers to the famed variety of fern used in <i>lei</i> for its fragrance and grew near Pu`u Makana)
Meaning:	Refers to a loved one (Pukui and Elbert 1986:194).
‘ <i>Ōlelo no ‘eau:</i>	<i>Ka pali kā`ili wahine o Kē`ē.</i>
Translation:	The wife-snatching cliff of Kē`ē.
Meaning:	Alludes to a tale in which the men of Kē`ē fell in love with the women (<i>wahine</i>) of Nu`alolo, went to that valley and scaled the cliff to reach it, threatened the men and took the women back (Pukui 1983:165).
‘ <i>Ōlelo no ‘eau:</i>	<i>Kupopou ana i ka pali o Kē`ē.</i>
Translation:	Going downhill at the cliff of Kē`ē.
Meaning:	Said of a non-cooperative person and played on the place name’s resemblance to <i>kē</i> (to object) and `ē (elsewhere) (Pukui 1983:207).
‘ <i>Ōlelo no ‘eau:</i>	<i>Aia a Kē`ē.</i>
Translation:	There at Kē`ē.
Meaning:	Refers to the distance between Kē`ē and other locales; figuratively it means something hardly worth looking for, it is so far away (Pukui 1976:105).

3.3.5 Place and Object Names

Hawaiians of old generally named everything; from winds and mountains, to rocks, canoes, taro patches, fishing stations, and “the tiniest spots where miraculous or interesting events are believed to have taken place” (Elbert in Pukui et al., 1974: x). They all represented a story, some known only locally, while others became legendary. The list below (Table 2) represents place names with an association to project lands in Hā`ena and vicinity.

Table 2. Place and object names in Hā`ena and their *mo`olelo* and significance

Hā`ena	Tucked against the Nāpali cliffs is the ahupua`a of Hā`ena; “red hot” – possible reference to strong <i>kapu</i> that surrounded this place (Wichman 1998:125). Land section, village, point. <i>A Lohi`au-ipo i Hā`ena lā, `ena`ena ke aloha ke hiki mai;</i> and Lohi`au-ipo at Red-hot, hot the love that comes (Pukui et al. 1974:34). Hā`ena was always ruled by a chiefess who was independent of the <i>ali`i nui</i> and who ruled for life. One high chiefess was Kekela who was alive during the Mahele and directed the people to file their land claims. Hā`ena was also noted for the quality of dog grown here as food for the chiefesses who were not permitted to eat pork (Wichman 1998:126).
Hala-aniani	“Clear-pandanus” – the lake of fresh water within the upper wet cave of Hā`ena; it was set aside for the <i>ali`i</i> and commoners could not bathe in it. The waters were thought to be able to restore an ailing person back to health. The chiefs either drank from a calabash filled with the water or swam in the underground lake (Wichman 1998:129). Visitors in

1849 reported legends of *mo`owahine* and a white substance on the surface there, although it did not keep them from taking a canoe inside to explore (Alexander 1991:126-127).

- Halele`a** “House of happiness” – cited in chants as the most beautiful place in all the islands. Moku or district on Kaua`i that includes Kalihiwai, Kalihikai, Hanalei, Wai`oli, Waipa, Waikoko, Lumaha`i, Wainiha and Hā`ena; the extent includes Wai`ale`ale to the sea, bordered by Nāpali on the west and Puna (the Makaleha Mtns) and Ko`olau on the east (Wichman 1998:105).
- Īlio Point** “Dog” Point – may refer to the Polynesian-introduced canine or the seal (*Īlioholoikauaua*) - “dog running in the rough seas” who have been known to beach themselves there (Major and Carpenter 2001:9).
- Ka`aulama-poko** A fishing hole near shore “light from a short-burning torch” because it can be fished at night using a *kukui* nut torch, which never burned for very long (Wichman 1998:125).
- Kai-kua`au-o-Hā`ena** “Lagoon sea of Hā`ena” – the only lagoon on Kaua`i – protects Makua Bay (Wichman 1998:125).
- Ka-lua-`āweoweo** “*Āweoweo* hole” is the fishing hole at the farthest point from land; the *`āweoweo* gather in this grotto – this fish was eaten raw, cooked or dried. A large school of young *`āweoweo* (*alalauā*) swimming into the bay was an omen of the death of a high chief (Wichman 1998:125).
- Ka`iwi-ku`i** A Hawaiian man and his wife used to steal from the fields of the Menehune farmers in Mānoa Valley; he was chased up the ridge toward Pōhaku-o-Kāne where he put up a fight, but the Menehune used their slingshots and pelted him with stones. Some were so large that the bones of his skull were shattered...in this form he was turned to stone -- the ridge where he lies was named Ka`iwi-ku`i or “hammered bone” (Wichman 1998:126-127).
- Kānehunamoku** “Kāne’s hidden island” son of two cloud gods Manoiku(kiu)lani (“Male head of the clouds in the blue sky”) and Hihikalani (“Female head of the rolling clouds”) who lives on a floating island that is “sacred and shall not be seen in the light of day. It shall be seen only at certain kapu periods in July and August. When it hovers near Hā`ena, Kaua`i , then he shall be near on the floating island of Kaonohiula” (Beckwith 1970:71).
- Kaonohiula** Floating Island that hovers near Hā`ena, Kaua`i in *kapu* periods of July and August (Beckwith 1970:71). Beckwith interprets references to invisible or floating islands and clouds as metaphors for the seclusion of high-ranking *ali`i* children raised under strict *kapu* and thus it may be inferred that Hā`ena was considered a sacred place...where *ali`i* children were raised and trained (Major and Carpenter 2001:6).
- Ke-ahu-a-Laka** “Inspiration of Laka” – Hā`ena was famous for its schools where students came to study the sacred forms of *hula* or to learn the history and genealogies of the chiefs. Ke-ahlu-o-Laka [*heiau*] was the school of *hula*, chanting and composing religious chants as well as songs. The student remained for seven years. The *heiau* and the student were dedicated to Laka, goddess of the forest and dance (Wichman 1998:132).
- Ka-ulu-o-Pā`oa** “Inspiration of Pā`oa” – This *heiau* was the school for historians and genealogists. It was said that during the final examination a student listened to a genealogical list that lasted several hours and had to repeat it without error. Pā`oa was the *kahuna nui* and close friend of Lohi`au at the time of Pele’s arrival. He swore to avenge Lohi`au’s death and confronted Pele at her home on Hawai`i. Pele, assuming her most beautiful form,

beguiled Pā`oa into living with her for three days. He drowned himself in shame for not having kept his oath (Wichman 1998:132).

Ke-a`a-lewalewa

“Dangling root” is a peak on the east side of Mānoa Valley; *a`a lewalewa* are aerial roots of the *ōhi`a lehua* tree of the forests or the pandanus tree of the lowlands. Kea`alewalewa was a Wainiha man who constantly stole food from the Menehune farmers of Mānoa Valley. They got so angry after a time that they chased after him and turned him into stone (Wichman 1998:126).

Kē`ē

“Avoidance” – beach and cliff west of Hā`ena, Kaua`i (Pukui 1974:105). The beach and lagoon at the beginning of Nāpali District is Kē`ē, the site of the legend of Pele, Lohi`au and Hi`iaka. Pele came to Kē`ē when she was first looking for a home and safety from her sister Nāmakaokiahā`i. Once she found her home on Hawai`i Island she was lured back by Lohi`au’s drumming. She returned and found him and fell in love with him, but each time she dug a cave to make a home for them, she met with water. She left Kaua`i as she was in her spiritual body, promising Lohi`au she would return for him. After a long wait, Lohi`au hung himself in despair. His body was placed in a cave above Kē`ē and was guarded by two *mo`o* sisters Kilioe and Aka. When Hi`iaka and Wahine-`ōma`o arrived as envoys from Pele they found Lohi`au dead. Hi`iaka killed the two guardians and with herbs and prayers restored Lohi`au’s life then took him to Pele, who in the meantime had destroyed Hi`iaka’s *Lehua* forest. The angry Hi`iaka embraced Lohi`au so Pele covered him with lava. Hi`iaka dug a tunnel from the sea to her sister’s fire pit and almost succeeded in killing Pele, but their brothers persuaded her not to. Hi`iaka returned to Kaua`i ; her brothers restored Lohi`au’s life once more and sent him after Hi`iaka. They married and spent the rest of their life together at Kē`ē (Wichman 1998:130). Kē`ē probably also refers to the *kapu* of the place in light of Beckwith’s interpretation of legends as reference to seclusion of *ali`i* (Major and Carpenter 2001:9). `Ili of Hā`ena (Waihona 2010)

Kilioe

The body of Kilioe became a furrowed rock beside the sea that is still used as a birth rock, a place for safeguarding the umbilical cord of newborns. In doing so, the child is placed under the protection of Kilioe. The ancients believed that the fate of the umbilical cord foretold the child’s life (Wichman 1998:130). When Hi`iaka went to find Lohi`au for Pele, she had to fight two supernatural lizard women (Kilioe and Aka according to Wichman 1998; Kilioa and Kalaimanu according to Kalākaua 1990; Kilioekapua and Kalanamainu`u according to Beckwith 1970). Kilioe was turned into a *pōhaku* that was used as a *piko* stone where the umbilical cord of a newborn infant was placed to be under the protection of the *mo`owahine* (Wichman 1998:130).

Koa-manō

On the way to Kaua`i , Makani-kau, chief of the winds, god of love, was crossing the channel between O`ahu and Kaua`i in his wind form and saw some people being chased by a big shark. He landed on the canoe and told the frightened people he would play with the shark and they needn’t worry. He jumped into the sea and the shark opened its mouth to seize him but he climbed onto it and caught its fins and forced it to flee through the water into the rocks and became the great shark stone Koa-manō “shark warrior.” Kahuna Pa`ihulu would go to this rock and offer prayers and food to a shark. The shark would then carry him to Kalalau and back again (Wichman 1998:125-126).

Limahuli

“Turning hand” – a deep valley in Hā`ena (Wichman 1998:125; Pukui et al. 1974:133).

Makana

“Gift” – a triangular peak, prominent and unmistakable. Firebrands (*ōahi*) were thrown from the top of this peak. On the side of Makana is a storied stone, a reminder of a tale of friendship. Nou was a boy who saved the life of a Menehune who had fallen; in return the Menehune promised Nou that he would become a champion firebrand thrower. The other firebrand throwers became jealous of Nou and his prizes and killed him. The Menehune put Nou’s body into a cave and sat at the entrance and allowed himself to turn into stone

to guard the bones of his friend (Wichman 1998:129). *ʻŌ`ahi* were thrown from Makana up into early historic times: during Queen Emma’s 1860 visit to Kaua`i; when Eric Knudsen staged a display in the early 1900s; and on Kamehameha Day in 1925(Knudsen 1946; Barrere and Kelly 1978 In Major and Carpenter 2001:8).

- Makua** “Ancestor” – a large lagoon and bay in the *ahupua`a* of Hā`ena (Wichman 1998:125).
- Manini-holo** “Traveling reef surgeon fish” – large dry cave on Ka`iwiku`i Ridge; Manini-holo was also the name of the head fisherman at the time the Menehune were leaving the island to return to their homelands. He brought his workers to gather food from the reef and bay of Hā`ena; during the night all the food disappeared, but Manini-holo saw the *e`epa* in the fissures of the pali and realized they were the thieves so they killed them. The Menehune gathered in the mountains, crossed Nāpali coming to the plain in front of Manini-holo where they boarded their canoes in Makua Bay. They sailed away and never returned (Wichman 1998:127-128). Historic visitors were told that a certain side room of the cave was used as a hiding place by *ali`i* during times of war (Alexander 1991:126) and construed that a stone wall at the rear of the cave was meant to block off a burial area (Lydgate 1991:139) (In Major and Carpenter 2001:9).
- Mānoa** “Thick” – a shallow valley in Hā`ena (Wichman 1998:125). Stream (Pukui et al. 1974:146). `Ili of Hā`ena (Waihona 2010)
- Naenae** “Congested” – wife of Hawaiian man who stole from Menehune farmers; they chased her into Limahuli Valley. She stopped to rest near the waterfall where the Menehune caught her and killed her. She was turned to stone and is called Naenae (Wichman 1998:126).
- Nā-hiki** “Many arrivals” – the bay beside the two *heiau*. At the end of their training students at the *hula* school had to swim the lagoon, go out the channel into the ocean and come ashore at Nāhiki where even on calm days, the waves surge fiercely in and out. In so doing they passed the shark that was fed by the chiefess. Those students who had broken any rules were devoured by it. Those who were without fault came ashore safely (Wichman 1998:132).
- Nā-Piliwale** “Clinging ones” or “the emaciated ones” – a stone formation on the Mānoa ridge looks like two running figures with skirts flying up behind them. It was the custom of the four Piliwale sisters to visit a chief’s court and remain until all the food in the area had been consumed. Therefore their appearance heralded a forthcoming famine. They had extraordinary appetites; their favorite foods were freshwater shrimp and snails and the fiddlehead fern (*hō`i`o*). Two sisters came to Hā`ena and because they were *kupua* and could not tolerate the sun, Lohi`au and his sister Kahuanui built them a shelter in Maniniholo Cave and one on the ridge so they could enjoy the view. They were fed their favorite foods at night and entertained by every *hula* dancer at the school at Ke`e. One night they forgot the time and raced down the ridge to the cave but the sun’s rays caught them and turned them into stone; they remain there as a warning to the other two sisters not to visit Kaua`i (Wichman 1998:127).
- ʻO`o`a`a** “Fast-rooted one” – a boulder formerly on Hauwā reef that now lies in the depths. *ʻŌ`ō`ā`ā* came to Kaua`i with her two brothers in the form of rocks; after their long journey she rested on the sea and became a guardian of the reef. She was moved from the reef in the 1946 tsunami where she is still waiting for her brothers offshore. She can be seen by snorkelers (Wichman 1998:128).
- Pā-ka-moi** “Enclosure of the threadfin fish” – a boulder near the base of the upper wet cave (Waiakanaloa); also connected to the story of Pele and Lohi`au. When Hi`iaka and her companion Wahine`ōma`o reached Hā`ena they asked Pākamoi a fisherman to find them a place to sleep for the night. He mistook the tenor of their request and after watching

them loosen their clothes in preparation for sleeping, he attempted to fulfill his desires on Hi`iaka who was saved by Pā`ū-o-Pala`e, a friend and servant, who changed places with her. Pākamoī was turned to stone where he lay (Wichman 1998:129).

Papaloa	“Long reef” – (Major and Carpenter 2001:9)
Pōhaku-o-Kāne	“Stone of Kāne” – brother of Ō`ō`ā`ā who tried to climb to the peak above but because he was round and the cliff was sheer, he would roll back to the bottom where he would start over. The god Kāne took pity on him reached down and placed the rock on the peak. It is said that when Pōhakuokāne decides to leave his perch, Kāne will raise the waters of the ocean to his level (Wichman 1998:128).
Pōhaku-loa	“Long-rock” – the other brother of ` Ō`ō`ā`ā who rested on the top of the sand dunes (Wichman 1998:128).
Wai-a-Kanaloa	“Water made by Kanaloa” – Kanaloa was one of the four major Hawaiian gods and brother of Kāne. They were known for digging sources of drinking water as they toured the various islands. The upper wet cave (Wai-a-Kanaloa) in Hā`ena was dug by Kanaloa. Other legends say it was Pele who struck the cliff here with her staff <i>Pā`oa</i> when she was searching for a home, but was met by water instead (Wichman 1998:129).
Wai-a-ka-Pa-la`e	“Water of the lace fern” – the lower wet cave in Hā`ena. In the olden times, the water in the cave had a brownish hue, which was said to be the hair of a beautiful <i>mo`o</i> maiden who could usually be seen sitting near the entrance of the cave combing her hair. A chief from Wainiha fell in love with her and the two disappeared for several months. Then the mermaid reappeared with a baby at her breast. When asked where the chief was, she drew her finger across her neck to indicate that he was dead. In revenge, his friends tried to kill the <i>mo`o</i> but she dove into the water and escaped. Her long hair spread out in the water giving the pool its color. As she grew older the brown tint turned gray. For this reason the cave was known either as Wai-a-kapa-lae - “water of terror” or Wai-a-kapa-la`e – “water of shiny tapa” (Wichman 1998:129-130).

3.3.6 Winds

3.3.6.1 Winds of Halele`a

Halele`a is cooled by *Kaiālulu*, a pleasant and gentle trade wind; and sometimes the forceful Ko`olau trade wind *Hao-Ko`olau-o-Halele`a*.

3.3.6.2 Winds of Hā`ena (Poepoe 1911 In Pacific Worlds).

He Kalahale ka makani o Hā`ena
He Limahuli ka manaki o Hā`ena
He Kolokini ka makani he`enalu o Kahuanui a Lohi`auipo, i Hā`ena
He Unukupua ka makani lawe leo a Lohi`au-ipo i Hā`ena
He Kanaenae ka makani kaili aloha a Lohi`au i Hā`ena
He Kilauea ka makani kaili aloha a Lohi`au i Hā`ena
He Leoikua ka makani lawe aloha a Lohi`au-ipo i Hā`ena
He Ipo noenoe laua`e ka makani ki`i wahine a Lohi`au ipo i Hā`ena
Aloha wa'e o Lohi`au-ipo i Hā`ena e--!"

Wichman (In Pacific Worlds) expands on the winds of Hā`ena below:

Kalahale refers to a house gable, but was also name of a chiefess of Hā`ena.

Limahuli	"turning hand," is also the name of the valley in which this wind occurs.
Kolokini	is the "surf-raising" wind (<i>makani he'enalu</i>) of the Kahuanui surfing area. Kahuanui is sister of Lohi'au; the surfing area is on the Kē'ē side of where Limahuli stream enters the sea.
Unukupua	the "demi-god's altar" - this is the "voice-bearing wind of Hā'ena," which must refer to a women's chorus, because it sounds like a chorus of women chanting.
Kana`ena`e	or "sweet fragrance," is the fragrance-bearing wind of Hā'ena. It is probably an evening wind. Na'ena'e is the name of several varieties of a native shrub with large cones of blossoms. But it may also refer to the scent of the laua'e ferns for which Makana mountain is famous. Kana`ena`e is also a boulder up in Limahuli.
Kīlauea	is the "love-snatching" wind (<i>makani ka'ili aloha</i>) of Hā'ena.
Leoikua	refers to voice of the gods heard in the elements; "the love-bearing wind" (<i>makani lawe aloha</i>).
Ipu no`eno`e	or "sedate sweetheart," is "the woman-fetching" (<i>ki'i wahine</i>) wind of Hā'ena.

3.3.7 Wahi Pana of Hā'ena

Henry E. Kekahuna surveyed the sites of Hā'ena in 1959 and wrote the following about Lohi'au's hale site (Pacific Worlds):

The sad remnant of King Lohi'au's residence foundation lies approximately 50 feet upland from the end of the Ka`umualii Highway...the royal foundation was terribly wrecked some years ago by the county of Kaua'i, by hauling stones from it for road building, running in a bulldozer, and even blasting rock. Through this utter lack of comprehension of the preciousness of Hawai'i's unique heritage bequeathed us by the ages past, and its complete lack of foresight concerning the great value of Kaua'i's then potentially foremost legendary relic of antiquity, was irreparably destroyed this fascinating place of interest to our island people, our posterity, and our host of visitors from afar.

Those of chiefly blood were trained in classes exclusively for chiefs. Their graduation ceremonies were elaborate and imposing. About ten days (*anahulu*) were devoted to feasting, *hula*, and the chanting of their name songs by the beautifully wreathed chiefly graduates. End to end of Kaua'i especially from the home districts of the students, would come their families and their hosts of relatives and friends, to lay before them heaps of food and other gifts. Canoes would swarm in the bay and crowd the beach at Hā'ena. In special honor of the chiefly graduates would be held glorious exhibitions of fire throwing, from the towering cliff of the 1590-foot high hill of Makana, at Hā'ena. And also the celebrated fire-throwing cliff of Ka Maile (or Ka Pali O Ahi o Kamaile), 2500 feet in height, at Nualolo.

The following excerpt is from (Pacific Worlds)

The hula school down here was the most revered of the hula schools. It was not for the faint-hearted to enter into scholarship at this *halau*, because it was expected that you would literally dedicate your life to learning. There were many strict *kapu* that governed the protocols of being a *haumana* in the *halau*.

3.3.8 Heiau/Sites of Hā'ena [References found in Bennett (1931:136-138)]

Site No.	Heiau/Site	Location	Comment (Figure 3)
154	Kauluopā'oa Heiau	Kē'ē	This heiau was thoroughly studied by Emory.... "The plan of this heiau structure is an unenclosed stone terrace, approximately one hundred feet long and sixty feet wide. It appears to have been built up twenty feet at the highest corner The retaining wall towards the sea is almost vertical, but

3.4.0 Historic References

By and large “Historic References” pertain to notable historic events, overviews of important place names and land tenure within the project area and districts. One of the most significant practices in the history of the Hawaiian people was their concept of stewardship of the land. However, over time, these practices were replaced by more western methods of land tenure and use, as the lands of Kaua`i went from the domain of the *ali`i nui* to the domain of the monarchy to various individuals and corporate entities.

3.4.1 History of Land Divisions

It was during the time of Kūkōna (ca. 1400s), father of Mano-ka-lani-pō (ca. 1405-1455AD) that the division of lands is said to have taken place (Wichman 2003:53-54). The islands were portioned into districts, sub-districts, and smaller divisions, each ruled over by an agent appointed by the landlord of the next larger division, and the whole under control of the ruling chief over the whole island or whatever part of it was his to govern (Beckwith 1970:383). Each island was divided into *moku* or districts that were controlled by an *ali`i `ai moku*. Within each of the *moku* on each island, the land was further divided into *ahupua`a* and controlled by land managers or *konohiki*. The boundaries of the *ahupua`a* were delineated by natural features such as shoreline, ridges, streams and peaks, usually from the mountain to the sea, and ranged in size from less than ten acres to 180,000 acres (Moffat and Kirkpatrick 1995:24-29, see also Chinen 1958:3). But sometimes “only the line of growth of a certain tree or grass marked a boundary; and sometimes only a stone determined the corner of a division” (Chinen 1958:1). The ideal *ahupua`a*, from mountain to the sea, enabled a chief and his followers to obtain fish and seaweed at the seashore, taro, sweet potatoes and bananas from the lowlands, and forest products from the mountains. However, this more often than not, was not the case (Chinen 1958:3).

Each *ahupua`a* was often divided and sub-divided several times over (i.e., *`ili*, *kuleana*, *mo`o*, *pauka*, *koele*, *kiha pai*), answerable to *ali`i* where the lesser division was located. However the *ili kupo* or the *ili ku* was “completely independent of the *ahupua`a* in which it was situated...tributes were paid directly to the king himself” (Chinen 1958:4). Some *ahupua`a* did not have any *`ili*, while others had as many as forty, “each with its own name and carefully defined boundaries” (Chinen 1958: 3). *Mo`o* or *mo`o`āina* were the next size of land division; these were set for cultivation purposes only. *Mo`o* were subdivided into *pauka* which were also for cultivation only. Patches of land cultivated by tenants for their chiefs were called *koele* or *po`alima* because they were worked only on Fridays. A *kihapai* was cultivated only for the tenant and his family. Rights to lands were mutable or revocable; a ruling chief or any “distributor” of lands could change these rights if displeased, or as favors--usually after a victorious battle, and after the death of the *ali`i nui* (Chinen 1958:5).

During the period between 1839 and 1855, several legislative acts transformed the centuries-old Hawaiian traditions of *ali`i nui* land stewardship to the western practice of private land ownership. In the first stage King Kamehameha III (Kauikeaouli) divided up his lands among the highest ranking *ali`i* (chiefs), *konohiki* (land managers), and favored *haole* (foreigners) (Chinen 1958:7-14; Moffat and Fitzpatrick, 1995:11, 17). This historic land transformation process was an evolution of concepts brought about by fear, growing concerns of takeovers, and western influence regarding land possession. Kamehameha III, in his mid-thirties, was persuaded by his *kuhina nui* and other advisors to take a course that would assure personal rights to land.

In 1846 he appointed a Board of Commissioners ‘To Quiet Land Titles’- commonly known as the Land Commission, to “confirm or reject all claims to land arising previously to the 10th day of December, AD 1845.” Notices were frequently posted in *The Polynesian* (Moffat and Kirkpatrick, 1995). Kamehameha III formalized the division of lands among himself (one-third) and 245 of the highest-ranking *ali`i* and *konohiki* (one-third) between January 27 to March 7, 1848. He acknowledged the rights of these

individuals to various land divisions in what came to be known as the *Buke Mahele* or ‘sharing book.’ These lands, however, were all “subject to the rights of native tenants” or *kuleana* lands, with reversionary rights to *ahupua`a* and *ili kupono* claimants if the tenant died without heirs (Chinen 1958: 29-30). The *Great Mahele* marked the end of the feudal system in the kingdom (Chinen 1958:15).

However, the legislature did not acknowledge this act until June 7, 1848 (Chinen 1958:16; Moffat and Kirkpatrick, 1995:48-49). “The mahele did not actually convey title to the various *ali`i* and *konohiki*; it essentially gave them the right to claim the lands assigned to them--these lands became known as the *konohiki* lands. The *konohiki* chiefs were required to present formal claims to the Land Commission and pay a commutation fee, which could be accomplished by surrendering a portion of their land to the government.” The government could later sell these lands to the public. Upon payment of the commutation fee, the Minister of Interior issued a Royal Patent to the chief or *konohiki*.

The last one-third was originally designated to the *maka`ainana*, but not acted on--instead it was set aside to the government, “subject always to the rights of the tenants” (Moffat and Kirkpatrick, 1995:41-43; see also Chinen 1958:15-21). *ili kupono* were the only *ili* (parcel) recognized in this process, all the *ili* and lesser divisions were absorbed into the *ahupua`a* claim (Chinen 1958:20).

In 1892 the legislature authorized the Minister of Interior to issue Royal Patents to all *konohiki* or to their heirs or assignees where the *konohiki* had failed to receive awards for their lands from the Land Commission. The Act further stipulated “that these Royal Patents were to be issued on surveys approved by the Surveyor General of the kingdom” (Chinen 1958:24; Moffat and Fitzpatrick 1995:41-43).

3.4.2 Hā`ena Ahupua`a

The *ahupua`a* of Hā`ena is located in the *moku* of Halele`a. Its valleys are not very deep and the *ahupua`a* is relatively small (1500 acres) compared to adjacent *ahupua`a* of Hanakāpī`ai on the west and Wainiha on the east. However, Hā`ena does include extensive, well-watered agricultural areas along two main stream valleys of Mānoa and Limahuli, as well as flat land along the coast making it suitable for both agriculture and habitation. The broad sand beach with its protecting reef would have provided a useful canoe landing and nearshore marine resources. Hā`ena is the westernmost *ahupua`a* in the district of Halele`a with easy access to the bountiful deep-sea fishing grounds of neighboring Nā Pali district (Major and Carpenter 2001:13).

Griffin (1984:6-7) concluded that the occupation of Hā`ena was divided into four phases, each with particular characteristics of cultural adaptation that focused on economy or sources of energy, residence or loci of domicile and task performance. His four phases are (1) Early Occupation, (2) Mid-millennium Stability, (3) Historic Transition and (4) Twentieth Century Adjustment.

The Early Occupation Phase is poorly known. Along the front of Ke'e beach two profiles have revealed deep strata as yet undated, yet suggestive of transient beach use. The data suggest a generalized strand looping adaptation, probably by parties of collectors-fisher people camped a few days at a time. No evidence of agriculture was found, nor is there any reason to argue its necessity. The origins of these hypothetical transients is unknown. Only by archaeological explorations in locations and environments favoring early and simple subsistence systems may we learn of centers of sedentism and population concentration.

The Mid-millennium Occupation Phase is well documented as to presence, duration, concentration, and general adaptation. This phase extends from the 1000s into the 1700s, and marks a shift of increased dependence on taro production and less on collection of marine fauna. The latter never was abandoned, yet as the human population rose, providence of marine resources seems to have diminished somewhat. We suggest that by the time of European arrival, most of the taro

pondfields were completed, the *heiau* built, and the importance of Hā'ena as a social, political, and economic center established.

The Historic Transition Phase, lasting from about A.D. 1800 to 1900, is exciting in what we do know, given excavation results and archival data, yet remains poorly developed. The land award testimonies are suggestive, but no excavations have sought the claimants' houses and fields, nor have the materials likely still hidden in written records and photographs yet been perused. Major anthropological questions remain: were Ha'ena and its people marginal to the colonial activities going on throughout the kingdom, or did Ha'ena play a role as a reservoir of economic and population strength linking Na Pali to Hanalei, Wailua, and other foci of political activity? When and how did Ha'ena lose population? How did the Hawaiian people of the area adapt to changing conditions and cultural systems?

The Twentieth Century Phase cannot be said to be without interest. To an anthropologist the variety of adaptive changes and new people utilizing Ha'ena make the phase one of the most interesting. Hā'ena between 1900 and 1950 saw the end of a land-and-sea focused adaptation, and the withdrawal of the last of the Hawaiian people. Only transient campers, again collectors and fishermen, used the beaches. The Taylor Camp "hippy" occupation was brief and, so far, a bit variant, but is heuristically useful in understanding the range of variations in adaptation to northern Kauai and the nature of American "counter culture" efforts to build alternative life styles. In fact, as we move into the late twentieth century, we are seeing new, diversified uses of Ha'ena. A new form of permanent residence is appearing, in the guise of expensive beach homes of our culture's socio-economic elite. At the same time continued transient occupation by both mobile (vacationing) elite and "squatting" lower class members of society is present. Most distant on the horizon, but still there, are the Hawaiian people, looking toward regaining the land once theirs, for farming, fishing, and residence.

The *mo'olelo* depict Hā'ena as a special place for a very significant chiefly class who interacted with deities such as Pele and her sister Hi'iaka. It was a sacred place where in traditional times Lohiau, lover of Pele and Hi'iaka, was once a chief of Hā'ena. He had a brother Limaloa and a sister Kahuanui who was the actual *ali'i nui* of Hā'ena, which was always ruled by female chiefs who ruled for life. The chiefess was also not under the control or whim of the paramount chief or *mō'ī* of Kaua'i, but rather independent (Wichman 1998:126). Lohiau and his sisters paid tribute to Laka and perpetuated the hula in a *halau* (school) whose significance is still honored to this day by *kumu hula* (teachers) and their *haumana* (students). Hā'ena as a chiefly residence continued into the nineteenth century with the Mahele Award [LCA 10613] of Hā'ena lands awarded to *ali'i* Abner Kuho'oheiheipahu Pākī, husband of L. Konia, granddaughter of Kamehameha I and father of Princess Bernice Pauahi Bishop.

<i>Ahupua`a</i>	<i>Number of Claims</i>	<i>Number of Awards</i>	<i>Ali'i Claimant</i>
Hā'ena	34	25	A. Pākī

Accompanying these chiefs and chiefesses were retainers and favored tenants who provided for the immediate needs of the chief's household.... Hā'ena has limited *kula* lands (flat, open fields/pastures) being that the cliffs drop so sheerly to the shore. Premium *kula* lands would be dedicated to those uses which sustain life – *auwai*, taro cultivation and residence (Silva 1995:18).

As an *ahupua`a* chief Pākī was entitled to select a *kapu* fish and produce of the land (generally taro); Pākī claimed that the *he`e* was the *kapu* fish of Hā'ena and had at least 12 *koele* that were cultivated for him (Silva 1995:25). Abner Pākī informs that *he`e* (octopus) is the *kapu* (restricted) fish [sic] of Hā'ena (Kingdom Konohiki Records 1852; 1854; 1857 In Maly 2003:19).

3.4.3 Konohiki of Hā`ena

Ahupua`a ali`i were allowed to have a *konohiki* or land manager and about 1837, Esetera Kekela was appointed as Hā`ena *konohiki* making her one of very few women who held this position; she too later claimed Mahele lands [5 parcels] in Hā`ena LCA #5477 [ʻIli of Kalole]. Kekela was the last known *konohiki* of Hā`ena.

3.4.3.1 Mo`olelo of Kekela, Konohiki of Hā`ena

Kekela`akalaniwahikapā`a (Kekela) had married Kamehameha I half-brother Kalaimamahu in 1804; five years later in 1809 she is widowed and in 1810 she is given [by Kamehameha I] to Kamaholelani [nephew of Kaumuali`i, king of Kaua`i] and returns with him to Kaua`i to live. Kamaholelani and Kekela settle at Lumahai, an *ahupua`a* not far from Hā`ena, which Kaumuali`i had given to both of them (Kamakau 1992:195 In Silva 1995:28-29).

Kamaholelani is sometimes referred as Kaumuali`i's cousin and his son. It was said that like Kaumuali`i and very few other chiefs of this time (early 1800s), Kamaholelani was adept at speaking and reading the English language (Kamakau 1992:244-245). He apparently was a court favorite and was well-respected among his peers. In 1820 Kamaholelani dies. Kekela remains at Lumahai until 1824. In that year, Kaumuali`i passes away, civil strife results and control of the Kaua`i dominions is given to O`ahu and Maui chiefs. Kekela returns to O`ahu and either forfeits Lumahai or is disposed of it. Further, not only is Kekela well-spoken for in the courts of Kamehameha and Ka`umualii, she is also the sister of Abner Pākī's own mother. Hence, her close association to her Hā`ena claim, Pākī's claim to the entire *ahupua`a* and her management of Pākī's Hā`ena holdings (Silva 1995:29).

Land records reveal that Kekela had arrived there [Hā`ena] in 1839 and had probably become settled with her entourage and tenants by 1847 [see missionary census below]. Kekela's obituary indicates that she was born about 1778, making her 69 in 1847 (Silva 1995:22).

3.4.3.2 Konohiki Privileges

Konohiki E. Kekela claimed that the *he`e* (octopus) was her *kapu* (restricted) fish of Hā`ena; and the *lehua* the special plant of Hā`ena.

Interior Department Doc No. 11 (1850) (In Maly 2003:20):

<u>Aina</u>	<u>Konohiki</u>	<u>ʻIa Ho`omalū</u>	<u>La`au Ho`omalū</u>
Hā`ena	Kekela	He`e	Lehua

Kekela also listed among the usual *konohiki* responsibilities, the management of 12 *ko`ele* whose names she gave as: Pākī, Kaho`okumaka, O`ahu, Kapala`a, Akole, Kaluahine, Ka`ili`ili, Pe`ekaua`i, Kalaole, Ko`i, Kanaele and Keokea. Soon after settling in Hā`ena, testimony reported that she made three *loko* or ponds within the *ahupua`a*. Native testimony does not reveal the names, locations, sites or nature of these ponds or whether these ponds are the *loko kalo* which she claimed in her application (see LCA #7949) (Silva 1995:26).

Kekela died in Honolulu in 1865 without issue. Her obituary read:

Death of an ancient woman. On Thursday, May 15, died at Honolulu, KEKELA, an aged Hawaiian female, believed to be eighty-seven years old. She was a nurse or *kahu* of the late high chief Pākī, and through a long life of upright conduct and fidelity, she has enjoyed the respect and esteem of the chiefs and all who knew her (Hawaiian Gazette June 17, 1865 p.5 c.4; In Silva 1995:29-30).

3.4.4 Mahele Awards in Hā`ena State Park Lands

With the exception of *kuleana* lands awarded to individual tenants, Abner Pākī was awarded the entire *ahupua`a* of Hā`ena in name only, which means that the land was not surveyed at the time. As *ali`i*, he held ultimate control over the resources within the *ahupua`a*, including water sources and products from the mountain and seas. He had twelve *ko`ele* (parcels) in Hā`ena. Eight LCA claims for Hā`ena (Figure 4) were within the Hā`ena State Park boundaries and included Pākī and Kekela as well as these below (Silva 1995:30-33):

Haole – LCA #7998: 8+ Lo`i 100 (f) X 25 (f), bound by Makana cliff and other cultivated lots; given to him by Mokuohai. This parcel was formerly cultivated by an older Hā`ena tenant Ho`oleali`i whose claim was not supported by Kekela who said Ho`oleali`i had returned his taro land in 1834 because he suffered poor health and was unable to maintain it. [`Ili of Kē`ē]

Kanehakili – LCA #7996: His land was given to him by Kekela in 1839; his lo`i measured 50 X 35 (f) and was surrounded by lo`i on three sides and by the beach on the other side...his house was located in Kekela`s lot where he lived since 1839. [`Ili of Kapihae]

Mokuohai – LCA #8200C/RP 7091: Mokuohai acquired his awards (house lot and pond field adjoining Loko Naia) from Kekela in the 1840; in c. 1844 Mokuohai received Loko Kē`ē; his holdings totaled 4.25 acres 25 rods which was considered a sizable holding for Hā`ena. Upon his death, his award descended to his grandchild and heir, Kaenaku. [`Ili of Kē`ē and Hā`ena]

Naiwa/Naiui – LCA #10941/RP 6388: Naiui received his taro lands from the *konohiki* prior to 1839 [prior to Kekela]. These lands contained 10 lo`i, a house lot adjoined them – the house lot was given to him by Kekela in c. 1839. These parcels appear to be situated in the midst of extensively watered taro lands. [family cemetery front of house cared for - 1964 photo (Major and Carpenter 2001: 19)] [`Ili of Kamo`okahi]

Poa – LCA #10674/RP 7638: Pea was a tenant from the days of Kaumuali`i [but] his claim was supported by Kekela; he claimed a houselot, 3 large taro pondfield and 10 smaller ones. His parcel was surrounded by well-watered taro lands, bound on the seaward side by sand hills. Pea died in 1849 and his widow claimed and was awarded the parcel under his name. [`Ili of Pa`akala]

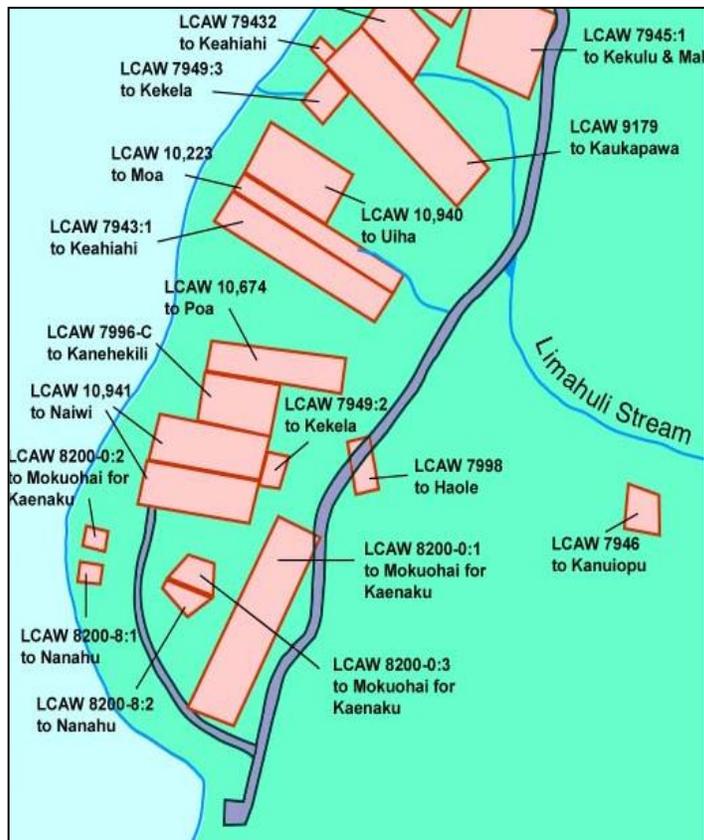


Figure 4. LCA Claims in Hā`ena State Park (Pacific Worlds).

Nanahu – LCA #8200B: Taro lands measured 20 X 15 (f); they appear to be situated between Loko Naia and Loko Kē`ē and his house lot is seaward of Loko Naia. Nanahu testified that his

claim descended to him from his relatives from the days of Kaumuali'i (pre-1824). He had received the land immediately from his brother who died in c. 1839. In c. 1840, **Mokuohai** arrived at Hā`ena, asking for a place to set up residence and plant taro. His lot was considered one of the most attractive and fertile parcels in the area. Nanahu and Kekela allowed Mokuohai use of part of the land, no gifting, however Mokuohai who may have been associated with Kekela claimed a part of Navaho's land and was awarded this parcel. Mokuohai gave Haole land to cultivate in 1846; this land was formerly cultivated by Hoolealii although Haole claimed them in LCA 7998. Ho`oleali'i had maintained his house lot in Nanahu's parcel, thus Nanahu's *makai* parcel contained both Nanahu and Ho`oleali'i's houselots.... Mokuohai and Haole may have had an affiliation with Kekela as they both arrived in Hā`ena after 1839 when Hā`ena was under Kekela's management. Kekela testified supporting both Mokuohai and Haole claims and discredited Hoolealii. [Ili of Naia]

3.4.5 Hā`ena Land Transfers (Post 1855)

Royal Patent # 3596, Land Commission award 106.13, apana 6, to Abner Pākī. This is the same land conveyed by deed of William Kinney, dated January 5 1875, to Kenoe D. Kekaha and 37 others as tenants in common, owning the said entire tract of land in 38 equal shares" (Silva, 1995: 25). Abner Pākī died in 1855, his wife Konia in 1857. Their only child Bernice Pauahi Bishop inherited their lands and in 1858 sold Hā`ena to W. H. Pease (Silva 1995). The Hā`ena lands were transferred several times including to a *Hui* (co-op); the Robinson family obtained an interest in the Hā`ena Hui lands. In 1955 the Hā`ena Hui was dissolved and the State later acquired the beachfront property held by the Robinsons for use as a public park. In the late 1960s the brother of actress Elizabeth Taylor, Howard Taylor, acquired a parcel of land and a community known as Taylor Camp was established and populated by transient residents. This parcel was condemned by the State in 1975 and added to the public land bank later becoming the Hā`ena State Park (Major and Carpenter 2001:16).

3.4.6 Kē`ē, `Ili of Hā`ena

Kē`ē is located at the end of Kūhiō Highway and includes the beach, canoe landing, trail to the *heiau* and *hula* platform, sand dune, comfort station, Kalalau Trail Head (foot/livestock trail) and Lohiau's house site, taro and sweet potato cultivation and at least one fishpond (although it could have been a *loko i`a kalo* – a pond for both taro and fish cultivation). The abundant resources of the area, both *mauka* and *makai* once supplied a good sized population in pre-contact times, most likely a permanent settlement, as indicated by archaeological cultural remains (Major and Carpenter 2001:16).

However, historic human activity and natural disasters such as the 1946 and 1957 tsunami greatly modified these lands and destroyed settlement evidence. The traditional oral histories (e.g. Lohiau, Laka, Pele & Hi`iaka, etc.) of the area illustrate that Kē`ē was once a very sacred and special place, a *wahi pana*, where deities and *ali`i* co-mingled and where sacred rituals (e.g. `ōahi, Laka's *hula pā*, *hula halau*, *heiau*) were conducted. For some reason by the 1930s when E.S. Craighill Handy visited, much of the cultivation of the greater Hā`ena had been scaled back with limited terraces in Kē`ē still functioning.

The sloping and flat lands east and west of Limahuli Stream between the sand dunes and the mountain sides were developed in terraces irrigated by ditches from Limahuli Stream. About a dozen of these terraces are now under cultivation in taro. The rest are used as pasture or abandoned under brush and grass (Handy 1940; In Major and Carpenter 2001:18).

By the mid-1960s Loko Kē`ē and Loko Naia were abandoned and only a few taro *lo`i* were still being cultivated. However, by 1967 the last taro crop was harvest in Kē`ē. The taro terraces would remain fallow until 2000 when a group, *Hui Maka`āinana O Makana* began to restore old taro *lo`i* (Major and Carpenter 2001: 19).

Today Kē`ē is a tourist destination where as many as 10,000 tourists visit in any given week (Major and Carpenter 2001:19). They come for the scenic drive, but mostly for the great snorkeling at its protected lagoon and its sandy beach. They also come for the hiking adventures to neighboring Kalalau Valley (11 miles) and visits to the wet caves (Waiakanaloa and Waiakapala`e).

Photo 18. Kē`ē Beach and Kai-kua`au-o-Hā`ena Lagoon



3.4.7 Other `Ili Names of Hā`ena

The following `ili names of Hā`ena are based on the database of *Waihona `Aina*: Ha`aheo, Hāli`i, Kahakaheana, Kahau, Kaia/Koia, Kaia`aimokua, Kalokomaikai, Kaloli/Kālole, Kamo`oloa, Kanulau, Kaoneana, Kapihae, Keleke, Kiwaa, Kupapaulalu, Lalaole, Mahau, Makanaulua, Mo`olalaole, Naia (fishpond), Pa`akala, Pahole, Pe`ekaua`i, Pu`ukahua, Puukoka, Waikapu.

3.5.0 Hā`ena State Park Land Resources and Use (Traditional and Historic)

The following map (Figure 5) depicts some of the traditional and historic resources in Hā`ena.

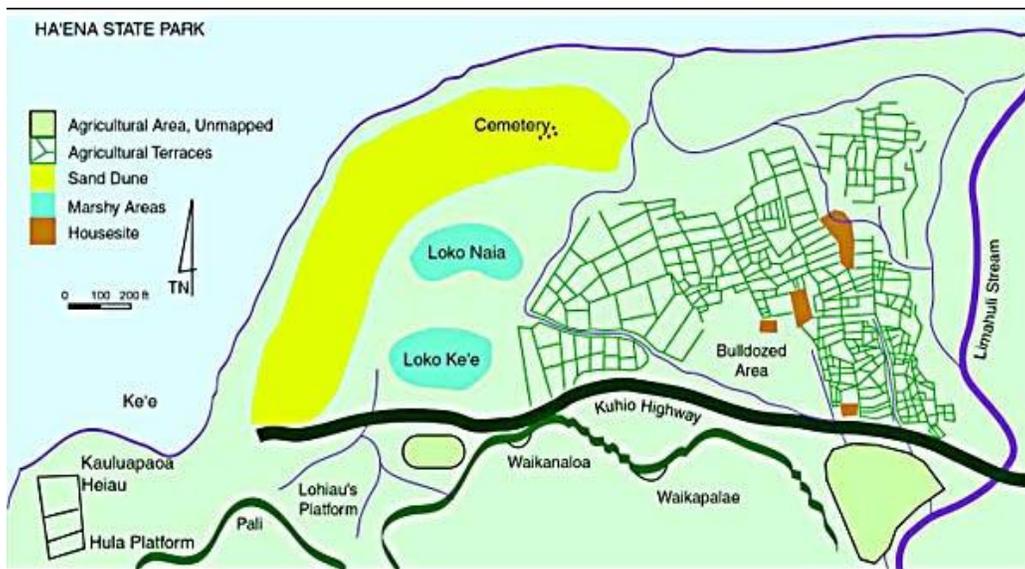


Figure 5. Map illustrating resources within Park boundaries (Pacific Worlds).

3.5.1 Hā`ena Pu`uone (Dune-banked Ponds)

Among the significant natural features in Kē`ē are the *Pu`uone* (dune banked ponds), called Loko Kē`ē and Loko Nai`a. The ponds, referenced in *kuleana* claims, 8200 B and 8200 C, were modified for cultural subsistence uses in antiquity, and remained in use through the early 1900s as fishponds and taro pond fields (In Maly 2003:34). One claim in the area generally is known as Kē`ē; specifically, the area of Loko Ke`e (Helu 8200 C) (In Maly 2003:8).

8200 B Nanahu at Hā`ena, Kaua`i. House lot, kula and *Loko* “Naia”. *Loko Naia* (Naia Fish Pond) is bounded *mauka* by *Loko Kē`ē* and *makai* by sea beach.

8200 C Mokuohai at Hā`ena, Kaua`i. Loko Kē`ē in the *ili* of Kē`ē; bounded *mauka* by Waiakapalaie *pali*; Napali by sea beach; *makai* by sea beach (In Maly 2003:18).

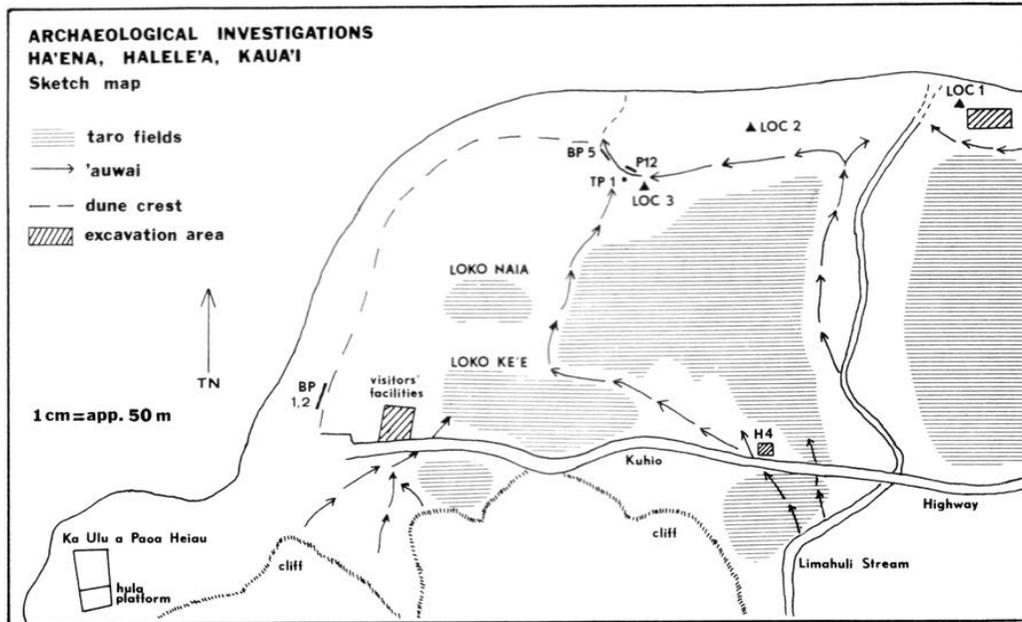


Figure 6. Map of dunes, fishponds, taro pondfields and `auwai systems (Griffin 1984: 9)

3.5.2 Sand Dune Habitation

Previous studies revealed the presence of household floors, hearths, *imu*, post holes and an array of midden and artifacts in the dunes and in the flat land between the bay and Loko Kē`ē (Griffin et. al. 1977, Hammatt et. al. 1978 In Major and Carpenter 2001:131)... It appears that habitation was concentrated along the dune crest (i.e. *makai* of the present unpaved access road to the poi mill area), spreading out at the west to occupy the whole flat area between Loko Kē`ē and the bay. Habitation of this area did not cease with the dissolution of the Hā`ena Hui, although the population did change radically (Major and Carpenter 2001:134).

3.5.3 Taro Lo`i

Land registry and testimony numbered well over 150 taro pond fields of varying sizes and shapes in Hā`ena. Of these 40 or so were situated within the Park site. That Hā`ena was well-developed and productive is unquestioned. Its water resources and available cultivable lands appear to be utilized maximally (Silva 1995:35). Lo`i restored in 2000 by Hui Maka`āinana. [See below 3.7.14]



Photo 19. Taro Lo`i in Hā`ena State Park



Photos 20-22. Evidence of burials on Parks lands

3.5.4 Burials

In August of 1994, the Hawai`i DLNR Division of State Parks conducted a community meeting to gather input for a proposed Hā`ena State Park Master Plan. At this meeting, concerns were expressed regarding the neglect of known burial sites within the park. These burial areas are known to local lineal families who formerly lived in what is today Hā`ena State Park. Some of these areas were formerly landscaped and maintained, leading to their slow deterioration. Some of these burials are as recent as 30 to 50 years old. The family burials are concentrated in one area within the boundaries of the park identified as a cemetery (State site #50-30-02-1892). Also the coastal dune system, a portion of which runs through the park, is a known burial area: some burials were located during previous archaeological testing and others have been exposed as a result of erosion. This pattern suggests a high potential for additional burials to be exposed in the future. The descendant families requested that a joint effort between the families and the Division of State Parks be initiated to stop further deterioration and natural destruction, and to restore a sense of respect to these sacred areas (TKC-H 2001:I-12-13).

3.5.4.1 Dune Burials

Sand dunes were considered “the most reasonable place for internment” for the Hā`ena commoners other than within the family house lot. “Hā`ena’s fairly sizable resident population through time would be reflected in more than moderate burial activity in the sand dunes.... Tidal and human impacts have negatively affected these dunes and will continue adversely unless policy, planning and enforcement measures are established” (Silva 1995:18-19).



Photo 23. Part of Dune System in HSP

3.5.4.2 Hā`ena Cave Burials

Given Hā`ena’s physical environment, one would expect customary royal internment in hidden or inaccessible areas on the steep cliffs. Numerous caves pock-marked the cliffs of this coastline thereby providing natural tombs for the chiefly class. Mythology verifies this practice in Hā`ena; Prince Lohiau was entombed nearby in a cliff cave until revived by Hi`iaka. It is possible and even likely that others of chiefly status have found a final resting place within these cliffs (Silva 1995:18).

3.5.5 Hā`ena Caves as Places of Interest in 1800s Literature

The editor of “*The Hawaiian Kingdom Statistical and Commercial Directory and Tourists Guide*” (1880) George Bowser, wrote about various statistics and places of interest around the Hawaiian Islands. The

following excerpt from “An Itinerary of the Hawaiian Islands” offer descriptions of the communities and various attractions of the Halele‘a region (In Maly 2003:35), especially Hā`ena.

From Hanalei I rode out to Hā`ena, which is at the northeast corner of the island, and is distant from Nawiliwili about forty-four miles. The land in this neighborhood is very sandy, and does not seem likely to be turned to account for any purpose but pasture. Two curious caves have been found near here. One of these, called by the natives Kanaloa, which means “the wife of the devil,” has no floor except the water which lies in it, the depth of which no one has yet succeeded in fathoming. At its mouth this cave is about sixty feet wide and twenty feet high, and from these dimensions the sides and roof gradually draw in, with a gentle curve, until there is only six or eight feet either way above the surface of the water. The full extent of the cave has never yet been explored. Its walls are perfectly smooth, and their curved surfaces are so perfect that they might have been cut by the hand of man. The other cave is dry, and is not far from Kanaloa. It is called Maninihola, and is about forty feet long, twenty feet high at the entrance, and gradually diminishing to about six feet at the inner end. The natives used to have various stories about monsters which inhabited these caves, but it is now impossible to find any connected story in what they tell you.

The editor of the *Hawaiian Gazette*, Henry M. Whitney, published a “Hawaiian Guide Book” in 1875 and 1890. The publication was produced as one of the early promotional guides to encourage visitation to the Hawaiian Islands, and included descriptions of the islands, agriculture, plantations, scenery, climate, population, commerce, and places to stay while visiting. His publications provided readers with commentary on traveling the old roadways through Hanalei and Nāpali and included several “traditions” of storied places on the landscape (In Maly 2003:36-38).

The wonderful caves, Waiakanaloa and Waiakapala`e, are about ten miles from Hanalei. In the early days of Hawaiian history, it is said, a brother and sister came from a foreign land, in order to supply the people with water, of which there was a great dearth. They came to a mountain, and determined to dig into its side until water would be discovered. Kanaloa, the brother, selected a spot where he thought he would find water, and after digging a long time detected a lake, whose waters he caused to flow over the land, and to this day the taro patches are irrigated from this source. Visitors are escorted into the arched entrance, and to the lake within. Here the natives light torches, and take the tourist for a row upon the water, which is cold and clear and fresh. At the entrance the depth of the water is forty- two feet, though further in it is said that no bottom has been found.



Photo 24. Waiakanaloa Cave

A strange sensation, a combination of awe and fear, creeps over one as daylight is left behind, and the frail bark glides into the blackness of night, and seemingly into the very bowels of the earth. The black waters reflect the ruddy glare of the torches, and the flickering flames throw strangely contorted shadows upon the rocky sides and ceiling of the cavern, while the half-nude forms of the rowers look weird and unearthly. Even the most frivolous scarcely speak a word, and then only in the faintest whisper, and it is with a long-drawn breath that the traveler steps out of the darkness into the light, but also with an impression that lasts for life.



Photo 25. Waiakapala`e Cave

The other cave, which was dug by Kapalae, has also an arched entrance, and though much smaller than the first cave contains a lake whose waters are ever covered by a thin film. There is a third cave, known as the “Dry Cave,” which one can enter and walk through, or can ride into on horseback. A few seconds walk into its depths brings one beyond the reach of daylight, and no one has ever ventured further within its gloomy recesses. A foreigner could not find his way out, and a native could not be persuaded to enter, because it is said that a gigantic moo (dragon) guards the cave. We are told that the ancient high chiefs of Kaua`i were buried there, far under the mountain, and that many priceless feather cloaks and feather helmets might be found. In speaking of the largest cave, the *Hawaiian Spectator* said: “Its entrance is gothic, from twenty to thirty feet high, and as wide. The entrance to the second compartment (or lake), is also gothic, and one half as large as the other opening. The first chamber is about 150 feet long, 100 feet wide, and sixty feet high, the whole forming a beautiful arch.”

3.6.0 Hā`ena Demographics of mid-1800s.

The missionary census of 1835 and 1847 a disproportion between the number of children and adults (Schmitt 1973:46 In Silva 1995:21):

1835		1847*	
Adults:	100	Adults:	108
		Male	46
		Female	62
Children:	16	Children:	54 [up to 20 yrs]
		Male	30
		Female	24
Deaths:	4	Deaths:	10
Births:	1	Births:	2

*At this time [1847] Hanalei’s adult population was 376 and children 146; Kalihiwai was 156 and 54; Wainiha was 153 and 63; and Kalalau was 115 and 16 (Silva 1995:23).

3.7.0 Previous Archaeological and Other Studies: Hā`ena and vicinity

As early as 1931 Bennett voiced this observation: “Unfortunately the continuity of culture on the Island of Kaua`i is broken. The older natives who still remember heiau (temples) are fast dying, and the younger generations are no longer interested” (Bennett 1931:3).

At the western edge of Halele`a, just on the border with the Na Pali District, lies Ha`ena, also the scene of considerable intensive archaeological study (Griffin et al. 1977; Hammatt et al. 1978; Griffin 1984). Earle (1978) mapped several large irrigation complexes that lie just inland of a large sand dune fronted by Kē`ē Beach. Excavations by Griffin, Hammatt, and others have revealed that these dunes incorporate well-stratified occupation deposits, with many superimposed cultural strata. Unfortunately, no radiocarbon dates are available, but a series of hydration-rind age determinations on volcanic-glass artifacts suggests occupation as early as the tenth century and continuing up until historic times. A number of relatively early artifact types were also recovered, including porpoise-tooth pendants and incipiently knobbed two-piece fishhooks. Hammat et al. (1978:168) outlined a tentative sequence for the Kē`ē Beach site. They believe that the first phase consisted of a ‘transient marine-oriented’ fishing settlement. By about A.D. 1200 there was a ‘population increase with a broader resource base,’ and settlement expanded inland. The 1400s witnessed ‘the development of intensified irrigation agriculture in inland areas with a continued use of the littoral environment,’ a pattern that evidently continued up until the historic period. The archaeological potential of the Ha`ena area, with both the stratified Kē`ē Beach deposits and the extensive irrigation systems inland, has just begun to be tapped and future work in the region may reveal much about the development of Hawaiian society in this part of Kaua`i (Kirch 1985:101-104 In Silva 1995:14).

3.7.1 Thrum (1907) “Tales from the temples” In *Hawaiian Annual for 1907*.

3.7.2 Stokes (1908, 1909, 1927) Various studies.

3.7.3 Emory (1929) “Ruins at Kee, Hā`ena, Kaua`i: Famous Court of Lohiau” in the *Hawaiian Annual of 1929*, Emory provided the descriptions for many of the sites listed in Bennett (1931) below.

3.7.4 Bennett (1931) *Archaeology of Kaua`i*. Bennett conducted his field work of Kaua`i archaeology in 1928-1929, “supplemented by a study of available collections, of published literature, and of manuscript notes on file in Bernice P. Bishop Museum” (Bennett 1931:3). Bennett (1931:60-69, 95) notes that various artifacts found are unique to Kaua`i such as the curved adze, gouged stone implements, polished stone knives, and Kaua`i pounder (ring, stirrup, and block), block grinders, the broad tapa anvil, *makaloa* sedge mats (Ni`ihau and Kaua`i), and decorated gourds or *ipu* (Ni`ihau and Kaua`i). [Hā`ena sites cited above].



Photo 26. Entrance to Hula Terrace



Photo 27. Ke Ahu a Laka



Photo 28 Kauluopā`oa Heiau



Photos 29-31. Views of Heiau Site

Site 154	Kauluopā`oa Heiau	Kē`ē, Hā`ena	Unenclosed stone terrace 100X60X20 at highest corner; top of heiau is divided by different levels
Site 155	Lohi`au’s dancing Pavilion & shrine	Kē`ē, Hā`ena	Above the heiau and against the base of the cliff are two wide and low terraces; the halau was on the upper terrace where dances were performed before the <i>kuahu</i> or altar to Laka, a simple frame decorated with leaves; the eastern end of the lower earth filled terrace slopes down...faced with four foot wall; a few feet back of level terrace is a bluff...a small rough platform stands against it, possible a grave....



Photos 32-34. Views of Lohiau's House Site covered with vegetation.

Site 156	House site of Lohiau	End of government road; stone faced, earth and stone Filled, unpaved terrace 80 feet long and 8.5 feet high at highest part....
----------	----------------------	---

3.7.5 Handy & Handy (1972) *Native Planters in Old Hawai'i: Their Life, Lore, and Environment.*

Almost certainly the first settlers chose protected bay and beach areas where fresh water was available and there was good inshore and off shore fishing...it would seem, if we accept the evidence of the story of Pele and her clan, that this (Kaua'i) was the first landfall of at least one group of early settlers (Handy & Handy 1972:268).

3.7.6 Griffin et. al. (1977) *Preliminary Archaeological Investigations at Hā'ena, Halele'a, Kaua'i Island*

The first survey and testing program began in 1977 under the direction of the author (Griffin et al. 1977). The most westerly portion of the dunes and back dune areas, and the terrain west of a transect running from the east edge of *loko Ke'e* to the outlet of the '*auwai* (ditch) by BP5 was closely examined on the surface. In addition, test excavations, coring, and profiling of seaward dune faces was completed. Several backhoe trenches were placed where stratigraphic data might be retrieved. Since complex stratification was apparent in the dune, special efforts were made to understand the depositional history and geoarchaeology (In Griffin 1984.:2).

3.7.7 Earle (1978) *Economic and Social Organization of a Complex Chiefdom: The Halele'a District, Kaua'i, Hawai'i.*

3.7.8 Hammatt et.al. (1978) *Archaeological Investigations at Hā'ena State Park, Halele'a, Kaua'i Island: Phase II: Excavations of Beach Localities and Visitors Facilities Area.*

3.7.9 Riley and Ibsen-Riley (1979) "Taylor Camp, Hawaii: The life and death of a hippy community" *Field Museum of Natural History Bulletin* 50, 18.22

3.7.10 Riley and Clark (1979) *Archaeological Testing and Excavations at Hā'ena, Kaua'i .*

During the summer of 1978 a combined University of Hawaii-University of Illinois (Urbana) Field School was held at Hā'ena. Griffin coordinated the project, while Thomas Riley directed the effort (Riley and Clark 1979). Riley worked at three "localities", each in beach deposits (Fig. 1). Two, localities 2 and 3, are in eastern and central portions of the park. Locality 1 is to the east of [6] Limahuli Stream, on the property of Mr. Barlow Chu. Riley and Clark opened horizontal test excavations as well as test squares and profiles (In Griffin 1984:2).

3.7.11 Hammatt and Meeker (1979) *Archaeological and Ethnohistorical Investigation at Hā'ena, Halele'a, Kaua'i Island.*

Riley's work on the Chu property was followed by further excavations in the high dune beside the stream and by surface mapping and ethnohistorical study (Hammatt and Meeker 1979a, 1979b). The work of Hammatt and Meeker was especially interesting, given its richness in data of historical archaeology. Hammatt, building on maps by Earle (1978) drawn in 1973, further mapped the historic remains of the Chu homestead and adjacent taro fields. These features ranged from the present road *makai* to the dunes (In Griffin 1984:2).

3.7.12 Yent (1980) *Preliminary Archaeological Testing of House 4, Ha`ena State Park, Halele`a, Kaua`i.*

Martha Yent (1980) conducted emergency mapping and salvage research of a *mauka* house platform, house #4, found near the road among the taro fields. While her project was necessarily limited by salvage constraints--a simple assessment of damage done by laying water pipe - her report has important implications for the Ha'ena settlement and agricultural systems (In Griffin 1984:2).

3.7.13 Yent and Ota (1983) *Field check of dune erosion and exposed cultural materials at Hā`ena State Park, Hā`ena, Kaua`i, TMK: 5-908:18.*

3.7.14 Griffin (1984) "Where Lohiau Ruled: Excavations at Ha`ena, Halele`a, Kaua`i." *Hawaiian Archaeology* 1(1), 1.18

3.7.15 Silva (1995) *A Historical and Cultural Report of H`ena State Park, Halele`a, Kaua`i.*

3.7.16 Major and Carpenter (2001) "Supplemental Archaeological Inventory: Hā`ena State Park, Kaua`i TMK: 5-9-06:14 and 5-9-08:1 through 19." Map below of sites inventoried (Figure 7).

Much of the archaeology done in Hā`ena has been on buried sites in the coastal flat, primarily because this is where houses have been built in the last two decades. Surface features are common in the valleys (Mānoa and Limahuli – agriculture and habitation), but the coast has very few. Archaeologists have not dwelt upon this pattern and it is not clear whether the lack of surface features reflects the original settlement pattern (post structures without rock walls), post-abandonment deposition of sand that has buried features, or historic removal or disturbance of surface features.... Archaeological excavations have failed to demonstrate that walls or platforms were common in the coastal area. Instead, it appears that although stone lined pits and pavements may have occurred, above surface features may not have ever been a major part of the coastal settlements. What has been recorded numerous times is the presence of fire pits, refuse pits, and one or more strata rich in charcoal, midden and artifacts. These appear to be present...in the Kē`ē dunes [pg 23].

Unfortunately, the archaeology that has been done is in response to development of particular private parcels; therefore the overall distribution is not known and what we have to go on are sporadic glimpses. Although the general opinion is that habitations were dispersed along the shore, rather than clustered in villages, burials seem to be concentrated in certain locales and had yet to be demonstrated that clustered habitations did not exist [pg 25].

Cultural deposits in coastal sands vary in age, but there are enough dates to show that Hā`ena *makai* was occupied by about A.D. 1300-1400. The earliest date (AD 252-549) fits the belief that Hā`ena would have been an attractive area for early settlement, but even the authors suspect the date's bias.... The A.D. 900-1100 dates for Kē`ē (Hammatt et al 1978) are invoked as justification for assuming occupation of the rest of Hā`ena, despite the fact that Kē`ē dates are based on volcanic glass and derive from a different valley catchment. There appears to be a strong willingness to accept the model proposed by Hammatt in 1977 saying that transient fishing camps began before AD 1000 and coastal settlement occurred in the 1200s [pg 26].

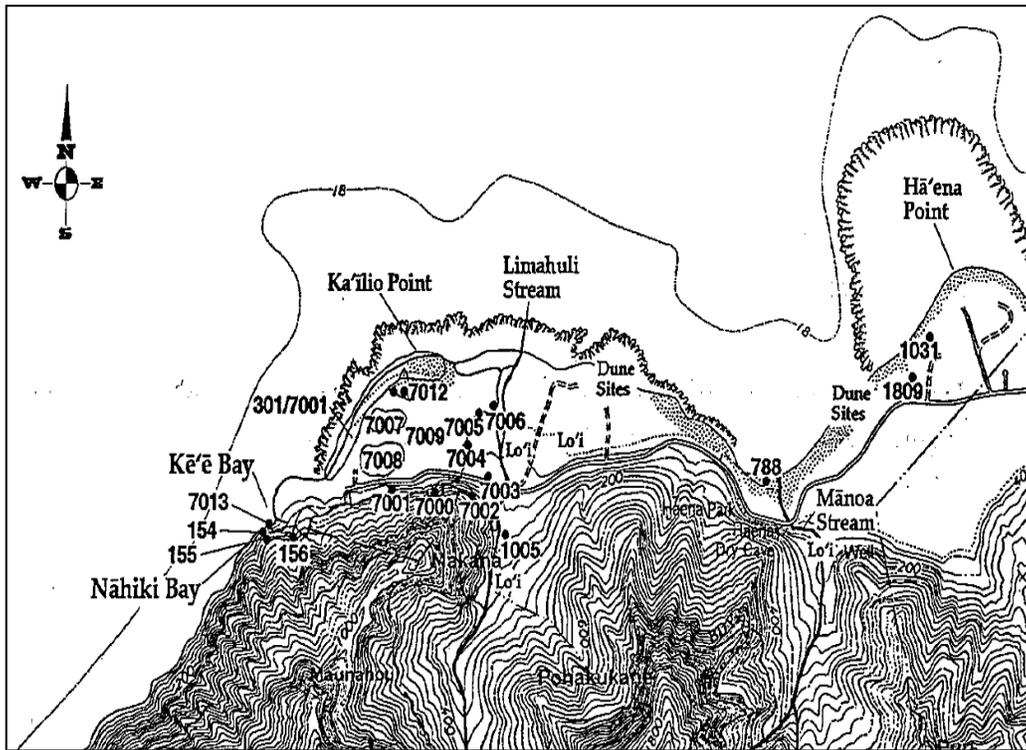


Figure 7. Recorded Archaeological Sites in Hā'ena (Major and Carpenter 2001:24)

Earl (1978) described the general settlement pattern in which inland *lo'i* complexes used all available land down to just behind the coastal dunes, with habitations occurring on and just behind the dunes. Historically, Land Commission data indicate a pattern of [pg 26] habitations dispersed amid the *lo'i*, but still with the majority of habitations located closer to the coast than to valley interiors [pg 27].... Field terraces immediately *makai* of the main road and on the west side of Limahuli Stream were mapped and tested, [and] showed evidence of both wetland and dryland cultivation. Three *mauka-makai* divisions of the project were identified, based on historical *kuleana* boundaries, morphological differences in features, and modern vegetation patterns. On either end, excavations revealed *lo'i* sediments, whereas the middle section lacked such a layer and contained an *imu* indicating at least temporary habitation.... Charcoal from the *imu* suggested occupation as early as AD 1050, well before the AD 1400-1500s dates from other excavations that were interpreted as beginning the wetland field system (Calis 2000:31-32, 35) [pg 29].

The Phase I *lo'i* complex [Figure 8] consists of 42 features, the majority (38) of which were irrigated pond fields; Features 1 and 40 are *auwai*; Features 41 and 42 are habitation features. Feature 1 at one time brought irrigation water from Limahuli Stream to System A, while Feature 40 is a large ditch that drained System B with runoff flowing into the ocean on the north/northeast preventing stagnation and flooding of the coastal dune habitation system. System A is bordered by the *auwai* (Feature 1) on the north and by the main road on the south. The original construction of the road (ca. early 1900s) most likely impacted this *lo'i* complex [pg 51]. The terraces within this Phase I are not the entire system; there were more terraces westward eventually draining into Loko Kē'e (65 meters west), a combination agricultural/aquacultural feature with no apparent outlet. System B is bordered on the south by the *auwai* (Feature 1) and on the northwest by *auwai* (Feature 40). Remnants of a Poi Mill (Site 7014), is just outside of this Phase I survey area [pg 53].

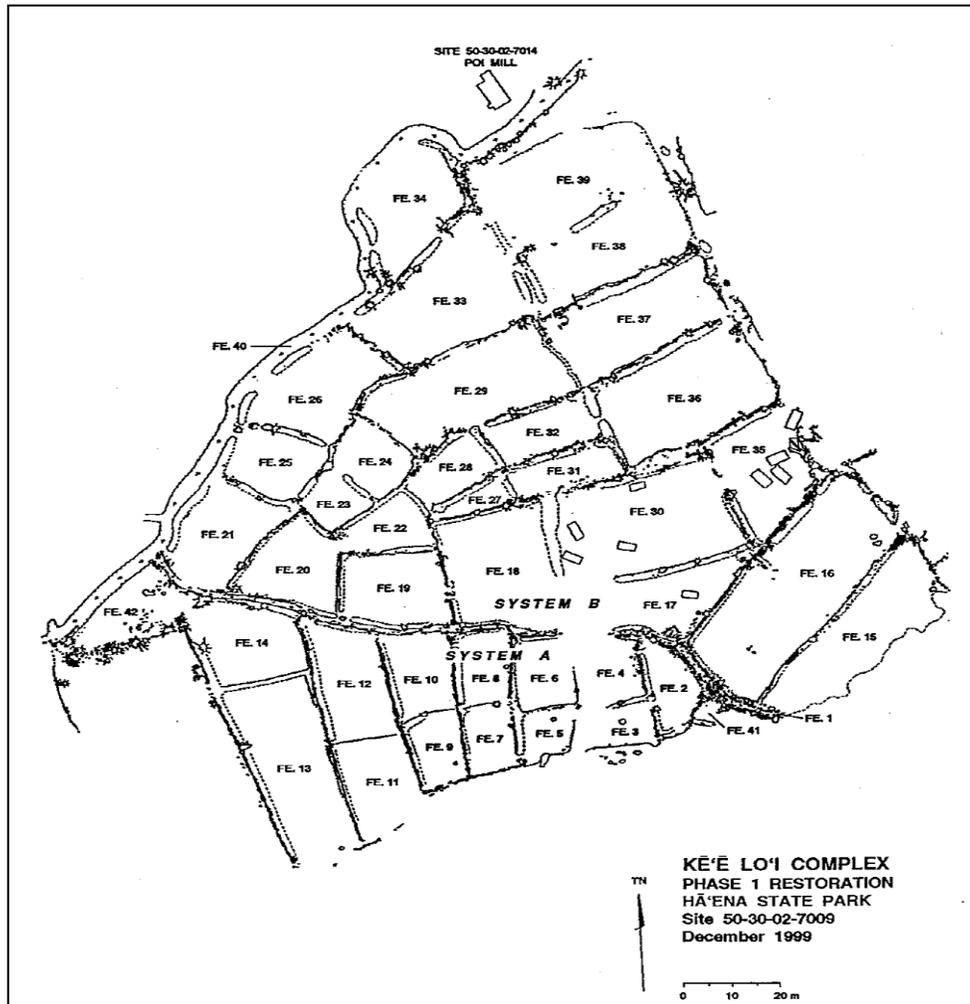


Figure 8. Kē'ē Lo'i Complex, Hā'ena State Park (Major and Carpenter 2001:52).

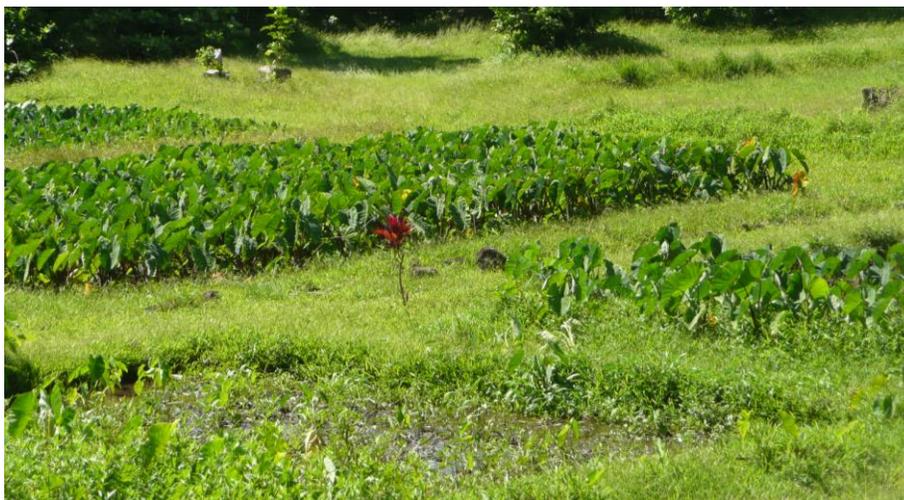


Photo 35. Part of Restored Lo'i System in Hā'ena State Park.

Subsurface testing included test units, stratigraphic trenches (6), a backhoe trench (near the *makai* extreme of the project), and shovel probes [pp 49-50]. Several charcoal samples were submitted for dating. The results yielded several date ranges: AD 1270-1410; AD 1320-1350; AD1390-1440; AD 1440-1480; AD 1440-1640; AD 1470-1660; AD 1490-1600; AD 1520-1590; AD 1620-1680; and AD 1730-1810 [pg 112-113].

Fishing and canoe-making artifacts recovered on the surface provided evidence of marine subsistence activity. Prismatic blades, basalt flakes and an adze fragment all indicated that work occurred amid the fields, but without sufficient resolution to interpret specific activities.... Together, the artifacts yielded the unsurprising information that non-agricultural activities occurred in or near the western edge of the project area [Phase I *lo`i*].... But since excavations were not performed in the middle of [the] field, it would be unfair to say that such artifacts cannot also be found away from the banks. Blades and flakes would be useful tools for preparing *huli* (propagative cuttings) and cleaning harvested corms, so their presence should not be interpreted as evidence of non-agricultural activity [pg 138].

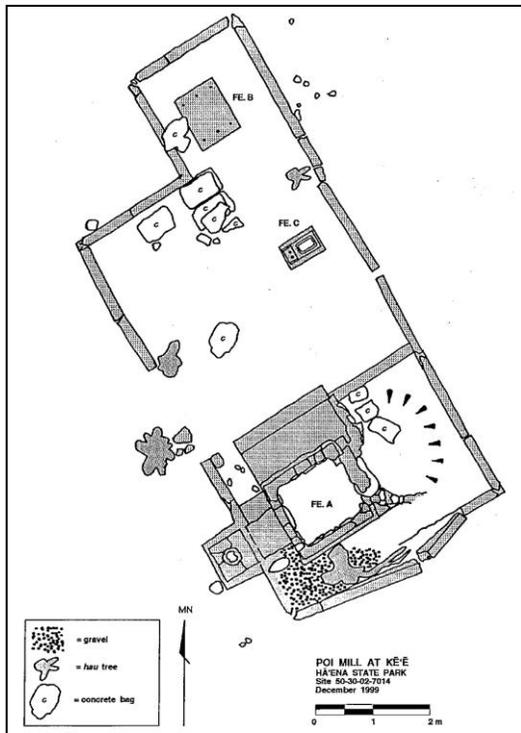


Photo 36. Remnants of Poi Mill Foundation

Figure 9. Poi Mill Foundation, Site 50-30-02-7014 (Major and Carpenter 2001: 54)

3.7.16.1 Chronology of Kē`ē Site 7009 [Agricultural System] [pp 148-149]

- | | |
|--------------|--|
| AD 1300s | Irrigated agriculture begins at Kē`ē as early as the late 1200s... “intensive” irrigated pond fields are the first form of agriculture here |
| AD 1500s | Existing fields at Kē`ē are overhauled. Large fields are subdivided and the current <i>auwai</i> is constructed. Activity appears to be system-wide and appears to differ from simple repair and rebuilding of fields that have been inundated by flood or wave sediments. |
| AD 1830-1875 | Boundaries of fields change and water flow is probably rerouted and managed differently as Kekela, a non-Kaua`i chief, becomes <i>konohiki</i> . Several land claimants in the area arrived during her tenure.... Abner |

	Paki received all portions of Hā`ena not otherwise claimed
AD 1875-1955	Most of the <i>ahupua`a</i> of Hā`ena is sold to a Hui of native tenants in common. Parcels now correspond to shares in the Hui.... By the 1930s, farming has declined and the tsunami of 1946 kills many residents and causes others to stop farming.
AD 1955-1967	Members of the Hashimoto `ohana are the last to farm the fields of Site 7009. Although some modern machinery is used for certain tasks, cultivation methods are essentially the same as those used traditionally. Hui parcels are sold off in a piecemeal fashion by many owners.
AD 1968-1975	Taylor Camp commune, a hippie settlement, occupies what is now the central area of the park. No further cultivation of taro, and the `auwai is abandoned. Population fluctuates and farming consists of small, unirrigated gardens on the old terraced fields. Perhaps for the first time, residents do not rely on local subsistence.
AD 1975-2000	The State of Hawai`i condemns land west of Limahuli Stream, evicting Taylor Camp residents so that the land can be developed as a State Park. Parking and restroom facilities are built and other land use is limited to squatter camping, fishing and recreation, all of which are oriented to the shoreline.

3.7.16.2 Significance Evaluations

Aside from modern additions...all of the features within the project area [Phase I] are significant under NRHP and SRHP criterion D and certain features are significant under Criterion E of the State of Hawai`i criteria due to their cultural significance to Native Hawaiians [*auwai*][pg 150].

3.7.17 Dye (2002) “Archaeological Assessment for a Residential Lot at Hā`ena, Kaua`i (TMK:5.9.02:62)”

The assessment included a brief field check of the parcel to document existing conditions and an extensive review of maps and other documents to determine the likely presence or absence of unrecorded historic properties. Information on historic land-use patterns before, during, and after the *māhele* is presented, as are the results of archaeological surveys at Hā`ena Point and in the vicinity of the residential lot. The archaeological information is synthesized and used in conjunction with information on land-use patterns to formulate expectations for inventory survey results.

4.0 ETHNOGRAPHIC SURVEY

The Ethnographic Survey (oral history interviews) is an essential part of the Cultural Impact Assessment (CIA) because they help in the process of determining if an undertaking or development project will have an adverse impact on cultural properties/practices or access to cultural properties/practices. The following consultant selection criteria were initially considered:

- ❖ Have/Had Ties to Project Area
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Referred by State Park staff
- ❖ Referred by NTBG-Limahuli staff

Both State Park and Limahuli Garden staff had names of *kuleana* land awardees, lineal descendants, cultural practitioners, well-known historians and long time residents of the project area and vicinity. An effort was made to contact people from each category.

The consultants for this Cultural Impact Assessment were selected because they met the following criteria: (1) consultant grew up, lives or lived in the vicinity of the project area; (2) consultant is familiar with the history and *mo'olelo* of Hā'ena and vicinity in general; (3) consultant is a known Hawaiian Cultural Practitioner in the project area/vicinity; (4) consultant is a lineal descendant of *kuleana* lands; and/or (5) consultant was referred by Staff of Limahuli Garden or State Parks (see Demographics Table 3 below). Copies of signed "Consent" and "Release" forms are provided in Appendices H/I.

4.1.0 Research Themes or Categories

In order to comply with the Scope of Work for this cultural impact assessment, the ethnographic survey was designed so that information from consultants interviewed would facilitate in determining if any cultural sites or practices would be impacted by the implementation of the proposed *Hā'ena State Park Master Plan and Environmental Impact Statement* (Job No. F74C664A). To this end the following research categories or themes were incorporated into the ethnographic instrument: Consultant Background; Land, Water, Marine and Cultural Resources and Use; Anecdotal Stories; and Project Concerns. Except for the 'Consultant Background' category, all the other research categories have sub-categories or sub-themes that were developed based on the ethnographic raw data or responses of the consultants. These responses or clusters of information then become supporting evidence for any determinations made regarding cultural impacts.

4.2.0 Consultant Background

The project and the CIA process was explained, then after signing the consent form, each consultant was asked to talk about their background; where they were born and raised, where they went to school and worked, and a little about their parents and grandparents. This category helps to put the person being interviewed at ease, establishes their connection to the project area, their area and extent of expertise, and how they acquired their proficiency. In other words, how the consultant met the research consultant criteria.

The consultants either have family ties to the project area and vicinity and/or are familiar with the history of Hā'ena State Park and vicinity. Six people were interviewed; all are part Hawaiian. Four were interviewed in their homes (one in Hanapēpē, one in Wailua, one in Kīlauea and one in Honokua, South Kona); one was interviewed at Limahuli Garden and one was interviewed at NTBG office in Kalāheo. Efforts were made to interview three more, but there were no responses to emails or telephone messages.

Table 3. Demographics for Hā`ena State Park CIA Interviewees (all are part-Hawaiian)

Interviewee	YOB	B/R	Lived/Lives/Works	Connection to HSP
Alquiza, Kapu	1954	O`ahu/Anahola	Hanapēpē (CP-H)	Ke Ahu a Laka – cultural practice
Hashimoto, Thomas	1934	Hā`ena	Hā`ena (CP-F)	Fishing; <i>lo`i kalo</i> ; <i>ohana</i> history
Medeiros, Clarence	1952	Kona	Kona (CP-T/LD)	Descendant of Mokuohai (<i>kuleana</i> land)
Wichman, Chipper	1957	O`ahu/Kaua`i	Hā`ena (M)	Limahuli; Hā`ena <i>lo`i kalo/mo`olelo</i>
Wichman, F. Bruce	1927	O`ahu/Wailua+	Hā`ena (M)	Limahuli; Hā`ena <i>mo`olelo</i>
Wichman, Randy	1957	Wailua/Hilo+	Hā`ena (CP/M)	Limahuli; Hā`ena <i>mo`olelo</i> , cultural sites

CP = Cultural Practitioner; H= Hula; F Fisherman; T=Taro Farmer; LD = Lineal Descendant; M = Mo`olelo (history expert)

4.2.1 Kapu Kinimaka Alquiza (Kumu Hula)

[This interview was disrupted when Kumu Kapu had to leave to pick up a grandchild; the follow-up scheduled interview did not work out.] I don't know why my parents named me this but my mom and dad both married twice, my mom had ten children and my dad had from his previous marriage had six, so they had sixteen children...we were all raised together. My mom had three children from her previous marriage, and then came us 7 kids after that. My dad had the six children before the second batch came around. I'm from the second batch. That's how we distinguish ourselves with each other, first batch and second batch. But anyway, I was actually born on O`ahu, and at a very infant age my parents moved to Kaua`i - I was the youngest at the time, so my [younger] brothers and sisters...four of them, were born on Kaua`i. I was the youngest at that time moving from Honolulu to Kaua`i, so I knew nothing of Honolulu, actually. My dad inherited the first batch of children, and when he met and married my mom, she raised the first batch of his and her children. When my parents moved to Kaua`i (1954) they lived down at Nawiliwili, near the Marriott - that's where we were raised; and the rest of my brothers and sisters were born there.... I think it was 1963 or 1962 when we moved away from there to go to Anahola - in 1963 my mom got awarded a Hawaiian Homestead in Anahola...we stayed there until we all graduated from high school, married, and left the home. Prior to St. Catherine's I went to Immaculate Conception School in Līhu`e from kindergarten to fifth grade and then St. Catherine's from sixth grade until eighth, and then Kapa`a High School from ninth to graduation. Gee I'm amazed I can remember those days. Of course some of the kids came after, so we never had all sixteen children in the house at the same time. Some grew older and went off to their specific destinations, and others came and took their spot. Life has really passed for my mom and my dad.... My mom is Ellen Pai Kinimaka. My great great grandfather's name was Keawemahi Kinimaka; he married Kawahine Pai is what I know her as, I don't really know her first name, but she was from Borabora.



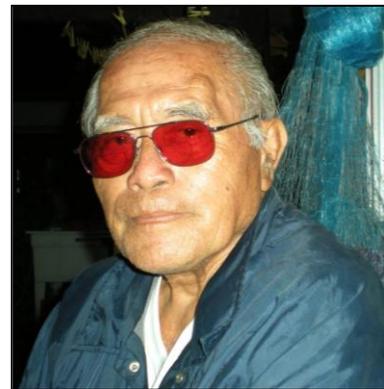
My dad, Joseph Kamanaua Kinimaka, was a glaze tile setter; he was one of the first here on Kaua`i, which was really cool at the time, but of course we really didn't know it yah. Then for his recreation he was a falsetto singer, and a steel guitar player. So his first batch of sons became great entertainers in Honolulu.... We have a cousin who's been doing the family genealogy for over ten years. I was just amazed when we all came together as a family and she busted out this chart, and generations going far back to Umi and Liloa and so forth and I'm like 'holy cow!' My great-grandfather was David Leleo Kinimaka; he was commander in chief to King Kalakaua's guard; he was a Lt. Major. We have documentation on his life too. I don't know my grandpa or my grandma, but my cousin found a lot on his father; so our great-grandfather and great-great-grandfather, and great-great-great-grandfather! My last grandson is named after my great-great-grandfather. Anyway, my dad is from Kona and he was raised in an orphanage, so I don't know much about my grandpa and grandma. He met my mom there in Kona, and moved to O`ahu and living in some really poor districts of O`ahu.

After high school - I was kinda active in high school stuff and did a lot of traveling during high school for Aloha Airlines and Ala Moana Hotel -- we were promoting both the airlines and the hotel during my four years of high school. My kumu was a great kumu and he was asked to take on this responsibility of promoting the islands, and so he selected a few of his dancers within his halau - he was Manu Gonzalves. I was really young, but I was always told I looked old kinda - like mature looking, so I guess I was fortunate that that happened because I got to see the east, west, and Midwest of the mainland; Canada, New Zealand, Australia, all those beautiful places. I know I would never have been able to see these through family travels because of our situation of having so many children, you know how that goes. So I was so blessed - not only me - I had other sisters; there were five of us, so all five of us had the privilege of going to different parts of the world through hula, through promotion of our islands etc...all the way through high school...some of us after high school. I went to college and another went off to continue dancing and traveling, and stayed with our kumu until he moved away. We started out with Auntie Lovey Apana when we were little, and she did get a few promotions but we were babies then, but we did most of the island kind of performances. Then when we got bigger and moved to Anahola, my mom took us to Uncle Joe Kahalelio who was in Kapa'a, so we went to Uncle Joe when I was in the sixth or seventh grade, we stayed with him until we were all out of high school. He was the one that actually took us around the world. It was a good thing that my mom pushed us to keep hula because she just believed that we needed to be part of hula. My mom was a kahiko dancer and to her it was important that we did hula...she danced *auana* too.

I danced at age five with my sisters. I went to high school, got married at age 20, my first son at age 21, my second son at age 24, and my daughter at age 27 I think. I started teaching when I was part of a halau here on Kaua'i that was going to enter the Merrie Monarch Festival, they asked me to come and be part of it and I did. My daughter was two years old at the time, and so I did what my mom did, bring her along and get her to find some interest in the dance. Lo and behold as I was practicing for the whole year with this halau, she was two years old and I sat her in the back, and I said okay mom is gonna practice, you stay here and you watch or dance. She ended up dancing in the back at age two.... Kumu Lake became my kumu at one point, and then he passed away. I called him my kumu although he wasn't officially my kumu, but he took me into his home and shared mele, history, and stories.... And there was this other gentleman, he wasn't my kumu, he's a haole guy that was raised by a Hawaiian family on Lanai, my dearest friend, Kepā Maly. And he is sooo knowledgeable; I love him dearly. Today, I'm so happy because he was here on Kaua'i, married a Kaua'i girl and they lived here and then he moved to Big Island. But when he was here on Kaua'i, he worked with me in my halau. And it's that kind of people that I like, Kumu John and Kepā, that kind of people we get drawn together. They're just all true, real people. When he was on Kaua'i, he educated me on so many places on our island. He got me interested in reading more about Kaua'i, our home. I said wow I've been missing out on all these things! And then he moved away.

* * *

4.2.2 Tom Hashimoto I'm Tom Hashimoto and I was born (1934) and grew up in Hā'ena with my mom and dad and my brother Joe Hashimoto. My mother was Dora Poe Hashimoto; she was born in Makua on O'ahu, and my dad was born in Napo'opo'o on Hawai'i. I lived in Hā'ena 41 years. Actually I bought this house [in Kīlauea] and moved away in 1973 to Princeville, and moved up in this area [Kīlauea] in the 1970s when I bought this house. My father worked for the County and my mom worked in the cannery during the summer months...Hawai'i Food Packers. I went to school when we came to Hā'ena -- think we were the last class in Hā'ena -- you don't know the area so it's kinda hard for me to explain. The place is all *kamani* bush. Well, right in between there from Kapuhi to that one near Kuhao, it's right between there that's where the school is...on the mountain side, right where you know that big open lot, that nice open



lot down after you pass Kapuhi and the houses, it's right next to that, but they all covered with *kamani* trees that area. After that to Kapa`a High School, but I never graduate because I went to work to help support the family because my two brothers were in Korea at the time, was war time eh? And then for the Army not taking me, I went go join the National Guard in 1950 to help support my dad. I went to work here and there like the cannery, indoor kind...at the time job was scarce in 1950 and then I worked for McBride for five months in 1954 I think, and then after that I worked for Julia Wichman -- I worked at their house property in Hā`ena. I would be asked to do all kinds of work by Mrs. Wichman and doing all that because I was employed by her. I worked for her and then in 1968 we were called -- the Unit and they took us to Honolulu because we got activated. So I went away for two years. And then while I was in the service, because Mrs. Wichman was paying me my wages while I was away, I figured I owe her something so I came back and worked for her, although my mind was so in the career, in the service because I had 18 years, but because of that I came home and then I was working at the Hanalei Plantation Hotel (overlooking Hanalei River mouth) - worked over there until 1962 until the time that place closed. [Club Med] that's the place and we worked the club too.

I worked for Mrs. Wichman and then I planted some taro down in where the State lo'i is right now, down by the cave. But my pastime was fishing, so that's the reason why I learned it well. My dad was the best fisherman; he go throw net fishing. And of course we fish with old man Hanohano Pa; he was a good fisherman too. And of course I fish with my father-in-law Henry Tai Hook. I still do that now -- throw net, making net, everything, like most fishermen. The only net we had at the time and then we had to go pitch *kala* and then we had *nenuē*, that's the only kind of net we had, nothing heavy duty. And the other kind of fish we just throw net on 'em like moi and all that. Bang-bang net is about 500 mesh across with floater and lash too like the time we using *aho*, and *aho* had 96 -- no more this kind rope now you know. That's how we use to rig the net with the *aho*. Twine, that cotton twine, you call them *aho*. We use to use the *hau* floater because you don't have to go buy. You only buy the *aho* and weave and of course the twine -- another *aho* to lash the net down to the length. We use to do everything for the bang-bang net; in fact we use to do everything for the throw net too. We use to sew our own net and we learned it very young. When I was 12, I started to make nets because we were interested in throwing net because my dad catch all the fish, so we learned that time. The other thing we use to catch too was the turtle; that was our meat. So what we use to do was catch the turtle and give every Hawaiian family over there a turtle, one each house. Even at that time the jobs were kind of scarce and the wages no good. Like the County use to pay \$30 a month. So my dad when kinda lay off from the County for a little while in the 1940s I think and worked for Dora Eisenberg and had better wages. At that time the wages Mrs. Eisenberg paid \$55 a month, which was good money. And then of course my dad use to ask her for car like that and then she use to go Garden Island Motors and buy the Model A and give to my dad. My dad would pay back slowly and all of a sudden she tell my dad just to keep the car and stop the payment. She just gave him the car. And we had several cars from Mrs. Eisenberg. My dad use to take care all the properties out here like we use to take care up to across the pond down by Limahuli, we use to take care all that. That was Eisenberg's. And then where Mrs. Wichman owns, they had house made for us, and we stayed there part of the time and where my sister lives, that's where our property was so we use to live there too. We lived there for many years, all my teen days.

My dad use to work *sailamoku* on the boat, you know, deck hand. They call it *sailamoku* at the time. He use to work for the *Wai'ale'ale*, they had I think 3 or 4 ships that ran between the islands to haul cows and rice and whatever. He use to work over there on that boat partly and then go back to the big island when the coffee season harvesting time to help his dad - his dad was a coffee farmer. See, what happened, my grandfather came here - I guess he had a family back in Japan, he came from Japan and married a Hawaiian woman over here. That's where my dad was born and then us guys. He had my dad and one sister; I think there was five of them. My grandma was full blood Hawaiian. My grandfather came from Fukuoka, Japan. My dad's name was Joe Mahi'ula Hashimoto. He came here because...well his grand uncle Keoni - that's what brought him over here. He [Keoni] came to this island when he was 80 years old in 1910, that's why he knew this island all over the place because after my grand uncle passed away, he lived with old man David

Pa. Old man David Pa...this is a complicated story. The old man was 17 years old, he married my grandma who was my grand uncle's wife that came from the big island, and my grand uncle married David Pa's sister, just like switching over. When my grand uncle passed away, he (my dad) lived with David Pa, because David Pa married my grand uncle's wife – my grand aunt. And then we stayed with the Pa family too because the connection was there because my grandfather married the old man's sister, who was Kaihilani. And all these people were born and raised in Kalalau, the last family to come out from Kalalau – the Pa family yeh. So when I was growing up Hanohano Pa's mom who was Wahinekouli, she was in her late 70s when I was in my teens. We got all acquainted with these people because my dad use to live there part of the time, live over there, live in Waimea, live in Hanapēpē, that's why he knew people that lived on this side of the island and in Waimea, Kekaha and Hanapēpē. Like the Akuna, the Malama, all those Hawaiian families. He lived over there. And my dad was very good in Hawaiian - fluent Hawaiian. I don't know why my dad didn't want us to learn the Hawaiian language. Even Japanese, that time they had Japanese school. But war time they went close the school because the Army took over all those places. I understand Hawaiian when people talk, but to converse, no. Now we kinda older and it's hard to learn than the young people. I know my granddaughter, five year old, she good in Hawaiian because she go to the immersion class. Now they get school for that. You just let em go because that's the only way they going learn the language.

I was young, my dad when he was around with people he always talk the language, you gotta talk it every day and that's what happened. Like they would talk funny kind stories that we no can hear or understand, that's the reason why maybe because they talk that kind. So that's what happened. After we grew older we kinda know what the hell was going on he would explain to us. Like he use to tell us...oh you know he use to listen to the music from Alohikea, you know who that is? He was a composer, a cracker-jack composer who lived in Waimea, I think he came from the big island. He used to write songs about how he used to handle a woman. So when the song is sung, so beautiful but the meaning of the song is nasty! And my dad use to explain to us but we were older already. We were married when he use to do that. We use to go sing that song and he laugh because we don't know what the hell's going on. He gotta explain to us what the song was all about. That's how we knew.... My dad never go high school, he went grammar school, but actually it's learning with the people in this difference areas, that's how he learn that. My dad knew his Hawaiian, nobody touch him. Even the name places of this whole island, when you ask him, he tell you what the name of that place like how these activists and all that he tell em the name. Even the other side Waimea side, he going tell you because he lived all over this island, that's how he knows. Like from the old people, the Hawaiians. I was real stupid I never go sit down with my dad because at the time I had family, I gotta go work. I use to work for Julia Wichman during the day and at 5 o'clock go work hotel til 2 o'clock in the morning, bartender. I did that for what 35 years. And then quit 1994. steady go work. And then go work only Limahuli. But I did plenty things in my life.

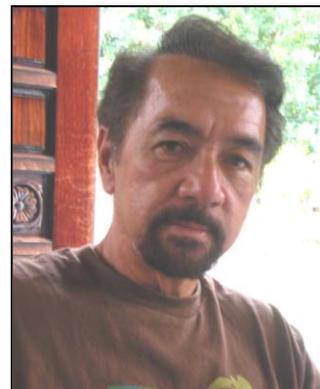
I think they (mom and dad) met over here because my grandma had three families - grandma Martha had three families. One was my mom folks - my mom and her sister - and then they had another family, Saffery. She was for Leonard Saffery. And then she came here and she married Kimokeo Kanehe, so that's how my mom moved over here. And that's how I think my dad got involved. My grandma was Martha Ka`aiakamanu from Maui - the family still there. That was her maiden name. And then she has two sisters in their 80s and they still living in Maui, I think in Lahaina. And they look exactly like her, the smile everything, reactions. That's what my cousin told me because they went down there, they had one reunion so that's how they met these people. And we were thinking about it because last year we went down for my granddaughter's baby luau in Makawao, but we never even think about it because we got so involved but by the time we came home was too late already. So we didn't have any time to go run around the island. [With Saffery] they had two; I think one girl and one boy. My uncle's name was Jack; now I forget what my aunty's name was... ah Sarah - Jack and Sarah Saffery. Kimokeo Kanehe, that was her third family; she had three children with Kimokeo Kanehe.

I don't have that much education, but in my own way, I see all around the way these guys act and that's what made me try..... Where my sister's living in Hā`ena that's my house. I went build that house as my memorial for my dad...but you know what, my dad wanted me to get the property but I wish I didn't get it. My sister, in fact, when my mom died my sister never go put that probate in court, because we were asked to; myself, my brothers Joe, Jack and George who lives in the mainland, and we got two acres in Hā`ena – that's what she got. She tells my brother George 'that's my property, my property' - til today. And you know what happened, she never realize today computer eh? My daughter Dancit can go in too, go find out who own the property; my daughter Leilani own the property - only her name on there. My sister went change um.... I paid the inheritance tax since my dad. Our property value was 40,000.... That's why the Hawaiians sell all their property in Hā`ena because they couldn't handle the tax. Like you know the Chu family they own below Limahuli, Barlow Chu – retired, worked with me. They had to sell um, forced to sell. No can handle the tax. All over there. With that kind price behind over there, no way.

I get a little over 20 when I got married in 1954 I was 19. I got married young. 54 years we were married. We had one reunion, on our 50th anniversary we had one party, my girl went throw one party for us at the Raddison, and that one they went surprise us they went catch us really off guard!

###

4.2.3 Clarence Medeiros, Jr. My name is Clarence Medeiros Jr. of Kona, Haleki`i and Kanāueue, North Kona. I also reside in Honokua, South Kona. I went to school in Kona, from first grade to sixth grade at `Alaē School, South Kona. Then I went to Ho`okena School, South Kona. When we -my dad and I-moved to O`ahu – he was working on O`ahu with some other cousins. We stayed in Kalihi, and I went to Lanakila School. We also stayed with my great grandmother over there. She was Mary Pacheco Costa Pimental, on my father's Portuguese side. She lived on Birch Street. Then we moved to Kalihi. Then we moved back to Kona, and I finished school at Ho`okena School until eighth grade. Then I went to Konawaena High School. I joined the U.S. Army in 1969 until 1972. After that I went work but I also went back to school - masonry apprenticeship school in adult education classes at night and earned my journeyman certificate and worked as a journeyman mason as block setter, cement finisher, stone mason, and doing masonry skills such as layouts and estimates. I continued my college education at UH Hilo that included the requirements like English, math, and took up blueprint reading, structural engineering, Hawaiian language, Hawaiian history, ceramics; and I took some fun courses like golfing. I worked in the construction industry for a couple of years, and did some heavy equipment operator jobs too, because when I was in the military I went to engineering school and got a certificate from the military. I worked at the Kona Hospital in the engineering department and took care of all the electrical, nurse's call systems, etc. throughout the facility. I had to stop working because my injuries that I got in Vietnam was getting really bad and I get hard time move around to do my job because I would fall off the ladder when my legs would buckle and my injuries kept me in the hospital as a patient a week at a time. So I was asked to stop working and got disability income. I then stayed home and took care of my farms: macadamia nut, coffee, dry-land taro, a big banana operation, avocado, cattle, and horses, but coffee and macadamia nuts were the main money-maker for my farms; and I also grew produce for the house. I did that from the late 1970s all the way up until 2007 when I decided to let the pigs enjoy my farms because price for the macadamia nuts went down significantly and it was not worth the effort. We haven't harvested the nuts for almost a year now. The coffee is okay. I still plant the taro, and give the huli to my children and grandchildren to work, pass em on to the next generation to learn about em so they can continue.



So now we talking about Hā`ena. But since I`m talking about the taro, I wanted to say how I got involved with Hā`ena because Nellie, my wife, had a seminar on Kaua`i . She was there for three days, and during the day I was by myself and I had this rented car, so I went gallivanting. In preparing for the trip, I had to drive quite a ways to find this place where our relatives had property. In doing genealogy thirty years ago, somehow we get family over there by the name of Mokuohai. I did more research, looked through books and listened to stories from our elders that kinda pinpointed the family to Hā`ena. Then I got the book from State Preservation, Dorothy Barrere - she made this book that was an Ali`i Awards book about the *konohiki* that were awarded properties from the king. That name Mokuohai was in that book, the probate. This was all probates. It showed the genealogy; and then my genealogy was in this probate. It looks like since this probate was done, he had property on Kaua`i and it was in Hā`ena including three kuleana that were located across from the wet cave by the end of the road. Awarded was half of Honokoa Ahupua`a on the Nāpali Coast of Kaua`i.

So, during that trip I left the hotel and went on an adventure and came across this helipad for tourists located on top of the hill on the way to Hā`ena. So I went to inquire how or if I needed to make an appointment to go on the helicopter that was available, and how long it would take to go where I wanted to see; so the tour people said it would take about two hours, so I paid them and went. We flew along the coast, we flew around Hā`ena, Limahuli, and at that point I still didn`t meet anybody yet; but I saw smoke by the wet cave area. We flew in a circle, looking down, seemed like people were opening up the land yeh, cleaning and burning rubbish and stuff. So, we made a couple of passes there and then we went along the coast, but while we were flying somebody was giving us the “birdie,” maybe we were irritating them, tourists or what. So after I got off the helicopter and drove the car down and I seen people working there. So I parked the car, walked across, and talked to this guy who introduced himself as Carlos Andrade, Chipper Wichman, and his wife Hauoli. As we got talking it appeared that Hauoli was a relative of mine on my mother`s side and she was related to the Leslie family etc. from Kona. They invited me and showed me what they were doing and they asked me what was my interest over there. I had my genealogy documents with me and the paperwork that talked about Mokuohai kuleana. They were really happy because they met me, a relative, who was interested. So they asked me if I wanted to come back and help them and join the organization, a nonprofit group. Since then I went back at least three times to help them with the lo`i, planting and clearing; but I haven`t been back there for maybe six years or so, because I`ve been busy and had to take care of some health problems. I got to know Chipper and stayed at their place the second time we went.

The last time we went back Halau Hula O Maiki had a hula uniki there and we were invited to go because Nellie is with the halau, and they asked me if they could have a black pig because whoever they tried to get it from they couldn`t come up with it. It had to be a black pig that was big for the occasion so they can eat the whole thing – as part of the uniki, the people had to eat everything, all of the pig, the whole thing. I went to my friend and he got the pig, it was about 80 lbs, and it was really down to the wire like they were gonna do it on Saturday, we got it on Friday and got em to Kaua`i . When we got there they had prepared the *imu* but it had rained so heavy that they had hard time getting the imu lighted. We had hard time making the water hot because everything was wet; but we got it done. The uniki went on and it was something that I was really impressed with – how they did their customary uniki. I was asked by Coline Aiu to sit with the *kupuna* on top where they had all the guests but I stayed down with Chipper them because I was talking with them about all of the work and stuff so anyway I felt too young to be sitting up there with the *kupuna*, and they respected my wish that I stay down and help with the work.

After the day I went on the helicopter and met with everybody, I still had two days left. So the next day I went to the real property tax office and met this guy named John Kruse who was working there. He made me all the maps that I needed, the areas that I was concerned about. Even Ni`ihau, he made some maps of over there. He gave me the tax map keys. I went to see the County guys the next day about any archaeological stuff down there, and they gave me this report and I was looking for the burial of Ka`aumoana Moa Niau, my great-grandmother who moved from Kona to O`ahu and then to Kaua`i under the name Moa. When I looked at the public notice

that they were looking for descendents of these people, I knew exactly who was there and who I was looking for, and that was the Moa family from South Kona – Kalahiki Ahupuaa, and I found my great grandmother; she was buried over there. Alongside the Mokuohai family was family on my father's side; so I hit two birds with one stone and that fulfilled my search when I was looking for my mother's grandmother – my great grandmother. So I found the link and made the connection. When I went to the census records I found some of our other family that moved from Kona and lived over there in Kapa`a and Waimea areas under the name Moa that came from Kona.

My great-grandmother was married to a Chinese; my great-grandfather was from China. Zen Sing. When I looked in the ship's manifest, I looked for Zen first -- Man Sing that was his first name. But then my grandmother was born they did em just like the Hawaiian way, they drop the Zen and they used Man Sing. That's why her name was Annie Man Sing. Sometimes they would use Zen in the end, not all the time. The first name became the last name - same way in Hawaiian. The first name became the last name. A whole bunch of them came on the same ship, all cousins. I found all of the cousins that came the same time. Was good, because when you look back on the ship's manifest, they tell who the parents were and on the mother's side – Soong family. Sometimes it was Soong depends who wrote em yeh. Other times was Sun, but they were related to Sun Yat Sen.

The Mokuohai genealogy, the one that was awarded the *kuleana* in Hā`ena and part of Honokoa comes from here in Kona and also in Ka`ū. They left Kona when Kamehameha's fleet went over to fight or take care of business with Umiumi; and he never came back here in fact he came back but he was awarded some lands and then had children over there [Kaua`i] – a different batch of children from the ones that were left here. That Mokuohai, his first cousin is Puhalahua that I descend from, who married Kanika. Mokuohai married to a La`a, and he had a batch of children that stayed in Ka`ū. With another wife that was in the probate, they had a bunch of children that stayed in Kaua`i. Then he had another wife in Kona that would be the Ka`ahanui line from Kona and Ka`ū; so there's a whole bunch of descendents of that Mokuohai. When I was on Kaua`i I met one of my cousins at the same time when I met John Cruz, I went to the OHA office and met one lady named Francine something. She was working at the OHA office in Kaua`i. I just went in there to ask her if anybody by the name of Mokuohai was registered or who come in to inquire of the genealogy to call me, and I gave my telephone number. So when I went back to the hotel waiting for Nellie to get off work so we can have dinner, my phone rang and it was Francine. She said you know had one lady came in here and said she was from the Mokuohai line just after you left that was registering at the office but her last name was Daniels, and she lived someplace in Kapa`a close to town. So she gave me the number, I called her and we met at her house, we had lunch and she had a nursery and was shipping all kinds of plants like ginger etc. to the mainland – really, really nice kind plants, good flowers. I helped her and gave her some of the information I had. She was going share some stuff with me of her line, and she told me that the Fernandez living in Kaua`i who was a state forest enforcement officer, the boss was from the Mokuohai line – a descendent from the William Mokuohai family that was living there, and his mother who was a daughter, married a Fernandez. There are other relatives but I never had a chance to meet any of them. She was gonna get back to me about stuff but she was in the Hawaiian Kingdom movement, and she asked me my opinion, and I think that might have turned her off when I answered her.

As far as the Mokuohai line, that was the only person that I met on Kaua`i. I still have to go find out about the Fernandez family and whatever other families - their names. The Mokuohai was the *konohiki* for that area, the *kuleana*. I think more at the Honokoa area along the coast. There's a big valley in that area. When I walked in quite a ways I seen some remnants - look like people planted coffee in there because I seen some coffee trees. That's some terrain for wet and steep. La`a was one of his wives. Another wife he had was Ka`ahanui, and that wife was from down in Napo`opo`o. And I also seen records of her with him. He had some other wives and had children from them. One of the wives was Kaikai. We come from his cousin. So if we go back to their parents, I descend or Puhalahua descend from Keli`iuwela or Keli`iuwelawela and Kuwalu; where Mokuohai descend from the brother of Keli`iuwela and the mother is `Aukai; but his wife is just

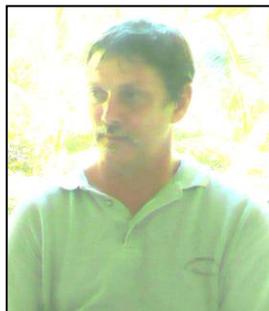
La`a. [Mokuohai's father was] Kekoa and then the grandfather is `Aikanaka. `Aikanaka with Kama'i Keohokalole - that's where Kalākaua and Lili'uokalani them come from. But I come from `Aukai, the second wife – that's where Keli`uwela and Kekoa come from. [Kekoa's grandfather was] `Aikanaka. His second wife was `Aukai yeh, sometimes known as Keli`i`aukai. I seen in different books, Keli`i`aukai, like at the Bishop Museum, it's Keli`i`aukai. In this probate, it's `Aukai. Z. P. Kalokuokamaile's genealogy, it's Keliiaukai. But I saw on record where he had another wife – Kaiohua or Kaiaha. And then they had one daughter named Liliha. Liliha, when they were doing the sandalwood trade `Aikanaka was kind of involved in that; I'm sorry, would be `Aikanaka's sister not daughter – Liliha. They had a fort someplace on O`ahu; they were bringing all the sandalwood down, and she was there. I think it was in Kamakau's book.

[`Aikanaka's parents were] Kepo`okalani and Keohohiwa. And Kepo`okalani descends from Kame`eiamoku and Kamakahekui. Kame`eiamoku is one of the royal twins; his twin brother is Kamanawa. But Kalākaua's father is Kapa`akea who married Keohokalole – he descends from Kame`eiamoku's brother; so they marry family down here yeh. [The twin's parents were] Keawepoepoe and Kanoena. That's where Alapa'i comes in yeh. Pi`ikoi. That's where all the Kawanakoa descendants come in, from this Pi`ikoi line. David Kawanakoa them, they all come from the Pi`ikoi line. Keawepoepoe is the common denominator coming down.... This is old stuff. But we were very fortunate that they had good lines and were easy to find. Once you find one everything, connect back to. That's why every time we get into some civil action kind stuff, especially with land titles, we most likely can get our native rights because of 1778 and when Kamehameha conquered all the islands, we can link ourselves back to almost every place where `Aikanaka was, or Kepo`okalani, all the way back where they either fought or lived there or was in control of battles and stuff so we can pretty much be successful and in most of the cases in fact every one, we get our native rights, not just because of the third generation back but we can go back all the way to prove that in Makalawena or in Maheula or in Ka`u, each chief was in all of that area or buried over there or something. We are very fortunate we can get the proof with all this kind documents, archival records, we can connect to them. Most cases, hard to beat other people that have been on the land for a long time but they cannot beat our native rights, then we can use the old trails or practice some of the things that were done in the past yeh. [Mokuohai had a kid there also named Pu`uhalahua Mokuohai] he died, and then Pu`uhalahua named his child Mokuohai. That's the one I showed you the picture. You see this one here, Kauhewa, Mokuohai he get one sister and she was named Kauhewa. So both sides used each other's names so they no lose the name. So, when we name our grandchildren, we brought the names back, like Kapa`akea; my brother David, he carry Mokuohai; my grandson Lincoln, we named him Kawehe because of Kamae's father; and then my granddaughter we named her Analea, which is another version of Ana Keohokalole's first name; the young one with the curly hair, his name is Na`ea. Kanika, this one here, her father's name was Na`ea and he descends from Keaweheulu; so we named him Na`ea Keaweheulu.

One day, when my dad was still alive back in the early 1990s, we went and met with one of the Kawanakoa grandsons, his name is David, and his brother was running for office – Quentin. He lives in Kona, he has an 11 acre coffee farm up in Holualoa - hard working guy. So we met and then we talked and shared, and we now know we're family; real humble guy, hard working. Eventually, I try meet as many people as I can and go meet the families, and then show em how and make the connection – find the missing part, and everything connect.

#

4.2.4 Chipper Wichman I'm Chipper Wichman and I was born on O'ahu (1957). Our family is from Kaua'i here; raised both on O'ahu and over here on Kaua'i because every summer we'd come and spend our summer with our grandmother who lived in Hā'ena. That's how I really got to appreciate and get to know some of the people over there. Around 1972/73, I came to live over here with my grandmother. Since 1976 I've lived here full time. My wife father's side, my grandmother is Juliet Rice Wichman, and her husband...well, my Tutu Man is and I were married in 1984 and we raised our kids in Hā'ena. I graduated from Roosevelt, then UH.



My father is Charlie Wichman, and my mother is Jean Wichman. My father was born here on Kaua'i and my mother, Oklahoma, I think; she came over here on the Lurline. I think my dad was working that time as Assistant Attorney General for the State, and he met her - my dad is an attorney. My grandparents on my-actually [my grandfather was] Holbrook Goodale. My grandmother [Juliet Rice] had two children from Holbrook Goodale -- Uncle Holby Goodale and my father. Then he died in a plane crash, and she married Frederick Wichman. And she had a third son, Uncle Bruce...he'd be my dad's half-brother. Then all of them - the two previous sons were adopted so they changed their names to Wichman, but Holby when he got older ...when he became an adult he changed his name back because...the Goodale line was going to die out.

To me it's [Hā'ena] a very special area. Very significant for the fact that...when you go back and look at how our *kupuna* looked at the world and their traditional life style, the way that they lived and their cosmological beliefs and relationship to the *`āina*...it was all so very integrated. It was dependent upon their ability to have a personal relationship with the land and live a subsistent lifestyle to be able to have access. Much of that was factored throughout our *pa`e`āina* when western style of land ownership and looking at the world came to be, starting with the Mahele and the creation of actual land ownership. The Mahele was really the beginning of the demise of the traditional Hawaiian way of life because of the factoring of that system.

4.2.5 F. Bruce Wichman. I am Frederick Bruce Wichman. As it turned out, I was born in Honolulu (1927) but the first seven years of my life were in Upper Wailua on this island. Then my father and mother moved away to Oregon, so I didn't get back here until 1945. And this has been more or less home ever since, I've always considered this home even though I've been all over the world. My interest in the Hawaiian stories and place names because as a child we had no electricity so the family always got together in the evenings and there were always stories told, especially up at Kokee or Kipu Kai. And it was just part and parcel of growing up with all of these stories. When I got back here, although when I got back in '45 I worked for the Garden Island newspaper for one summer under Charlie Fern, and he gave me a column to write on, 'Kaua'iana' it was called. So I began to put down certain things, and he would put me on to certain kind of feature article stuff ... like when the *aweoweo* came in by the thousands into Nawiliwili. It's always been of interest. When I got back here after I retired, I found that no one was using the Hawaiian place names; nobody knew the old Hawaiian stories, and so I started collecting both. So my 'Place Name' collection for the entire Hawaiian Islands is around 5,000 words now. I've got four books out with eighteen stories each, and I have two others already in manuscript.



I went to Menlo School in Menlo Park, California for junior high school and junior college. Got my AA degree out of that.... because we were shifting...I was put into boarding school in September of 1941...but of course with no chance to come home. So I just stayed in the school

campus through the summer...instead of just sitting around doing nothing, I took all the courses I could to keep busy, so by the time I was sixteen I had my AA degree. Then I got back to Honolulu before the war ended, finally got permission to come back. And then I went to the University of Hawai'i for one year, but got kicked out over whether I wanted to go to school or play bridge...couldn't do both! By that time I had no problem so I went to the University of Oregon and graduated from there. That was just when all the GI's were coming out...you could get on the waiting list but with no guarantee that's why I went to Oregon.

[My major] ended up being English Lit...it was easier to do. Perfect for what I'm doing now. Then the Korean War broke out...I had missed World War II by twenty days, and I volunteered and was in the first volunteer group in Hawai'i. Got down on to the pier to go to Korea and the officer came down and said, 'You, you, you...step forward...you're going back to Schofield.' The draft had just come in and they needed people who could man typewriters. And because I had a college degree, they figured I could type. I volunteered for Korea five times and ended up in Germany! But during that Germany experience I ended up being -- I was a Private First Class ...and because they had nobody else who had, they thought, any kind of qualifications they wanted to put through One-Star Generals and Colonels into 'public speaking', but they wanted them to be trained so they put me in charge of them. And you talk about a PFC telling a General what he was doing wrong and in public speaking! But that's when I really realized I enjoyed teaching. I could do it...I mean I didn't get court martialed by these guys! After I got out of the army, I took a year and Gladys Brandt had Kapa`a -- she gave me all but two days of the school year as a substitute teacher. So I taught everything from kindergarten though all of the high-school courses....so when I got to the university to get my life-time certificate I knew where I wanted to teach, which was the four, five, six-grade level. I was a pain in their neck because I already had practical experience and I was older than the other students in the class...and would tell the teachers that some of the theory that they were expounding was a bunch of whatever! Gladys never really forgave me for that year of teaching because I walked off with her daughter! But, I was a teacher and then we moved to Switzerland. It was our dream to be in Europe for a year, and we ended up staying eight. I did technical writing for a lot of small American engineer firms, which kept us there...happily. We raised our six kids there and then we came back to Massachusetts...finished my teaching career and came back...and now have started a whole new career. So that's basically the story of my life.

My dad is Frederick Warren Wichman. He was in the Legislative House in Honolulu from '31 to '33. He was part of the Massie Case that took place and he accompanied my grandfather, Charlie Rice, to Washington to try to persuade the powers that be that the Navy should not take over the islands. The Navy wanted to put Marshal Law on the Islands and run it. They almost got there but... I think that's one of the reasons why he wanted to leave. In his old time -- his father had come to Honolulu in the 1880s -- he answered an ad that King Kalākaua wanted an engraver and jeweler. My grandfather answered the ad and got the job! He was H. F. Wichman; he had a store on Fort Street at one time.

My mom was Juliet Rice. Her father was Charlie Rice, the senator ... from Kipu Ranch. Her grandfather was William Hyde Rice, and of course he is the one that wrote the book on Hawaiian legends...Bishop Museum Bulletin #63. It's called *Hawaiian Legends*, I believe. And he was fluent in Hawaiian, his father had come out as a teacher to the Wichman Mission in Oregon, but he and the Harris' were put up in the home of Mr. Hall, who had just set up the printing facilities in Oregon, and he persuaded these two couples not to go because the situation was so bad, so they stayed here. William Harrison Rice taught at what is now Punahou, the Royal School. Then he was the manager for the Līhu`e Plantation. And an even older branch is my grandmother, Grace King -- Grace King Rice, [my mother's mother]. Grace's grandmother had come from Mo`orea to here to Hanalei. A German ship came into the harbor, this was in the late 1830s, and the First Mate on board lay dying. The Captain had asked him what his last wish was, and he said he wanted to die on land. And so they dropped him off in Hanalei and she ended up taking care of him, nursed him back to health and they had six children! So part of the family has been here since 1830s. Her grandmother was Ann Mo`orea Henry, married Freidrich Wundenberg. And he is the

one who blasted out the Kalalau Trail. This was in the 1860s. He did not want to endanger any of the men that were working with him clearing this trail, so he himself set all 400 charges of dynamite that they blew up along the trail ...because he was the Superintendent of Roads for this district and for the Monarchy.

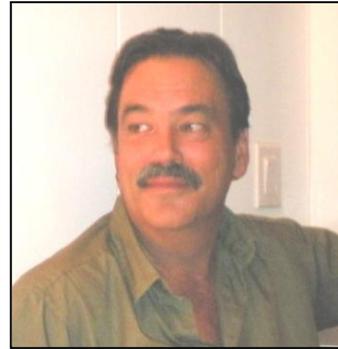
I had one wonderful time being a chauffeur...that was at the Constitutional Convention time when they were electing people for that. And I drove grandpa to all the different political rallies that there were... My grandfather was part of the militia in 1896. And her [my wife's] grandfather was put in prison for being part of the Hawaiian side of the attempt to put Lili'uokalani back on the throne. William Hyde Rice was a member of the Cabinet, I believe -- he was the Governor of Kaua'i. The family story says that when Lili'uokalani was deposed, before she abdicated, that he wrote her and asked her to come to Kaua'i and declare her 'kingdom' there. The center of her kingdom would be there. And evidently so did the Maui governor. Because she trusted the American word, she didn't...all she had to do was walk down the bloody steps...if she had gone and confronted those sixteen marines, they never would have fired on her. They wouldn't have dared. Or if she had gone down the back steps and taken a ship to either island, and then said, 'Here is my kingdom'.....it would have been so different. There had been Lahaina, there had been Kailua, no reason why she couldn't have set up back in Lahaina, or our own Līhu'e .

When I grew up at Pihanakalani....do you know where the Hindu temple is now... That big house there...my father built it...that was my childhood home. My wife's grandfather was raised in Kaupo -- family name Kanuha...[Hana] -- that's like Hā'ena used to be. When my mother first moved out here when you got to the Powerhouse Road, after the *hau* hedges...then you came up over that Kaumaka Point and around, from there on ... narrowly, was just a track through the grass...sandy...double track...that's all there was. The nearest telephone was Mama Nakatsuke's store in Wainiha. As far as we were concerned that was the first electric line too. My mother got a phone call when John Hanohano would jump over and tell her, 'You have a phone call. Here it is. Call back.' But in those days you cranked the phone and the operator answered and you'd say that you were trying to get a hold of so-and-so, and they'd track them down, 'Not at home, but I think they went visiting somewhere.'

#

4.2.6 Randy Wichman I was born at Wilcox Hospital (1957)

-- I was delivered by Dr. J. Kuhns. My father was a schoolteacher. We also lived in Hilo, as he taught school there. When I was six-years old he packed up the whole family and moved to Lausanne, Switzerland. From kindergarten to seventh grade I was in the Swiss private schools -- Swiss public and private schools. Coming back into the U.S., I went into a Naval prep school on the East Coast, Taber Academy, and put to sea when I was fourteen. Graduated at eighteen, came back home and then delivered yachts all over the world -- did the Atlantic, Pacific, and Indian 'till I was about twenty-one or twenty-two. Came ashore, now that I had all the experience I needed, but I wasn't rich enough to afford my own boat so I went to work with Grace Guslander at Coco Palms. Well, first I started at Hanalei Bay Resort...Hurricane 'Iwa knocked us out...right after Iwa I worked for Coco Palms as the Assistant Manager for Grace Guslander.



That was 1982 to '85. Then I moved into the museum. I was a curator for the Kaua'i Museum for four years or so. Then I opened up my own business, photography...the eight by ten glass plate work for various institutions and private collections. I accessioned private collections all over the State, and worked on the big public catalogs. In 1992 I was in a position to afford my own yacht. Purchased a sailing yacht, a fifty foot Swan from the East Coast, sailed her out to Hawai'i. And did five trips across the Equator, to Tahiti, Marquesas, Cook Islands, Tuamotus. Got married when I was forty-five, and have been ashore since. Numerous trips to Paris ...to Europe....as we go back and forth....numerous trips to the South Pacific...traveled extensively for thirty years or

more on my own...all over the world. I am the president of the Kaua`i Historical Society. I`m on the KHPRC, County of Kaua`i Historic Preservation Review Commission. I`ve chaired it several times over the years; I`ve been on it eight or nine years now. I think I`ve been Chair three times. I was a member of the Office of Hawaiian Affairs Historic Preservation Council. We dealt, at that particular time, with all the various issues that were going on at the time...repatriation, things like that.

My background is in this particular aspect, I grew up in a family that each generation made significant contributions to the history of Kaua`i . As my father has done all the place names and the legends, as my grandmother`s done many of the botanicals and some of the pre-contact prayers. My great-grandfather made huge contributions, as well as William Hyde Rice, with the Kaua`i legends...and Harrison. So it`s a multiple generational thing. Every meal -- three meals a day...it`s the only thing that we talk about every day...all day. A lifetime of that...this is where we`re at. And then I`ve been buried in the library several times. My grandmother had one of the finest Hawaiiana collections. By eighteen I was already fluent in all of the material, and in many private journals that are in the family. Since then I`ve been through her library again and the Historical Society Library twice, which constitutes years...around three or four years solid when you add it all together...reading in the libraries. So I must be on my fourth time going through all the books.

Now Hā`ena, having been raised in Hā`ena ...my parents were living ... we owned the Ahupua`a of Limahuli and the adjoining five thousand acres to it. My ahupua`a is Hā`ena, my mountain is Pōhaku Kāne and Makana. My chief is Lohi`au. I am currently on loan to the Waialua Complex of Heiau, because as past president of -- I`ve worked on the *heiau* now for a good twenty years...have been chair or *po`o* of the *Na Ka Hui*.... I am currently the vice-president Nā Pali Coastal Hā`ena also; we`ve been doing the Nualolo Kai for twelve years....that particular one.

Hā`ena is the center of the Universe to me....especially Kē`ē - the very end of the world. We have a very unique responsibility...my grandmothers, both my grandmothers, Gladys Brandt and Juliet Rice had a love affair. Naturally being in my front yard this is the one place on Earth that I`m the most familiar with. The earliest stories that I knew were the Hā`ena stories. Over the years I`ve seen Taylor Camp come and go.

[`Ohana]...Kanuha, Lawa`a, Kamakakuokalani, of course, and from the Kona side -- Kohala to Kona -- they were the first architects of Pu`u Honaunau over there. We can trace our ancestry back into the main charts, and even to a direct ancestor that actually started the Pu`uhonua. They were the third banner carriers for Ku-ka-ilimoku during the time of Kamehameha, and that`s why we happened to be on his side of the fight and naturally made it. They were generals under him. They fought, killed, and died for him. And in return Kamehameha gave our family extensive war prizes on all islands, except for Kaua`i. Our lands can be easily traced through us. My grandmother ended up with Ka`anapali. She sold it in the 1960s, but clearly Ka`anapali was a war prize for services. We ended up...we had Pelekunu; it was another war prize of our services to Kamehameha on Moloka`i. Our lands on O`ahu were also services from the battles there. My grandmother was Gladys Kamakakuokalani Ainoa Brandt. My grandfather was also part-Hawaiian from the Kapuna`ai and Naele from the west side of this island. So I have both moku old Hawai`i and old Kaua`i also in the line. Although I suspect that my particular line here on Kaua`i were occupation soldiers after the Hume Hume Rebellion. I`m just suspecting it, that they were occupation soldiers. My grandmother [Gladys Brandt], of course, was a matriarch -- as both my grandmothers were. I`m a matriarch male and real proud of it...our men are strong but our women are even better. So I was guided by many very potent and powerful womenI can take it! Don`t stand close to the fire if you can`t take the heat....and I always could. So Grandma Brandt...was my mother`s mother. My mom is Loretta Kuuleialoha Brandt - `Ainoa-Brandt. Nawa`a also Kanu`u - Nawa`a and `Ainoa are -- we suspect was a name change by my great-grandfather after he was jailed for his role in the Overthrow. But I believe more the story that said he hated his father and that he wanted to break the *kapu* that came with the name, Kanuha, and that`s why the name Ainoa is there because that`s the lifting of the *kapu* - that it is free, so I suspect that more.

Yes, he was jailed and all that, but I think it's because his relationship with his father was...he needed to break the *kapu* or the stigma. The Provisional Government [jailed him] for his role; he was right there next to John Wise - they were really good friends. It's an old family related to John Wise side of it too. He was right there with Prince Kūhiō also.

On my father's side they arrived here on the ninth company of missionaries. They started Punahou School...1840s. By 1850 they were here on Kaua'i. That was the Rice's. So they were here by the 1840s. He started Līhu'e Plantation...started all the agricultural ditches...really revamped all the sugar production...hated it, got out, and got into purveying. So for the next four generations we did all the beef, the horses, the milk...for Kaua'i. My great-great-great-great-grandfather, William Harrison Rice, was the governor...the first governor after the massacre...after the wars...was Ka'hala'ia...and right after that was Ka'iki'o'ewa, after Ka'iki'o'ewa was Paul Kanoa...well, Ka'iki'o'ewa ...his wife Keaweomahi took over just for a little bit then Paul Kanoa comes in and for a very short period there's another one...then William Harrison Rice is governor...then William Hyde Rice is governor...he takes it through the Overthrow...and then Charlie Rice...my great-grandfather was the senatorbut each one of their brothers - William Harrison Rice's brothers, William Hyde Rice's brothers, and Charlie Rice's brothers, were the sheriffs and judges. Go figure that one. But I think the history books are real clear, they were fair. But you can make up your own mind on that aspect of it. The 'Wichman' comes in from H. F. Wichman who Kalākaua really admired, and brought him to Hawai'i. He was the one who did all the metals and all the jewelry, and all the things that you see in all the photographs that these Ali'i's are wearing. After the Overthrow they started the jewelry shop, H. F. Wichman, both in downtown....

I think the last part of it essentially is that I'm *po'olua*, child of two fathers, my second father is Thomas Hashimoto. I do belong to the Thomas Hashimoto School of Rock Wall Building. I also belong to the Thomas Hashimoto School of Fishing and Fishing Resource Managements. I belong to the Thomas Hashimoto School of Ethics and Hard Work. His training has helped me in my life and a great deal in all of my *heiau* work, and so I'm deeply appreciative to his training and nurturing my whole life. [Growing up, going to Hā'ena]...absolutely. All over, all the time, especially out to the *heiau* area, to the dry caves, to the wet caves also. I spent a great deal of time working in Limahuli. I was with Thomas Hashimoto learning how to fish, throw a net on these whole areas. I'd be there early morning, mid-day, afternoon, even at night I'd shine my spotlight over the reef just to see what the fish were doing. I very rarely fished on my own; I always carried net for Thomas Hashimoto. But I always kept an eye on it...as he trained me to watch the fish...but I always kept an eye and would report to him every time I saw the black cloud. For him he called it 'black spot'...but because of the *kauna* we needed to use in all our fishing activities, we had our own separate language. He had the names of all the different houses...for instance, the *moi* that was in front there watching through the net, he knew exactly the next house they would run to. And all the way up from Kē'ē at the end of the road, all the way up into Wainiha he knew all the houses of all the fishes there. He knows them.

A *kapu* is a *kapu* and to me there's no exception. I've been *kapu* to bananas for thirty years because it's Kanaloa's *kino lau*. Being a navigator, a deep ocean person, out of respect for Kanaloa I didn't eat any of his *kino lau* forms. It was important for me when I was eighteen years old to know what it was like to live under *kapu*. And after thirty years of it, I can tell you, it's not a big deal. It's very simple. No is no, there's no such this as any exceptions so don't be tempted by anything. I'm sure I'm not under the real serious *kapu*'s that once existed prior to the lifting of the *kapu*. But it was important for me to understand - to have *kapu* in my life and to learn to live with it. I make no requirements on anyone else, this is just me.

###

4.3.0 Land Resources and Use

Land resources and use change over time. Often evidence of these changes is documented in archival records. Occasionally cultural remains are evident on the landscape and/or beneath the surface. However oral histories can give personal glimpses of how the land was utilized over time and where the resources are or may be. Oral histories also provide confirmation of cultural practices. Based on archival documents and subsurface studies the pre-contact uses of the project lands were ceremonial, burials, habitation, marine subsistence and agriculture. Based on archival and ethnographic data the cultural and/or historic use of the land in the project area was agriculture, recreation, subsistence fishing, and hula activity.

4.3.1 Hā`ena in Halele`a

[Hā`ena] in Halele`a, but when you look at it[on the map - 1901] it's in Nāpali really, yah you know, that's why they went put that like that because it's in Naāpali. But now just like they been move em around so now stay in Halele`a, - Hā`ena. See Hanalei is way down here. But you know what they did now, they been put Halele`a and Nāpali together now because nobody go represent this place, Nāpali, so we the ones stay take care of this too. This and this. Because me the moku rep for over here...for the fishery and for the moku too [like the *konohiki*] [TH].

Hā`ena is an ahupua`a. The boundaries are kind of unique. It's real interesting during the Mahele, they were arguing over where the boundary between Wainiha and Hā`ena actually fell. They ended up creating a point. It's actually ...there's a small *papa* kind called Haki (?). That is the eastern most boundary of Hā`ena, and from there it runs kind of an angle up towards Mānoa right behind where the Hashimoto's property is. And then from there it goes more inland up towards Mānoa. It includes upper Mānoa Valley and upper Limahuli Valley, and then it comes down by Hanakāpī`ai, it includes all of the Limahuli watershed and then it comes down by...there's a peak called Maunapuluo and from there it goes down by Hanakāpī`ai. So most of the first two miles of the Nāpali Trail are still within the Hā`ena ahupua`a [CW].

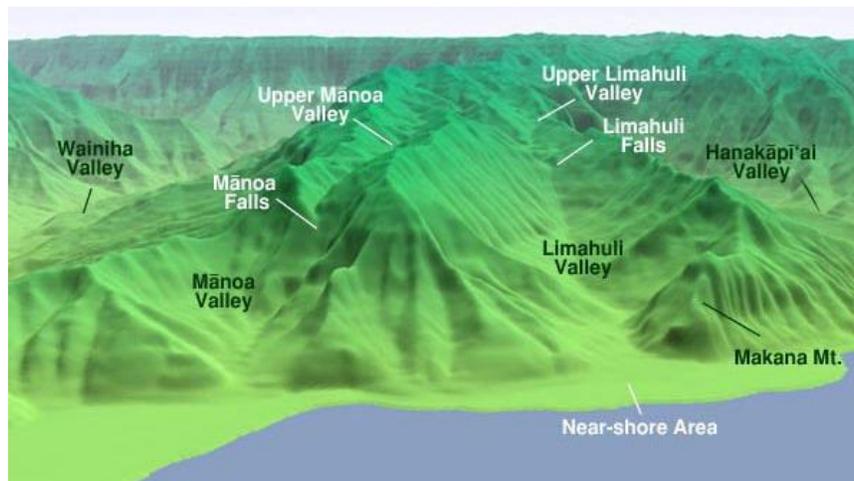


Figure 10. Valley Systems of Hā`ena (Pacific Worlds)

1901. Yeh, this is old map. It's not a new kind, - this is when was Territory yet. But you can get it in Honolulu this map, I think, because this came from Ilei [Beniamina]. Ilei went give me this map. She said "Uncle, you keep this one, this is an old map" and she like one of mine. But I say I don't think so I going give you mine. They wish they could do all their papers of the moku just like mine eh. Get all the names along the coastline. But no more people that know that - they all gone already [TH].

Because Halele`a goes way up to Namahana over here. Shee, Namahana way over here you know. I see em over here. It's past Kalihiwai, that's the boundary for Halele`a. But now stay mark different, the map now, the color [Crown Land = Yellow; Government Land = Green; Napali and Hā`ena were "green" or government lands] [TH].

The actual ahupua`a of Hā`ena was not formally partitioned until the partition process began in 1955, it was concluded in 1967. It wasn't until the conclusion of that that the land was really truly cutup and divided and distributed. It was really from that point on, 1967 that we began to see real change in Hā`ena. So change, in my mind, change really began after 1967 when people could buy and sell and develop property. The other thing that changed in 1967 with the completion of the Hā`ena Hui Partition was the fencing of the cows. The Hui allowed the cows to run unrestrained over the common land in the ahupua`a, once the partition was completed the cows had to be controlled or locked up. Most people didn't have large enough acreage to have cattle, so the cattle began to disappear [CW].

4.3.2 Park Lands: Former Residents

What's really interesting was that *maka`āinana* were able to purchase that *ahupua`a* back - I think it was 1875 when they formed a Hui, Hui Kū`ai`ainā o Hā`ena. That purchase enabled the Hawaiians living in that area to continue their traditional lifestyle. And if you think about it, in 1875 there were still many *kupuna* alive who had been born prior to Contact [pre 1778]. There was still a lot of knowledge of the old ways. And being that Hā`ena was so rural, it was isolated, and being able to more or less recreate their traditional land stewardship model through the purchase of this and the ownership of it in undivided interest, it allowed Hā`ena to really move forward into the modern era in a much more traditional way [CW].

In the Hā`ena Hui [my family] originally purchased as they were doing the Hā`ena Hui because my family had been living already right there on the flats, on the side of Kē`ē Beach where the Morays are and others. But the family had been living there in Hā`ena for quite a bit, so it was just across the river, right across Mānoa Stream. So they were there when the Hā`ena Hui [formed] [RW].

The Provisional Government immediately after the Overthrow banned everyone from Kalalau and dumped them on the beach right here at the end of the road. And there they made their way in through Kaua`i, some stayed in Hā`ena; others moved on, others moved off island and went elsewhere. But the entire Nā Pali Coast essentially came in on the beach right here and then entered into the new society, if you want to call it that, from Kē`ē Beach [RW].



Photo 43. Kē`ē Beach at the end of the road.

So I was there as one of the original members of Hui Maka`ainana. And I was there with Carlos [Andrade], Chipper [Wichman], my father, and others....in the initial conceptualizing. I was there when the master plan originally, in the '90s, was being talked about. I was there when it was pulled off the shelf and put to bed. I'm aware of some of the recommendations in that particular plan. Photographically, as president of Kaua`i Historical Society we have quite a photographic data bank in our society. We have all the original Hā`ena Hui materials, so I'm familiar also with that particular aspect of it. But my expertise is more pre-contact. Let's say Chiefess Kekela on back [RW].

[From the Park stream all the way to Kē`ē Beach, before the tidal wave, was] nothing. The only house, you know the road going inside, was the old man Hailama. Only the old man Hailama use to live inside there, where ___ own now - that was the only house that I know of that was down in that area. Had that house and get the State house that was Montgomery house where the State get now. Get one house down but you no can see em from the road. From Kekuhi to Kalinakauwili and below Kē`ē` behind the point, then get come Kauila. But anyway, now going back to this, it's some place in this area - the Montgomery house is on this side - you gotta drive past the stream and before you go down the hill get one road going down there on the other side of the river, I think this is it, because this is the parking lot. Yeh, this is the place, the clearing, that's where that house is. You kinda halfway down to the ocean. [and] that's where that lady, that redhead lady she get her house, and I think this is past this place right here -- this bushes over here. But this belong to the haole, and this one over here. This over here I don't know who own this house over here, and then this is the Moore's, that's their house. And then this is the road, and then the black boy, the one went marry Kana's granddaughter, Birdy Birdy, that's his place right here, clearing right by the pear tree right around that bend, now he been clean em all, he went build one little house down there, but never clean when this map was made [TH].

Mahuiki was one of the families that you can trace all the way back to the formation of the Hui Kū`āi`āinā. Their name...you see it in different variations...but I think originally it was Mahu and then it became Mahuiki [CW].

Well, there was Francis Brown who originally bought it. My grandmother before she passed away deeply regretted that she didn't buy up all of it...and she could have. She thought the people that would come into the area would recognize its cultural and sacred significance and not build. But she lived long enough to prove herself absolutely dead wrong on the subject. People moved into the area had no connection whatsoever, did whatever they wanted to as if it was some piece of property on the mainland somewhere with no history. She deeply regretted it [RW].

All I remember...by the time I was growing up over there Mr. Allerton owned that house and then he traded it to the State. I think that trade was right about the time the partition was complete, about 1967. I think before Mr. Allerton was E. E. Brown... Allerton's house burned down. It was like his tool house or something like that. And I think it's okay to leave that up there, I think it's not really that visible in terms of impacting the ancient cultural use. Back like twenty years ago we were working with the *halau* and stuff to try and figure out...sometimes they need a staging area and a place to get ready. We were looking at what was going to happen to the place where the Allerton house was after it burned down, so I think its important [CW].



Photos 44-45 Allerton Estate

They [Allerton cottages] were all there when we were growing up. The workmen house were all there...the workmen use to live there yeh [TH].

It was in the early'70s that I got to come and actually live out there in Hā`ena with my grandmother. Those were really amazing years because it was still very undeveloped, still rural. The hippies had caught on and they had found Taylor Camp, which came really out of the partition process and the State's desire to acquire that. Howard Taylor had that conflict with the State and so he opened his property up to the hippies. And so it was kind of an era of change, it wasn't only Hawaiians and locals over there now, you were getting hippies and you were getting surfers...it

was kind of the beginning of a wave of newcomers that were coming there. But it was a time where there was still a lot of, how would you say -- among the local people -- still really traditional. The families were so closely knit and inter-related...there was still that real sense of aloha and mahele...helping and sharing with each other...it was a wonderful period of time [CW]. Barlow's [Chu] property was right across from Limahuli. That's where he would come out and clean over there. That was their family's property until they sold it. You know who used to live with Barlow...and live down there, was Carlos Andrade [CW].

Most people, they don't call it "Taylor Camp" already. The whole lo'i restoration probably...to me we call it Kē`ē...but to me Kē`ē is more down here. The lo'i is not necessarily, like you said, there would have been a more specific name to that [CW].

This place right here right by the Taylor Camp was Kuakala and Kuahiwi but that name Kuakala was the one right near the shore that's why went put em like that and Pulimukeiki is a little deep water over here and then this is Laikohola because that's where old man Kalei Kelau went get lost and they go send men down there in 1946. That's where we use to go fish down there. But he went die in that tidal wave. And the only house down there had was old man Kelau's house, was down in this area here. That's the only house had down there...down inside this area, below the parking lot, because over here get taro patch. That's where the taro patches are right in this area, this is the meke. All of these places get iwi over here, all these places. Only the old man Kila and like the old man Kila's house, the old man use to live over here the old man Kalei and Kila right next to each other. You gotta look back -- to back here. Right here, that's where they use to live in the back here at Laikohola. You see had different people planting over there. But you see at the time when the people were planting there was undivided interest. So you go claim wherever you like, and then if you had shares to cover what you had, that's yours. Because they went choose taro patch and house lot eh. That's how they did it. That's why some of the properties where they owned like for example like the old man Kila, what he did he took property right next on the side of us and that property use to be my grand uncle's property, use to be five acres but because my grandma went go marry him he gained that half because my grandma died young, so he went get the property was 2.5 acres too. So what he did, he went go take acre and half down the lo'i and one acre where the house was to make up his share. That's what happened. Was right inside here. Below where our taro patch area is right now. Inside here, was close to the kind he was planting all inside this area here right below the parking lot. All inside here, where all the lo'i use to be him, the Maka the Kelau families and that's about it and us, but we were planting on rice land at the time. Adjacent to us was Kinney [TH].

The Kinneys owned property out there [Hā`ena] too. I think they come from Kalalau too. That's why they been own land over there and they get *kuleana* over there. The one house went buy in the back of us Limahuli Garden, that's from Kinney. That's Kinney *kuleana*. So they own that place because get royal deed, the *kuleana*. So they been own that place. And you know where that place stay? Right inside here. Up across the river. Up inside here. Gordon Haas and Roberta Haas own that place. You know that place windy, that place stay right in the wind channel [TH].

Some of the old families that I know are still hanging on to *kuleana*'s right there - the Wann family, Presley Wann, Lei - the Wann family - W-a-n-n. And recently having gone over the *kuleana* claims and then re-familiarizing myself with the names - some of these families are still running around too, and I would imagine, if give a chance, they would take certain *kuleana* in this too. And the other one is Keahi that I know of, that's also in there [RW].

4.3.3 Park Lands: Taro Agriculture

I planted all on old man Kila's place. I planted all over here in 1959, after the 1957 tidal wave until 1966. I pulled my last crop from here in 1966 because the State like buy em because of the hippies. That's why all the landowners been sell to the State, that's why the State been own these. But you know what? That was fine. The State went go buy em with federal funds. You would think that's federal place not State. By that time Kila wasn't here already. Too old already, he

was on O`ahu with his daughter. By that time maybe the old man went die. Because I went to Honolulu go see the old man for the land so I can plant taro in 1959. No I seen him in 1958, 1959 I been go plant over there because I went clean all the sand in the taro patch from the tidal wave before I went plant that place [TH].



Photos 46 and 47. Restored *lo`i kalo* in Hā`ena State Park

[We plant] what the ground can handle. Not every variety. The variety we had was *nukea*. That's the dark green one. And then we had *peali`i*, *lehua*, *piko*, get the black and the green – *hapu`u*. *Hapu`u* get the black and the green kind, dark stem on the bottom. Either *nukea* or ___ that's the best [for poi]. White, when you bag the poi just like sour poi, but *ono* that poi when *poha*. *Ono* that poi! That's what I like, in fact, we all like that. We go pound the poi it still white just like sour poi, but *ono* this poi when *poha*. But now they get more *lehua* now eh. *The hapu`u* is good, the *hapu`u* grow like the Maui taro because he grow big eh. Because before, you can tell the *hapu`u* because he going grow higher than any other taro. The *hapu`u*, the black one or the green one. That's the way it is, just like the Tahitian kind now. They grow like that and the *huli* big like this, big just like one coconut. Like when I went plant the Maui one here in Hā`ena, that buggah was just like one coconut. Nine taro for one bag. Big, enormous – the taro was big like this! The first time I went plant that, when I went to throw fertilizer, I had to go underneath the leaf to throw the fertilizer because was big like this. The first time I went plant the Maui one down in Hā`ena in 1969...that's when the *huli* came around eh. I had some for my friends, that's how we went plant. [Nukea] that's what I like. The other *ono* poi, well, all the poi is *ono*. You see, like the *hapu`u* and the *piko*, the poi is gray, it's not white, it's gray. And then the *lehua*, the poi is red. And then you get the *peali`i* is maroon the poi, on the dull side the color - maroon, just like the purple potato, something like that, the taro. So when you going make em and the buggah come *poha* he going come maroon, like the *lehua*, little different. That's the pure, not all mix up kind [TH].

Well, when we were growing up it was being actively farmed. Fred Fuji was growing *kalo* down there. Uncle Tom was growing *kalo* down there, Uncle Jack, his brother. There may have been a couple of others, but they're the ones that I remember [CW].

[For leaves] any one. But you see, the Maui is the best because no itchy. The one real itchy is the red *lehua* one, but nobody get today. They get all the Maui. So all the other taro even the Tahitian, it's good the leaf and the stalk. No itchy. But the *lehua* you gotta cook em good, you gotta cook em overdone, and still you going feel that little bite. But before the people eat em. Depends what we got. But then of course we get that other one, what they call that, the one that grow in the valleys like that, sweet one, you get that because the taro small like that eh, and the *huli* and the leaf; but sweet that one. I forget what the name that was. And everyplace we get spring, river, or ditch, that thing grow. Like down above I could see em from the ocean, growing in the stream. Because it's kinda high on top where get the house, I forget the place, in fact before is it Hanako? Or right after Hanako? Get that place, you can see on top eh. People use to live in that valley, still get that taro on the side of the river. In fact Kalalau, only place get. You can go take the whole stalk and eat em [TH].

Like up here get all kind, even some from the South Pacific. In Palau, they eat taro. They don't know what ulu is because we get one student come from Palau, they eat taro and fish. That's what they eat down there, that's their staple. Not like the Samoan, the Samoan's staple is ulu eh. But the south Pacific people, theirs is taro. We get taro over here that come from Palau. They no like em for poi, I don't know something's wrong with it. The Palauans no like that, but for go eat like that regular, it's good [TH].

[Poi Mill], that was old man Kina, he had that thing over there. The two places that had that was there and Rice. You know where the pasture is, right across the pasture get that gate over there? Right inside there, in fact the house get one house right there with one white fence on the roadside, use to be right in there. Long house, one long roof house, but only get one two-cycle engine to grind the poi. And Kina had the same thing. Only few people owned that kind machine and of course old man Alohikea had one machine. Sanborn had one in Hanalei, that's the only places that I know had the machine, the kind mounted on a regular basis, they grind. Although my grandfather had, he went go make with the model A, the tire. Start the motor and put the belt on the tire and turn the grinder, that's what he had with the model A. The Kalaaua's had the same thing, with the model A. Some had em on the drive shaft, Some had em on the tire with the belt. I seen that that's why I can talk about it eh. When I was planting taro down there, the thing was in the storage. Was inside the place where I store all my tools. And everything was all intact eh. After the State went buy em, everything went, and we had two hurricanes so everything went [TH].

We have the connection of Limahuli Valley itself which is where a lot of the food was grown that cared for the community that lived out here full time. So I believe you had some of these taro patches right here along the edge of the Limahuli Stream, but also Limahuli Valley was really the entire bread basket that fed the religious center at the end of the road [RW].

At the end of the road here used to be functioning taro patches. And they have started that *lo'i*. Of course the State Parks should never have allowed them to go out of use at the beginning anyway. And there's no reason why that can't be put back and turn it into a sort of a place where people can come and see certain of the stuff growing. Would have to replant the *hala* trees....but I don't see why you can't allow some place where people can come in and do *hala* weaving....fish netting...fish hook making. There's a lot of stuff that can continue the culture; that would go along with the eventual plans for Kamehameha Schools for Lumahai....because their idea is to turn it back into a functional ahupua'a....but of course that's going to take years of planning and lots of money [FBW].



Photo 48. Broad-leaf *hala* at Kē ē Beach

When we went in originally with Hui Maka`ainana o Makana [1998 or 1999], was there when they founded it, was there when they first went in and they opened up the *lo'i*, worked it and got at least three to four of the *lo'i* up and planted and operating. I was there with Todd Musashimoto -- he did all the initial clearing of the land and subsequent planting.... I think one can easily vision the areas that Hui Maka`ainana o Makana can expand to taro patches. I think we can begin to envision what the experience of our visitors is going to be when they arrive there. That immediate connection into the taro patches to begin with, I think is going to be important. Having a trail that actually loops around the ocean front and actually makes a full circle from the internal parking lot, which we know is going to have to be expanded and is not enough [RW].

They were talking about that way before that guy you know that guy that went go draw the plan and then they went run away go mainland. Run away go home - that's when we started that project. That's when we go open all that taro patch for the archaeologist go inside there go map

em. They had all this drawn up already, but like I told Chipper, you guys go do the paperwork, we go do the tackling part, which I did go clean up all that place [TH].

4.3.4 Park Lands: Other Vegetation

All these guys who plant *hau*, the *hau* do damage. Where I was planting down Kē`ē no had *hau* before you know. That hippies went bring over there go make the kind shed that's how that thing went grow all inside there; before no more *hau* down there - only had palm trees and *kamani*. After 30 years I been go back inside there, I went kinda lose my bearings eh because everything is all high. That's why I told them to go back over there go plant down there, they was going open the one right by that house where I was telling you, Montgomery, the State house. They was going cut over there, the trees like this big! How you going do that in the taro patch? The ones down there at least not big like that - stay all on the *kuleana*. On top the bank, not inside, had some inside - I been get em with the backhoe. The excavator, I been dig em all out. Although we not supposed to take machines inside there, but we go with machines inside there anyway, I did all that thing up. That's why now stay clean eh that place. I take em all out [TH].



Photo 49 Hau grows in several places



You know, it just was always...I guess at that time it just seemed so...it was a lot less overrun with alien vegetation; it was a lot more open.... The coconut trees were all there but a lot of the octopus tree, and all of that stuff that's covering it all now, none of that was there. There were vines and stuff, but you could see the rock walls, you could see the area. None of those *kamani* trees were covering the inside side of the park, right behind the lo`i and all of that. The ironwood trees are still there, were there originally. But it was an area that was never crowded [CW].

Photo 50. Coconut trees in HSP

4.3.5 Park Lands: Activity

Well, when we were growing up it was really different...it was still very rural, very little tourism. Maybe once a day the "stretch"...we call it the "stretch", I don't know what you call it now. Actually, it looked like the long limo kind of thing. That was the tourist car, maybe once a day the thing would come down there. The cows ran wild in those daysthey fenced in the people... now the people run wild and they fenced in the cows. I think it was better before. It was just an amazing place to get to be. It was so beautiful [CW].



The Kauluopā`oa (*heiau*) and Keahualaka, you could see it from the beach. You could go down there and go to the beach... it was just a great resource [CW].

Photo 51. Can no longer see *heiau* from Kē`ē

4.3.6 Park Lands: Kalalau – Hanakāpī`ai Trail

[Freidrich Wundenberg, Grace Rice's grandfather] is the one who blasted out the Kalalau Trail. This was in the 1860s. He did not want to endanger any of the men that were working with him clearing this trail, so he himself set all 400 charges of dynamite that they blew up along the trail... because he was the Superintendent of Roads for this district and for the Monarchy. Because he

also did a lot plant experiments to see what plants would grow out here, he's the one that started the oranges and the coffee. So along Hanakoa and Hanakāpī'ai [trail] you'll still see coffee trees. But the blight hit the oranges and blight hit the coffee. They wanted to be able to bring out the produce out of Kalalau. I believe they thought it was easier to come out this way -- one of the reasons they came this way was because Nu`alolo was almost impossible to get in and out of except by sea. So that you had Kalalau, Hanakoa, Hanakāpī'ai, all of which were heavy with oranges and coffee. So his instructions were to build a trail that was wide enough for a fully loaded *burro* to move comfortably, which makes good sense [FBW].



Photos 52 - 54. Trail signs in Hā'ena State Park.



4.3.7 Park Lands: Taylor Camp

Elizabeth Taylor's brother brought this piece of property that's right there on the bay, and the State condemned this particular end of the road in the early sixties or so - scattered all the owners and the taro farmers to the four winds, locked it down. This guy Taylor, in anger allowed these -- I don't want to stereotype or anything like that, but allowed a commune to begin to form that went unchecked for a long time. I remember the hepatitis epidemics one after another, almost non-stop epidemic level hepatitis with all the various strains, the significant trashing of everything and the whole subculture that happened there... Taylor Camp occupied all of this [looking at map] - this was all Taylor Camp. Well, actually it goes further out; it's actually all of this.... Taylor Camp just refers to that particular time in history when it was overrun by the commune [RW].

Photo 55. Kalalau-Hanakāpī'ai Trail

4.3.7 Park Lands: The Future (Master Plan)

We know the helicopter pad's got to go in there; we know that certain portions of this is going to have to be data recovered as you might be taking out a couple *lo'i* in order to actually put in the basic infrastructures that you need right there. RW

A lot of this stuff in here - the vegetation is *kamani* - there's a botany aspect to it too, so that's a separate 'House' too. There's a whole *lā'au lapa'au* aspect that could be done here too, which actually creates a whole other separate 'House of Botany' - again, a completely different discipline, and under different goals and objectives, but still important to the big picture. RW

Prior to the commune it was the Taro Mill - the footprint is still there so, I think, interpretive-wise that's still pretty cool. I think even to allow the Hui Maka'āinana to have the potential, if they should want to, to grind the taro in the original footprint, or close to it if you wanted to keep it. We can let SHPD decide on that one, whether we can use the original platform or build one right next to it. But the taro production and the taro mill, they are capabilities - could be there if they needed it - I know it's a long range plan but this is what it's all about. It's long range [RW]

###

4.4.0 Water Resources and Use

The Hawaiian word for fresh water is *wai*; the Hawaiian word for wealth is *wai wai*. This is because of the value the ancient Hawaiians placed on fresh water. For taro farmers water was a crucial resource and a lot of effort was employed and strategies used in order to get it to the *lo`i*. Fresh water was also crucial in the lifecycle of stream inhabitants such as the *`o`opu* and *`ōpae*, as well as some of the marine life that depended on the benefits of *muliwai* or brackish water areas.

4.4.1 Fishponds and Fishpond Fauna

The big *meke* was over there and had plenty water inside down there by Kē`ē. That's the only local ones down there, that one. And then of course up, the one below the water tank, the one past the Wichman's...going down Kē`ē. All inside there, I don't know if had *meke* inside there or what because by the time we been go had all grass inside there - *honohono* and *pukamole* and all that. I don't know if had taro patch inside there because we never go walk all inside there because it was always like that - like now get the Jobs Tears - more worse [TH].

We use to get *`o`opu*, *`akupa*, and I think crayfish; that's all I went see in there [fishponds], I don't know if had mullet. And of course had bull frog. The crayfish had plenty down there. We use to eat the crayfish, catch em, rinse em out in the 5 gal. water and *pau* we fry em in shoyu, even the sand crab we do that too, fry em and eat em, and that time was *ono* because get big meat right inside the leg eh just like how the crab you know [TH].

These can also end up being working fishponds too. And so that could be another aspect under the fisheries in not only managing the *kai* fisheries but the *wai* fisheries also. So those are there as far as expansion capabilities. It would be nice to have it as a larger master planand step by step work up to it [RW].



Photo 56. Part of former fishpond and marshlands

4.4.2 `Auwai

There were two main `auwai that came off of Limahuli Stream and this one here came down, this was the primary one [CW].

It was after the partition - I think they were bulldozing that when they were trying to clean up the Taylor Camp scene over there. So they've totally destroyed the `auwai system. And when they cut the water off to the `auwai system then the *lo'i* became useless. It became overgrown with all the trees. Then when we went in to try and clean it, to map it with Alan Carpenter and Mo Major - it was a huge job just trying to get it clean enough that we could actually go in there and do mapping. So what you see today is the result of a lot of work. A lot of years and years of work just to get the *lo'i* exposed - we've had to run a pipe down there to get the water back because the *auwai* system was destroyed [CW].

The water is going to be coming from Limahuli Stream. Right now, I know, it's tapped up above the road. In Limahuli it actually comes down through the *auwai*, crosses underneath the culvert, and reenters into the `auwai that starts to feed the *lo'i* that are actually down there. That water has been flowing for awhile now. We may want to take another look at the water supply Hui Maka`āinana expanding their footprint. Right now the last time I saw it there were four big *lo'i*, however I know that Thomas Hashimoto had two or three other *lo'i* in the areas ...and I know he wanted to open up too. So I think in visioning a larger master plan for the actual footprint that Hui Maka`āinana can expand their *lo'i*, with the foot-trails that are coming through there ... that we keep it pretty safe ... the terrain itself is not necessarily really difficult. Although slightly undulating, the view plains through here are absolutely stunning [RW].



Photo 57 Modern `auwai system.

4.4.3 Hā`ena Watershed and Water Sources

Limahuli is the primary watershed, the primary watershed or valley within the ahupua`a. Mānoa does have a perennial stream through most of the upper Mānoa Valley, but there are times when it dries up by the time it reaches down by the dry cave [CW].

Before times everybody would just drink the water out of Limahuli Stream ... our house...our water comes from an ancient spring called "Kawaialoha". That spring has provided our homes with water since before my grandmother moved out there. The guy who had the property before her was Philip Palama, and before Palama was Walter McBride. And Walter McBride had put in a system that took the water from that spring and brought it by pipe down to the house.... I know that that place where our home was, was supposedly *kapu* that was a *kapu* area. In ancient times before he put that pipe in from Kawaialoha, it was supplied by a spring called Waikapū. You've got to ask Uncle Bruce about that, he's got all the scoop on that [CW].



Photos 58 and 59. Limahuli and Mānoa Streams

4.4.4 Limahuli Fauna

We had a Filipino caretaker there for awhile. He must have been only four and a half feet tall...we would fish and come in to Limahuli and then deep fry them (‘o`opu) in the woks over a fifty-five gallon drum that was cut out for the fire that the wok sat on. This went on for years. These are some of my happiest moments [RW].

4.4.5 Hā`ena Floods

Flooding...I’ve seen this end of the road in the most vicious storms you can imagine. I know on the higher side the way the water comes you’re on the safer side - the lower side, no. Of course on the lower parts flooding is a problem in the heavy rains [RW].

4.5.0 Marine Resources and Use

The sea is a great resource for people with access to its bounty and Hā`ena was and is an exceptional marine resource according to the ethnographic consultants. However, it is a fragile resource sometimes abused by visitors.



Photos 60-62. Kē`ē Reef sign; Kē`ē Reef trespassers; Kē`ē Beach

4.5.1 Fishing Lifestyle

Everybody most time they stay home sleep, not us we fish night and day because night time is a different way of fishing. Like if we work the whole day, evening time we go fish, catch fish for the family. You like catch fish you go down the beach one time you wack em out in one pop, you take em home, share with all the people, take enough for us eat. We can do that every day because there was lotta fish around the place [TH].

[People say] “What uncle, you no go surf?” If I go do that, my dad would tell me “Now what? Go eat the board.” You know what I mean? Everytime like that. I hear the people always say, always tell me, *hana ka lima ai ka waha*. If you no work you no eat, if you lazy you no going get food. You gotta work with your hands and make something. That’s what I hear all the time. If you no do nothing they going tell you, ah *moloa* that boy, he lazy, we hear all that [TH].

Turtle, fish, but we no catch plenty, enough only, because we can always catch fresh kind. We know where the fish stay, we can go take our net and one blast we coming home with one net fish. That’s how it use to be with my life when I was young. That’s what made me interested in all the areas where I go fish [TH].

4.5.2 Fishing Grounds

We use to fish from Hanalei to there [Kalalau]. But you know, before was little bit different too because everybody we knew who the *konohiki* was for that area eh. Like in Waimea, my grandfather near the road, then you had Chandler, then you had Tai Hook, and then you had Haumea, all fishermen in that area. Then Hā`ena was La`a, Mahuiki, my dad, and Hanohano. Before everybody respect each other so they no full around that kind. Like Hanalei was Goo - Goo and Dias. Then down in Kalihiwai was the old man Naka, nobody go fool around down there because they respect; unless they ask for help. Waimea had old man Kimokeo Kanehe, Chandler, Haumea, Tai Hook. All them were fishing right in that area by the beach. They had all Apana right there, coastline. They had their land there, they own the land, so they can fish right all through there [TH].

All the stuff that I show you, the maps that I have was originals from my dad. And he knew the place. Like today I go tell em the people who go fish inside there, they don't know. I can tell em over and over they no can remember. Like how I remember all that names. There may be people I went miss, I know that, I use to know the names, but I no go over there often so I forget. Lucky I remember that much because my brothers don't know that much too. Me the one went fish around with my dad, because my brothers went go in the service by that time, 1950 they went go away [TH].

4.5.3 Fishing Methods

Hanalei we use to use *ku* net to *ku* the *ōpelu*, the *ahi - ahi* use to come we surround the *ahi* and catch em [TH].

When I had my family and I use the fish I go catch and sell em for subsistence to help me with money. At that time I use to sell the fish. And my dad did that when we were young too, selling the fish to the *Pake* – the *moi, āhole*, mullet – that's what the *Pake* like eat eh. That's how I learned to go catch fish. And we knew the grounds. That's how we learned everything that had to do with fishing [TH].

Photo 63. Uncle Tom's throw nets



That's why they don't realize how important we are passing down the message for the younger people. Sometimes like the old times, people don't wanna do that because people sell the information and make money out of it. That's where the wrong is. That's why the old people, they ask them, ah no, no, no, no, because they think like that. For me, I don't care because I'm not greedy for money. That's the reason why I share my *mana'o* with everybody, and I'll be sharing with Kepa Maly. Because of him that's the reason why I came up with everything, all the names, place names. Yah, I gave him all what I went remember and only very few I went miss because that's not my place for go, only those places where I went go fish where all the *moi, āhole*, where I go all the time. That's where I go back and back and back, and my dad use to say you go up there get big pile *moi*. I know where to go, I go straight over there go look [TH].

He [Uncle Tom Hashimoto] was mainly a throw net fisherman. He'd throw his own nets [CW].

I prefer to carry the second net anyways - I'm a team player - like to just follow Thomas around - carry the net. Whenever he threw his first net, I'd gather it up. If I had to go over the edge, I went over the edge. But I'd gather it up, drag it back to the beach, unloaded it and then drag his net back hopefully in time before he threw the second one. But I would go back and forth. I got to know the reef really good. As any fisherman knows, there are some taxes you have to pay. The spines of the *holi holi* hurt [RW].

Thomas is not a pole fisherman. We would surround the *ō`io* when it would come into the bay. There were times when we would catch at least over a thousand pounds, and we shared with

everyone - everyone between Hā`ena and Wainiha - all the old families. That's because different families had different parts that you needed. Thomas had the deep nets and the boats. But John-John Haumea, for example, had the bag net that we needed. Once the fish were surrounded we needed to corral them up to a smaller net and then drag them in. But I know John-John had to have that....John-John Haumea who used to live right there at the Wainiha Bridge [RW].

Thomas had eight foot, twelve foot, twenty foot, twenty-four feet deep by a hundred yards long or more as you can piece these nets together. Because of the way we worked in Hā`ena our property has stunning views of the ocean, and it was a constant thing that we lift our heads up and scan the ocean - always. And when we saw the black spot, or the cloud, the work would stop. Then I remember him telling us stories that while they were working they would set the fishing lines out and tie them to one of those tin garbage cans, and when the *ulu*a bit the garbage cans would be bouncing down the beach warning everybody there was a hookup. So all work stopped. Once the garbage can hit the water, the water stopped it and then they were able to retrieve it, and then pull the *ulu*a's in. But that was their way of fishing while they working. For us we weren't so restricted as such, so we had a chance to always check it [RW].

He [John] had the bag net that Thomas didn't have. Once the fish is surrounded we needed a smaller net to actually pull the purse strings on the bottom of it, and then that was the net that we actually dragged ashore - dragged closer in and actually up onto the beach. But all the times we ever did it, he never sold one of the fish. It was all given out to the different families that helped in pulling the nets in...it was a classic *hukilau* kind of thing. Absolutely. In Hā`ena - even in my day - which is the seventies and eighties when we were doing all of this [RW].

4.5.4 Fish Catches

In 1966 before I went in the service we caught something like 96 *ahi*, 100 lb fish. You know what the price? 19 cents! We sold `em to Kip Mulley in Waimea, and we use a big dump truck to haul all that fish. We sold 60 and gave the rest away. Two guys one fish. Nobody gave fish like that away. They cut em all up. With us two guys one fish. 100 lb fish we give em. Go cut your own fish. That's what we did. And that was traditional because my dad he always tell us when you guys get one good catch, people come there, share. I still do that til today [TF].

From Lumahai to Hā`ena I use to catch all the moi down there. Big school, big like this house, you throw one net on top. For years I did that til today. Only me the one go catch the moi because I know the grounds, if he run away from me I go look for em because I know where he go run. I go get em. But lately I not doing it because I like replenish the fish [TH].

One time in 1970s we went go catch *kala*, I look inside I see the color - green inside there - so we make that kind net like I tell you, 500 mesh across, so we went in there, myself, my kid brother, Richard's two brothers, we went go inside there, shucks we had 92 *kala* in that *kuuna*. So I go home and ask my dad, "Daddy you guys ever catch plenty *kala* in one time?" He tell me yeh, Muliwai we caught 110, but look out, this is way after now, that was back in the 1920s! But us in the 1970s we was doing that we was catching!! And I use to go catch *kala* myself, I go with my small dingy catch 60-70 *kala* myself, and the biggest job for me was to go put em in my car eh. I gotta haul em up and put em in my car. And go sell em. That time I use to use that for subsistence but I use to go sell em dollar one *kala*, I made some money for my family! That's how I use to clothe my family, feed my family, plus my wages. I never stopped doing nothing, that's why I dunno how to surf like people like that [TH].

Most time I was going there for the moi and all the places I went name that's what made me learn that because my dad would go in the area and say, hey, going down there get big pile moi over there. I go straight over there. I go over there I look the big pile inside the wave already from far I look already. I go there and wrap em. Like this year, for all the years, that's the most moi I went catch - this year. I been catch maybe 600-700 lb this year, throw net. But not the kind for the kill

kind, its just accident I run into em I catch em. But not sell though - give all my friends, my kids. They like the fish [TH].

Over here we use to catch, 18 lb `ō`io - big like this! Just like baby shark. In fact the one I caught this year was 10 lb - not too many, but mostly I would say maybe about 10-12 lb because all this kind size eh. I had few big ones. And I had some smooth side ones like that, that's the kind I like to dry - we been dry some [TH].

There was always so much fish there in those days. The amount of fish in Hā`ena when we were growing up was so much more than there is today. Really, it's pretty amazing. I used to go diving and see the giant schools of moi swimming aroundbig kind moi! Like as wide as this table...three feet. And the *kala* - every time before there's party, people go bang, bang and the *kauna* in those sand channels between *na papa*...and oh, the *kala*! That was always good fun...everybody went as one gang and go bang, bang at night in there. Now you hardly see *kala* like that, no more *moi* like that...big ones already.... Those were the main ones. When we were growing up I used to like to whip too - go catch *papio*. Uncle Tom - we were always spoiled because Uncle Tom was the base fisherman and he would always - we hardly even go fish - he just bring the fish for us or we go bag-boy - go carry his bag for him [CW].

Now I'm *kapu* to *moi*, I'm now *kapu* to all baby fish...because the supply of *moi* is running out. I've personally *kapu*'ed myself on that [RW].

4.5.5 Cooking, Preparing Fish, Etc.

Well before, most of the time we use to *pulehu* [*kala*], and make soup, cook em with shoyu and oil. It's *ono* that way. Of course they make soup only with water and salt. That time we real Hawaiian, and we use to eat all that because we had that at the time, we eat with the poi [TH].

The mullet, we use to eat em raw - what we use to do the mullet we use to cut em straight through and put em in shoyu and chili pepper, have you tried that? Yeh we cut em straight through just like the cucumber, straight through, and throw em in - put a little salt and shoyu and chili pepper inside there, ho *ono*. You eat with the hot rice, *ono*. You eat em like sashimi, like that. The meat by that time turn black yeh, from the shoyu, it's *ono*, you eat that you know, get that little bite from that chili pepper, that's how we use to eat em. We use to eat em raw and steam. That's how - we use to steam the mullet and the moi. Of course we fry em, we dry em. We dry the mullet and then we go fry em and that's *ono* again! At that time you gotta salt most of the fish because no more ice box. At a later date, then get ice box [TH].

My grandma - we get the salt from the Hanapēpē people, the Aukona family like that. That no worry because they give em by the barrel, so you always got. And then what we use to do we use to salt the fish and the turtle and whatever, and you know the kind you go mix poi, the crock, that's how we use to salt the things because inside there no can come rusty the crock [TH].

Yeh, they get that salt cabbage and black beans, that's how my wife make. You can throw green onion inside there but overcook if going steam um. So we only put the black beans and the salt cabbage, that's it. That's our way, and of course you going put ginger and garlic inside there. Chop em all up. My wife no can eat shoyu so we just steam em like that, then you put on your own fish what you going eat because the black beans salted eh. So that's where your salt is, right there. You like put shoyu, you put on top your own after you take your share...we steam em with the oil. We make that and we go make even the nenui, taste *ono* too. Cook em with black beans, or sometime for fast action cook em with shoyu and oil, garlic, just steam cook. That's it. Only the water from the fish stay in there but mostly going be oil and shoyu. That's how I cook em [TH].

Well, you can put em [*limu*] in the soup, when you boil moi and stuff like that. Even the stew you throw that inside, that's *ono* [TH].

The *kala* everybody used to just pulehu that thing. The *moi*, we always liked to just fry it. Mostly we just would fry it. Sometimes you steam it but takes too long to steam it! [CW]

4.5.6 Open Turtle Season

The turtle go eat all the *limu* and the fish no more food. [*Limu*] grow way on top just like one pasture on top the *napapa*. Before not like that, now the turtle he go on top the *napapa* he no scared you. Now get too much. Before that the *honu* dig out when we use to pound em. But you know what the fine for that though - you go catch the *honu* - \$55,000! Big fine when you go full around with that. That's why nobody like go touch that turtle, they go get em night time some.... They should open the season: one a month for one family you know what I mean, whoever eat that thing. And us we eat that thing, make good steak that -- mo bettah than beef steak because soft eh the meat. Like us we use to go catch em, cut em all up, salt em or make barbeque. That's the best, you put the turtle and the beef steak over there, they going eat the turtle because that thing going melt in your mouth. And then you gotta get good hand to cut the thing too because if not your whole house like if you go eat that turtle and your hand no good like when you talk to me I can smell you. I can smell turtle on you. And the people outside the road can smell the turtle cooking because the hand no good. The hand get lots to do with that kind meat you know [TH].

Before we use to make that kind Kalalau cook, and how they use to live they use to clean all the turtle guts eh, we put the wing inside there, we cook em with the turtle fat, no need put oil inside there. And what we used to use for make em just like the garlic, we use to use the orange leaf. We throw the orange leaf inside there. It's ono! By the time everything all *palahe*, you just slam that thing right on your rice or whatever in your bowl. We eat that way. After you warm em up everything all *palahe* eh, the meat and the liver and all that man it's *ono*. We use to do that, we call it the Kalalau cook. Kalalau cook we use to make one big pot and put all that things in there [TH].

4.5.7 Limu Gathering

All over get good *limu*. Well, most places get the *limu kohu*, and the only place get the other *limu*, but not too much now is at Kanaha. That's the only place. They get *limu pepehe*, *manauea*, *lipoa* – little bit not plenty. Before the fish go eat that, but you no can eat the fish. Smell. Too strong, but if only little bit, not too bad...I know where get so. So when I go catch the fish over there, I smell *lipoa*, I know where the fish came from. But we go eat, but not too much, only that particular place get [TH].

Our place no more that kind stuff like that. the only one that use to come plenty on the sand was *limu pa`apa`a*. The flat *limu* the one just like paper. When the *limu pa`apa`a* stay the *moi* go hide because get plenty small crabs that live in that thing, like Waimea. That's when they go *kokone* over there and catch *moi* and `ō`io inside that, when they see the *pa`apa`a* on the beach. That's the only *limu* that I see plenty on the beach, well use to get that and the *limu kala* but not anymore because the turtle eat em all. Like before we use to go fish, we use to go look *nenue*, get plenty *limu* rub against your leg, they eat your leg you gotta go with pants so that the *limu* no rub your leg when the wave come. Today no more that kind, the turtle eat em all. That's why the *kala* today no fat the *kala*, because no more their food [TH].

Kala and *lipoa* almost the same, but the *limu kala* is more thick and tough. The *lipoa* is short, but same color – brown. The *limu kala*, well I wouldn't say get smell – get some kind particular smell. Like certain *limu* get smell eh, like the *limu kohu* you know what I mean? The other *limu* no more smell, and then of course get the *lu`au*, the ___ *limu*, *limu `ele`ele*. The `ele`ele get a little smell like the dark hairy one, that's the `ele`ele. Get plenty other different kind *limu* yet, but these are the ones that they [turtle] eat all the time [TH].

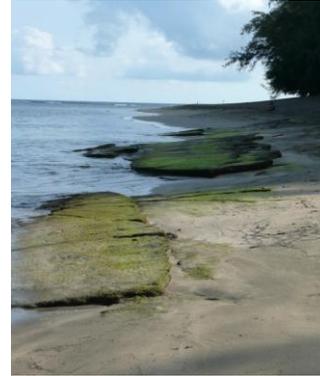
4.5.8 Gathering `Opihi

Get [*opihi*] but the screw-up when they market. That's where we lose em. When they start marketing that thing that's when we lose em [TH].

4.5.9 Beach Erosion

The beaches were bigger than. We're seeing shore line erosion now. The beaches are significant ...in my mind they're significantly smaller than they were. You can see that in just the land falling down and the erosion that we're witnessing now [CW].

Photo 64. Kē`ē Beach at low tide



4.5.10 Tsunami Impact

The other really significant event that I think had contributed to Hā`ena being really underdeveloped and really maintaining its rural lifestyle, were the tsunamis in 1946 and 1957. Those had a really profound effect on the people alive at that time because of the incredible damage that was done by those tsunamis. When I was growing up I remember all of the coastal areas of Hā`ena...just seeing the slabs of where the houses were...nobody wanted to rebuild along the coast. Because almost within in ten years you had two severe tsunamis, so it was fresh in everybody's memory. But by 1967 the most recent tsunami was ten years away. It was beginning to fade in the memory of the people, and as new people came they had never witnessed or understood the power of those tsunamis. So really, '67 was the beginning of a lot of change [CW].

4.5.11 Surfing

It was in the early '70s that I got to come and actually live out there in Hā`ena with my grandmother. Those were really amazing years because it was still very undeveloped, still rural. Change was beginning, the surfers were catching on. The surfers had caught on to that Kaua`i has awesome waves, and we were getting surfers from California and other places [CW].

4.5.12 Shark Grounds

My understanding of the shark home is actually in Makua in the outer edge. That is the hereditary home of the shark god. These are definitely his cruising grounds; they're definitely his front yard here. But my understanding is the currents are very deep off of Makua - the currents never cease even on the calmest of days, the currents always swirl in there and it goes deep onto the reef. I have never been able to swim, even on the calmest of days, in that corner of the reef. I can show it to you where Makua comes. Makua Reef is the Tunnel's area - off of Tunnel's [RW].

The ocean comes in in a big way there. I've also been there on the *heiau* and I've watched a whale shark go by on numerous occasions. There's one that does his regular route, so those are absolutely massive. Another time I saw it on the trail above this *heiau*, when you get into some higher grounds - I was able to watch it approach from very far away, come right off-shore right here at the *heiau* and I could tell by the scale of the people and the whale shark that it was an absolutely massive animal. So I know that he makes his annual cruise through there, this particular whale shark. I'm sure other people must have seen it. My brother was there also on one of the occasions too and saw it cruise right off beach itself, the lagoon [RW].

###

4.6.0 Cultural Resources and Use

This category includes traditional Hawaiian cultural resources and practices and other ethnic resources and practices. The traditional Hawaiian cultural resources and practices, includes the Pre-Contact Era, as well as cultural practices after Contact (post-1778). Cultural resources can be the tangible remains of the ancient past or the traditional *wahi pana* or sacred places, or any cultural gathering place. One of the most significant traditional Hawaiian cultural resources is the *heiau* or places of worship. Other places of great significance for all cultures are the burial places of loved ones. Unfortunately with the massive transformation of the landscape as a result of the many western industries [i.e., provisioning, sandalwood, cattle, sugar, tourism, urban development] coupled with the secretive nature of ancient burial practices, most of the ancient burial places are unknown or forgotten and are easily disrupted and disturbed by modern subsurface activity.

4.6.1 Burial Sites in the Park and Vicinity

There's lot of issues, small issues, there's lots of em. Like in Hā`ena they had that burial thing -- the iwi. That was a big thing, but you know what, those guys, they stupid, that's not their iwi. That's burials over there all along the coastline. We use to go fishing night time all spooky, the whole place. We know that. And my dad said they tried ___ in Naue, that whole flat over there, guarantee all iwi, that's why they been find that one over there. And these people who think oh because the place name is Kounui, ah they say the Kounui family was buried there... ah bull shit, they don't know, they not sure. Now they all confused now. Even Jeff Chandler, same thing, Jeff Chandler he went talk -- that's the family.... That's warriors. And I know the place. No more other people that older than me in Hā`ena. I'm trying to help out, giving information while I'm in a good state of mind [TH].

I guess way back in the 1300s – 1600s when they tried to come over here and conquer this place. They never did conquer this place because every time they tried the warriors over here would kill em. That's why they call the place Waikoko because that's where they use to kill em. Waikoko means blood water eh. Over there that's where they use to slaughter those kind people or they go chase em with their own kind canoe and kill em, take em down there to bury because big flat and sand. [They came from] off island I think coming over here to conquer this place. Like they did in Honolulu up by the mountain and dump em all down...the kind place like that, over there and like on top the Pali. They make that song like over the Pali yeh. That's how Kamehameha became the conqueror of the islands because he did that. That's why a lot of people don't know that the people buried in those graves over there. Now they do excavations so they gotta find something, but again I blame the real estate people because all these Hawaiian lands, get that kind stuff on these Hawaiian lands; and no more marker [TH].

Kē`ē get too, you know why? Kē`ē was a staging point for the people when they going back to Kalalau and maybe the ___ come pickup, drop, they no can go eh and if the people die they going bury em right there. But over there had plenty *paepae*, the other side of the *pali*, they had plenty stone kind formation around so you know that get grave yard but some places no more you know. Like where they had the cesspool they went go dig over there they went find bones over there, right by the toilet -- the new one, all over there, even in the front. I see people sleep on the ground over there, they sleeping on the buried bones [TH].



Photo 65. HSP Comfort Station

All that whole coastline - I no care. That's why when we go fishing over there spooky - use to be spooky for us night time, but we no care. We throw em off, like if we going down and run into em

we tell em you know what, my dad *po'e kaua*, Freddie Makua going *iluna* go up, but we still going down, so the thing he head up there where we not going, we going down so the spook *pau*. That's how we use to do it. And then when we go *holoholo* fish night time, we no say nothing, we only tell we going *holoholo* but not where, we just go, even day time if we going hunt, same thing, we just go we say we going *holoholo* but we no tell where otherwise this kind they wait for you. That time was haunted with devils when we go fish night time [TH].

I know there is one kid who got into trouble and thought he could hide out at the end of road in the *halau* area and that no one would come and find him. He said that he lasted a few hours there after dark...he said there were so much noises and voices and nothing and nobody could be seen and he couldn't take it [FBW].

[The iwi is of people who used to live here and] I think warriors too. That's what I think, that's why plenty eh? All along that coastline, even over here [looking at map], Kaloli, Kaloli inside here along this bank over here sometime you see the bones fully framed standing up-side-down, sideways, whatever. Just like they been throw em inside one hole like that -- that's all sand eh. So when the sand goes the high waters go eat em, eat em, then you see em all falling down...you see the whole frameworks well within the sand. All that place like that, even the Rice's, the one we were talking about. Before when they went bulldoze the place before 1946, they went bulldoze all that place make em flat eh [TH].

And then I'd say, 'Okay, why don't we have the Burial Commission get land from the DLNR, half acre or acre, several different places, pick up the bones, carefully envelope them with the prayers and take them to this piece of property which then becomes a memorial park. Inter the bones there again and put a plaque with the names of the people from the *ahupua'a*...their names are in the Great Mahele ...because those are possible ancestor of those bones...and those are the one names that we have...the most...the deepest listing of names that we have. But you get these fringe people...mainlanders come in...and they're going to tell us how to do things...and they come and make all of this great fuss [FBW].

We have Darren Mahuiki here who knows where his family is buried, and he got permission from the owner of that little corner...and you'll see it over here, it's marked 'Burial Place' now...and he has turned that into a garden And that is where his family bones are. The Smith family who are in the Park, they took where their family was buried and they turned that into a garden too. The Hashimoto's have their family, at least two generations that I know of, that are in the little hillock back behind the house. So these are three families here in Hā`ena who know where their family bones are, and they are taking care of them. And I would be the first one down there to fight off anybody going in there and moving those bones and disturbing them. That's one thing with the State Park thing, as far I'm concerned, that need to be kept in place and marked. Here are three families who know where their bones are and are keeping them, and doing something about it [FBW]

If you go there, just to let you know my great-grandmother is buried over there, her name is Ka`aumoana Moa Niau...the one says Moa, her whole name is Ka`aumoana Moa Niau. Come from Ni`ihau, get plenty family there, Niau -- my mother's relatives.... Kaenaku-- you know the first one, that's the daughter of Mokuohai -- I don't know the rest [CM].

4.6.2 Traditional Hawaiian Sites and Legends in Hā`ena

4.6.2.1 Heiau and Hula Platform

The Kauluopā`oa [*heiau*] and Keahualaka [*hula* platform], you could see it from the beach [CW].

As a side note that very few people know is that in the '80s with *Halau Hula o Mililani* we went up to the *heiau* at night. We made torches and placed the torches where the big *pahu* drums are said to be facing the altar. What happens is that the dancers cast a forty foot shadow up on the wall and that is clearly visible from every area around....so the images of many dancers dancing on the cliff walls ... combined with the various acoustics. There are certain places along in here that if you stand in this one spot...the acoustics... you can hear the entire cliff wall far away. You step one inch on either side of it, you can't hear it. I can show them to you when the sea is calm. When the sea is calm it's much easier, as you walk along the beach you can...you'll actually be walking along these acoustic windows...they're short but you know exactly where to stand to hear somebody way far away in the back of the cliffs. So there are some acoustics on here ...which are common in many *heiau*...Hauola over in Waimea, Kekaha side is clearly an amphitheater...as many of them were. The chanting style of passing over mountains ... and the long distance too...I'm sure was practiced here [RW].

People were still living there yet [when I was growing up], the people would go teach hula over there [by the *heiau*] -- the old lady Wahinekouli, she was the teacher over there; and then the old man Kila went go.... [Hula people] still go over there clean up that place and go *uniki* over there [TH].

I know people have [gone up to the *heiau*], but I can't give you specifics on that. I just know that there are people like me who have gone up there and left their *ho`okupu*...and said thank you for what's happened and what's going on. It's a place that's rich with all kinds of ghost stories too [FBW].

I think the archaeology at this particular point will take its own particular course. The *heiau* is itselfespecially when it comes to the hula...you need to separate it out for both hula and for the *heiau*...they're two separate things. Even though they could be under one housebut yet even then that house is divided into two separate categories...one is for the *heiau* itself and the other one is for the dance platform. They're two separate functions. Although it's all in the same because as you go up you're making your *ho`okupu* to the *heiau* itself, and then the *hula pā* is the secondary aspect of it. Once you've cleared the way through the *heiau* itself, now you're on the *pā*, and then now you do what you need to do to Laka. But there is a little bit of a gauntlet that needs to be run, and the protocols to the main *heiau* have to take place [RW].



Photo 66. Ke-Ahu-a-Laka

My understanding is when Kē`ē originally shows up in the material it's during the Mo`ikeha and La`amaikahiki saga. In that La`amaikahiki promised to Mo`ikeha that upon his death he would come back from Raiatea pick up his bones, intern them there at Taputapuātea of which he had a hereditary role there with his grandfather, Maweke. When Mo`ikeha passed away his bones were kept in Kē`ē, right there at the end of the road for safe keeping, until La`amaikahiki's return. La`amaikahiki comes there, picks up his bones, goes to O`ahu, sires that royal line, and then goes back to Taputapuātea. So that is my understanding where it first shows up in literature, the oldest. Already back then the school was evident as a place of history -- the school for historians. There's always been a center of history -- this would have been your PhD in all the various chants. I think a really good, more modern, but still shows you that even in the 1880's we have really good description of historical ... I'm jumping ahead a little bit but I'm just showing that even as it comes up to the early 1890's -- it's still very highly respected [RW].

My particular involvement, of course, has always been *heiau*. I understand that Auntie Kai Zuttermeister has a connection here also with the Kaulua Pā`ao, also the *hula pā* at the top. I think

there are only one, two, or three places in Hawai`i where the actual *hula pā* is incorporated in the *heiau* itself, so it makes it rather rare, very rare [RW].

I am aware of Kekahuna doing the map itself with Theodore Kelsey - the dynamic duo - can't think of Kekahuna without knowing about Theodore Kelsey. That was another part of it. I know that in the thirties the Kaua`i Historical Society hired...and I'll get the name again...it might have been Thomas' father or one of the more prominent residents. I'll have to look it up again. But we have all the pay stubs and all the materials, the monthly reports as we got from...at the same time the Historical Society had someone else working on the Wailua Complex - Poliahu, Holoholoku, Hikiakala also - full time hire. And for years the Kaua`i Historical Society maintained it. I was getting up to Kauai, Auntie Kauai Zuttermeister, which Roselle Bailey comes in and from my understanding there is a falling out over this heiau between the two. But I always wanted to be able to, obviously it's too late now, talk to Auntie Kauai Zuttermeister. I've always been meaning to go through her particular notes and papers on anything having to do with this...which I have yet to do. And I don't even know if you can or not...depending on the kind of notes she kept [RW].

Pā`ao was Lohi`au's best friend and retainer, and took over his responsibilities when Hi`iaka brought him back to life took him to the Moku o Hawai`i, where Pele rejected him, and he came back and lived a normal life. His sister, Kilioe was a sorceress and also the primary teacher in the school at the time. The whole Naupaka legend begins with her. She was rather a dangerous woman; you broke a *kapu* that was it! Accordingly, the stone right there in front of the *heiau* on the beach, right here, is Kilioe. That big one with all the - when they say they put the piko into it, that stone is Kilioe. Kilioe guards the grave that Lohi`au is in. He's behind the stone, in the hallow part of the hill as you go under - the chambers underneath and behind the stone, according to the `olelo that I understand [RW].

Do you know who Henry Kekahuna is or was? He was a very famous historian, he was the mapper. He did a map of Ka Ulu o Pā`oa, and he did a whole kind of narrative on the side of the map about it. That was really interesting, if you haven't seen that you should let me know, I think we got a copy of it at Hā`ena...at Limahuli. We should have it [CW].

4.6.2.2 Pele Connections

There is a chronology, (1) there is a genealogical chronology of the paramount chiefs, (2) there's a second chronology in the historical sequence which just shows up in our records, but there are many aspects to it, many portions in the history. So we're starting out in the 12th century with La`amaikahiki and Mo`ikeha, and Pele and Hi`iakaikapoliopole also begins there at Hā`ena also. Having grown up with the Pele stories from my youngest age, and being a soldier for Lohi`au, my relationship with Pele has been quite spiritual...but because of the whole Pele, Hi`iaka, Lohi`au connections as to the beginnings there, is a critical point in history for understanding the importance of this particular site [RW].

The first legend of Pele is set at Mana...that's the Pā`ū o Hi`iaka legend. They come into Mana, and the first battle with Pele and her sister takes place on Kalaheo side, at Kukui-o-Lono. And you have the legend of Pele and the `ōhelo berries. And of course the whole Pele, Hi`iaka, Lohi`au story, but that one gets very complex because you not only have Pele, Hi`iaka, Lohi`au, but you have Lohi`au's sister, Kahua. And you have the Chiefess in charge of the *hula halau*, Kili`oe, and Kili`oe is turned to stone by Hi`iaka and she's still down there at the end of the road. And my grand-daughter's piko was placed there -- she's taking care of it. So it's still kind of in use by some of us. And then Limaloa is Lohi`au and Kahua's brother. All of the Limaloa legends in my (???)... mirage that used to be...Limaloa catching the *uhu* off Hilo and there's the story of how he gets put into the mirage is part of the (???)...Just so that you know, you know where Lohi`au's site is...that stone wall...my mother saved it [FBW].

4.6.2.3 Other Legends

I never talk to my mother or my dad. My dad would know about all this, the legends. Like they talk about the Piliwale sisters above the dry cave...they all stone figures up there. Some day when you come here I show you.... Way on the side of the hill, Pōhaku Kāne stay over here some place you know. We look right from there eh. This is the start...that stone right up there, that's the one. And then Mānoa, the Piliwale sisters are up here somewhere because it's on the looking up it's on the right side right above the ____, you go look all that stone figures up there, get three pointed kind like that....[can see] right from the park -- the same side, and look straight up [TH].

We can go through the various stories. I know we have the Kihawahine activities going on with the Mo`o goddesses that were luring strangers into wet caves [RW].

My only one [mo`olelo] are the two dogs, but they're down over along the beach in front here, and in front of this County park. Because you know right in front of our house was that Hale o Pōhaku, which was a dog heiau. According to Tommy Hashimoto, the people who used to work down along in here and along in the park area, when they would ride home in the evenings a little white dog would come out...out of the woods and trot along with them until they got to the point where Hale Pōhaku was and the dog would disappear. I saw him once...really adorable little dog...kind of spotty face. And the other dog is the big black one, and he's supposed to come when there's going to be something bad happening...but he comes from the other side. He comes over this way and he kind of disappears around the dry cave. But he seems to be much bigger when you see him in the distance, than when he comes towards you. He just seems to slowly get smaller in size....odd looking thing [FBW].

4.6.3 Traditions

4.6.3.1 `Ōahi Ceremony

The stories that I heard when I was growing up...it was like a fire throwing ceremony from the top of Makana. And that was really one of the things that drew people to Hā`ena in the ancient days to see this amazing sight. To my knowledge the `Ōahi ceremony was only performed in two places in the whole *pae`āina*, and that was Limahuli off the top of Makana and at Kamaile down at Nu`alolo. Probably it had to do with the geological formations, the direction of the wind, and the up currents of the wind, but it was a ceremony where they used *papala* or *hau*, both of which were really light woods that were very flammable -- both have like a hollow pith or core. And while on fire they could be thrown and be caught in the updraft of the wind -- it must have been pretty spectacular. My understanding was that it wasn't like it was every full moon or something like that [when they did it] -- I don't even know if it was even related to things like the Makahiki or the four seasons [CW].



Photo 67. Pu`u Makana

I never did [see people throwing fireballs off of Makana], but my mother did. She said it was 1912. And I've seen a date somewhere recently where somebody said it was later than that, but I don't think so, I think it was 1912. I know La'a Mahuiki was one of the people, but he was a kid at the time because my mother was twelve. Of course, I think at that age what you remember are the brands floating -- the sticks with the sparks coming out the back. And it never occurred to her because she was afraid to ask how it came about. It's like me, I look back and the people that I remember, I wish that I knew what I knew now so I could ask the kind of questions that I should have asked! [FBW]

My grandmother remembers the `Ōahi taking place. She was there the last time the fires flew from Makana. That was in 1910-11... it was one of the Maka's or Mahuiki's who went up and did that.

My uncles probably remember it easily. I guess I don't really want to go into all the lore and history of it, because I think my father would be able to go through a bunch of it [RW].

Another reference is 'the sparks from the `Ōahi creating a feather cloak as it enveloped and draped over the whole bay.' So as you had the sparks in the shape of a feather cloak, you had all the people in the canoes, you had all the people on the beach, you had all the dancing, it made for a phenomenal spectacle [RW].

We knew that there were numerous ceremonies that everybody would gather here along the beach and in canoes [RW].

4.6.3.2 Kē`ē Pu`uhonua and Halau

The references that we have in the Historical Society - one particularly beautiful one was done by Emory's daughter in the forties and it's coming from Hanohano Pa - John Hanohano Pa. In it and earlier, we have references by his mother and his grandparents, also records from them. She distills it, but even then the entire Nā Pali Coast understood that if they were able to reach Kē`ē Beach right there in front of the heiau, they were safe [RW].

There are stories of robbers and bandits along the coastline, and canoes making a mad dash for the safety of that end of the road there [RW].

All the Kalalau, the Nā Pali Coast, went to school - especially the women - all went to school there [Kē`ē] - they were all trained. And speak very highly of it already even in the 1880s and '90s and 1910 the school continues to operate it seems like. But you can make up your own mind when you start reading this material [RW].

4.6.3.3 Gathering Rights

Take the gathering rights -- the gathering rights belong to the ahupua`a. You didn't have gathering rights in any other ahupua`a. And this is where you will find people like Tommy Hashimoto who will not fish in Wainiha. He doesn't go along the reef in Naue because that's Wainiha, not Hā`ena. He fishes only in Hā`ena because that's where technically he and his family belong within this ahupua`a, so he doesn't go around the whole island [FBW].

4.6.3.4 Fish Gods

The fish-forming stone is, although to a lot of people they don't know it, but to me it's rather common. But mostly those fish stones were given as gifts to the mountain. What would you give the mountain is a gift of the sea. What do you give the sea is a gift of the mountain -- the exchange between sea and mountain, right? So you're bringing up these basalt fishes up to the mountain, you're bringing up the coral up to the mountain for your *ho`okupu* - as your gift to the deities that live up there. And in return you bring the stone and the material from the very top of the mountain to the edge of the sea. That's how you're making that connection. The fish were an important part, you see it in Maupiti, you see it in French Polynesia, you see it in other places - the occurrence of the fish, the basalt fish [RW].



Photo 68. Possible fish god stone

The old man Hanohanopa`a, he supposedly had one rock he used to pray, and the fish would just come and they would line up. But after he was gone, I don't know, I don't think there's anybody like that any more [CW].

4.6.3.5 Hā`ena Rains

And the noe noe! How do you know which one you're under going? And you can see it...there's one rain that I like to see is Lilinoe but it may be Noe....this very fine fine rain that soaks you immediately...you get wetter quicker with this fine rain than you do with the big raindrop. And I look at that and I think here are three main kinds of rains and I don't which one is which! [FBW]

4.6.3.6 Hā`ena Boundaries

For me, I don't feel right until I get across Mānoa Stream. To me that's the boundary, right by the dry cave. Once I'm across that stream I'm in the zone...I'm in a whole other world...I will **not** cross that stream for **any** reason until I'm ready. So that's just my particular thing, once I'm across the stream I do not cross it until it's absolutely necessary. I stay from the dry cave to the end of the road, that's my turf. That's where my heart is, that's the center of my universe, that is my ahupua`a, and I have a sense of responsibility with the years of work that I've put into it [RW].



Photo 69. Mānoa Stream going over road

4.6.4 Ali`i of Hā`ena

Hā`ena was unique in that when the Mahele took place, the main ahupua`a of Hā`ena was given to Abner Paki who was not *kama`aina* to Kaua`i . He had, as far as my research has shown, he had really no relationship at all to the place. It was more of a political bone that was tossed to him. So the true Ali`i from there...there is no record of it...Mahele records show that Kekela was the *konahiki* at the time of the Mahele, but she was from O`ahu, she had been brought over. So we don't really have a record of who the traditional chiefs of that area were [CW].

Kekela that was the High Chiefess here, she was sent down by Kamehameha as one of the messengers to Kaumuali`i, and Kaumuali`i took one of the messengers by the name of Kihei, and gave him Kalihiwai Ahupua`a. So he stayed here and when Kekela came, he gave her Hā`ena. And Hā`ena has always been ruled by a chiefess, who is independent of the ruling chief. When the ruling chief changed, the Hā`ena chiefess was never deposed the way that the *konahiki* in other *ahupua`a* were. And at the time of the Mahele, she came to Hā`ena and made sure that everyone who lived here made a claim. Where as Abner Pākī told the people in Lumahai that he would take care of them, so only three people made any claims in Lumahai. Kekela lived most of the time, I think in Honolulu. Her home was...my mother's house is built over the platform of Kekela's house. It's built over the chiefesses's house site -- there's a stone platform underneath. She deliberately built the house over it so it wouldn't get damaged. I don't remember [any more about her], but you can track her down by going through Kamakau -- I'm sure there are other places; I've never really followed her. My interest has lain with the place names and with the history up until the end of the Kaua`i Kingdom, so called. So anything from 1824 forward I haven't really gone through. Information kind of spreads over that period, and I've never gone back to track her down [FBW].

I know that the last Chiefess of the area was Kekela. Chiefess - rule by women - is another important part of it. I need to preface with the Kaua`i chiefess, Kekela. She's all over the Mahele books and I'm sure there's probably some research to be done. My grandmother's home was actually on her compound...is on her compound. Everything that is there is still there and absolutely pristine, untouched. We had Emory come in - my grandmother hired Emory in the early sixties or so to do some work in the back of our gardens and the reports are there. I know all of Emory's carbon dates are in question, but he had some old ones [RW].

That [where Juliet Rice lived] was supposedly where the Ali`i lived and that's why that area was *kapu*. I know before my grandmother was allowed to live there she had to talk to the old folks ... she had to go talk to the *kupuna* and get permission to go over there -- to the ones that were passed already -- to the spirits. According to Uncle Tom there were *kahuna* in that area, powerful ones. But by the time we guys were growing up they were all gone already... She told us before there was no electricity; the spirits out there were strong. And even Uncle Tom, he said they go fishing like that, they see the hala tree on fire and they come over there and no more fire...they see fireballs...all kinds of heavy stuff up there. Now you don't see that kind of stuff [CW].

4.6.5 Kē`ē – Nā Pali Connections

That particular connection - and that's Wahinekipi, which is Hanohano Pa's mother and grandmother, grandfather also - it's a male name too, Wahinekipi, but it's coming from 'Rebel Woman' which was the name give to Pi`ilani, who was Ko`olau's wife. So we see Ko`olau's wife, the family name there [Kē`ē] and Kalalau - when they were all evicted in 1893 because of their role in helping Ko`olau. The Provisional Government immediately after the overthrow banned everyone from Kalalau and dumped them on the beach right here at the end of the road. And there they made their way in through Kaua`i. Some stayed in Hā`ena, others moved on, others moved off island and went elsewhere. But the entire Nā Pali Coast essentially came in on the beach right here and then entered into the new society, if you want to call it that, from Kē`ē Beach. It was because of their role in helping Ko`olau, the leper. Without going into that whole story, you know, the point that I am trying to make is the interconnecting of the Nā Pali with this whole bit and the far reaching respect that the school actually had [RW].

4.6.6 Kekahuna: Park Mapper

The [Lohi`au] *heiau* is right on the corner where the trail start. That's where it is. I went work on that project, the *heiau* project with the old man Kekahuna from O`ahu. He was just like one archaeologist eh. He draw all that, just like one archaeologist. He put down everything. You like look at that map you go to Kaua`i Museum they got em. In fact I think stay in Honolulu too. You go look. That man was an intelligent man that...go look on top that map went explain everything. Was me and my Uncle Ralph Kanehe, old man Kekahuna, and the *haole* old man use to be -- all stay on that map, that drawing. You go look at it, get all the information right from there. I know that, because he gave me one, but every time they make this kind paper they give us this kind. That's why this one they laminate eh? That's why it will last forever. I get plenty of this too [TH].

4.6.7 Cultural Identity and Balance

Establishing our Kaua`i identity, naturally, is a big deal for me. We do have our unique aspects, as each island needs to pursue their own specific cultural identity. Yes, we all belong to the same tree but we have our gifts also. And each island has a very distinct separate history because they have different genealogies. They have their own uniqueness that each island needs to seek and then adopt, and then relive them. And naturally, here on Kaua`i we have a big movement going back to seek our own cultural identity, and that part of the *kapu* is very important because now we're far more inclusive. So, no, I don't mind when women help us build rock walls. They did in Nu`alolo Kai, right? It's all incorporating. And when we do all the religious ceremonies, it's all male and female. It's not right unless the *kauna pule* that's both male and female. Here it just doesn't seem right to have a ceremony without the balance. Neither does it seem right for us to do the genealogy and leave the women out of it. So I do the male part, the women do the female part as we come up through the [genealogy]. But we're developing the female side of it right now. Having suggested to many of the women here that they need to get a lot more serious in collecting the female aspects of it...so you can see the duality when we do our genealogies [RW].

###

4.7.0 Thoughts/Concerns about Hā`ena State Park

Change often meets with resistance, especially change of lifestyle brought about by outside entities. People who grew up on the lands often don't want to see it changed, especially if it provided resources, recreation and respite. They also understand that things don't stay the same, and change could occur with cultural sensitivity. The consultants shared their *mana`o* about the future of this area; some of their thoughts are stated below.

4.7.1 Heiau and Hula Pā

Just like one of my dreams with this Park here down at the end of the road. I would love to see the *halau*, the *hula halau* area, and Ka Ulu o Pā`oa -- I'd like to see it restored and used. My idea was over by the parking lot put in some sort of a building so that any *hula halau* in the State can perform on the *halau* platform with the understanding that they put on a program for the public which would be taped and begin a *hula* historical record -- a depository -- so that these things that are so ephemeral are not completely lost. Because I think of `Iolani Luahine -- we have only one or two clips of her dancing and yet she was absolutely ...she was incredible! The minute she started, a possession took place. It was just incredible. And then, I think, there is so little of what she did, and I think this is one of the best places where you could set up something like that. I think you could end up with something that would be for a nonprofit organization running that sort of thing. And then, of course, you'd have a source of income being able to charge something to go to the performance. The *halau*, in order to be able to use the place, the actual school, would be, I think, somewhat of a good thing. I would think if I were a *kumu hula* to one of the most famous *hula halau* areas is some place that I could actually get to with my crew, would be something I'd want to do. And a few have done it in the past. But it's too dangerous right now. And too many people are going into it and lifting stones, and taking stones. Our former Postmistress used to dread getting these boxes addressed to 'whoever is in charge of the *halau*', because she said people would take these stones and then send them back. I don't know...something happened to them...she said you could just feel this mana! To me the only way you're going to save this, is to use it [FBW]

Again to me that should be directed to the practitioner's who use that [*hula* platform and *heiau*]. To me I think it should be cleaned up because when it's overgrown, the way it is now, the roots ... the trees and stuff...they're busting up all the rock walls. In my opinion, they're desecrating it. The challenge is that when you clean it all off, then all the tourists are going to want to go up there. So how do you control ...it's always a two-edged sword ...that kind of thing. So I think the master plan has to address ways of protecting cultural areas from just being considered public domain. The whole western [mentality] is so..."It's a State park and I'm a U.S. citizen, then I should be allowed to go anywhere I want in the State." That's not how this park should be operating. But I do think it would be ...it should be better maintained...it should be cleaned and better maintained. It's a really impressive site, like I said when we were growing up you could see all that -- I think Uncle Tom was the last one to really clean it really, really well for the Historical Society. It must have been like twenty years ago the Limahuli Garden was working, we were cleaning it, volunteering and going down there and cleaning it CW].

I think the archaeology at this particular point will take its own particular course. The *heiau* is itself, especially when it comes to the *hula* - you need to separate it out for both *hula* and for the *heiau* - they're two separate things. Even though they could be under one house, but yet even then that house is divided into two separate categories - one is for the *heiau* itself and the other one is for the dance platform. They're two separate functions. Although it's all in the same because as you go up you're making your *ho`okupu* to the *heiau* itself, and then the *hula pā* is the secondary aspect of it. Once you've cleared the way through the *heiau* itself, now you're on the *pā*, and then now you do what you need to do to Laka. But there is a little bit of a gauntlet that needs to be run, and the protocols to the main *heiau* have to take place [RW].

4.7.2 Lohi`au Site

The Lohi`au is another one. It's overgrown its right by the trail head. It's an area that kind of needs to be cleaned up. I think it would be great to have it cleaned up and have better interpretive materials. The whole park needs interpretive materials, it's really lacking, and it's one reason that most of the people come there. They just think it's a place to go swimming or lie on the beach, or throw their rubbish away in the bushes. They don't understand that in the ancient days this was like one of the Seven Wonders of the World with the `Oahi ceremony and the heiau...this was a very special sacred area that in ancient days people made pilgrimages to come here [CW].



Photo 70. Lohi`au's house site covered with vegetation

4.7.3 Master Plan: Cultural Methods/Protocol Recommendations

Multi-discipline Houses/Kuleana I really don't want to reiterate the recommendations we made on behalf of the County of Kaua`i Historic Preservation Review Commission. That motion and stuff is out there, that I think we'll address piece by piece as it comes as a Commission. But I think that my main point is that some of the cultural methods that you may want to consider in this whole thing. Number One, this is multi-disciplinary. You have the hale's, we'll call them hale's for now - the Houses - you have the house where all the....this area should be reserved as an archaeological preserve. And so therefore, for educational purposes, the archaeology should be allowed, but that's separate in its own particular field. You have the fishing, so another house is controlling...their only duty is to manage the fisheries of Hā`ena. Another house is going to be Marine Biology, which is the study of reefs...that needs to go on. Another house would be the taro, such as Hui Maka`ānana, which is the taro growing aspects of it right there. Then another house will be the house that actually is the *heiau* itself. So briefly, I know there's a couple of more houses and more disciplines that we're dealing with, but essentially you have these separate disciplines right here. Each is their own particular entity. I think it's pretty ridiculous to even assume that one group can handle all aspects of this...so there's room for different groups...their *kuleana* are very separate, but yet all of them are focused and the goals are all the same - making Hā`ena the jewel it deserves to be.

Number two, the cultural, educational, spiritual, philosophical reserve or preserve where all of that [the various Houses and their *kuleana*] is perpetuated. So there's a unique opportunity by laying the fundamental groundwork for the separation yet the unification of these separate houses. I think it would be well worth considering over a long range period. It keeps the arguments and everybody focused on their job, instead of one guy who is in every single camp, this just doesn't work in the long run. So, therefore, although I was there at the beginning of Hui Maka`ānana o Makana, their function is quite clear in the taro productions and the expansion of the taro lands,

and all the aspects of the taro growing that are going out there. They can expand into other areas, but whether they would be the group that would handle all the protocols and everything with the *heiau* that's different, that needs to be a specialized group...a specialized *kahuna pule* - the house itself - the protocols that need to go on in the *heiau* and all the activities need to be overseen by some very experienced people [RW].

Fishing House. At this particular point I'm not going to put in any individual, I could say that, for example, Jeff Chandler, he's a fisherman. He has a great deal of knowledge that could be added to the world of fishing. For example, he would definitely be in the House of the Fisherman. His ideas and his participation in the fisheries, conferences and meetings, and everything like that, along with Thomas Hashimoto, they know what to do in regard to managing the fishing resources. I think he would be really good with that [RW].

Botany House. A lot of this stuff in here - the vegetation is *kamani* - there's a botany aspect to it too, so that's a separate house too. There's a whole *la'au lapa'au* aspect that could be done here too, which actually creates a whole another separate house of botany....again, a completely different discipline, and under different goals and objectives, but still important to the big picture [RW].

Mason House. We were able to do that in the new Loko Kai restoration Project, in that we created the Mason House in all the restoration work. The Mason House included both males and females. It was their job to decide how the stone walls were going to be built. Once they knew exactly what they were going to do, then they told the Kahuna Pule House, and then they're the ones who decided how to open the door....keep it open....keep everyone spiritually safe...and close the door after we're done. It was their job to protect the masons while they're working. The Third House was the Na Pali Coastal Ohana which both the masons and the Kahuna Pule knew exactly what to do, and then it was our job that both of them got exactly what they needed whenever they needed it [RW].

State Parks House. The Fourth House was State Parks, which oversaw the whole thing to begin with. In the long run that methodology really helped focus the work and the energy. It kept people from being in too many places...and into discussions where they don't really belong. It facilitated things in the long run much better and made for a stronger more cohesive unit [RW].

Cultural Methodology. I think the main point that I really wanted to make is to consider the culture methodology and the way you organize the different disciplines. I think it's going to help you a great deal in the end. It's worked for us. Our cultural methodology and problem solving and work ties everyone together, keeps everyone focused, keeps the arguments, keeps everybody out of each other's hair, keeps everybody out of where they do not belong, but also gives everybody a sense of responsibility and a place - a sense of importance and a sense of a very specific responsibility. People need this to grow, but at the same time it's symbiotic, if we don't seek the symbiotic relationships we're not following the lessons we're supposed to [RW].

The cultural protocols that demand this particular approach just because of the site you're dealing with. You're dealing with one of the most important religious, cultural, historical centers. Our ancestors deserve the best. Naturally when you're dealing with these elements it is much safer to be operating on a much higher elevation of ethics and protocols. And in the long run it's much safer for everyone. But at the same time it ends up as a spiritual experience because in the end it is a ceremony that binds us together. Now once we've experienced the ceremony together we have something in common. So the ceremony is actually critical. As far as I'm concerned, the more ceremonies that go on up there the better, but that elevated protocol is critical in keeping everyone safe and respectful [RW].

4.7.4 Master Plan: General Issues

I think by thinking that Hā`ena State Park is only at the end of the road is misleading. I think we have a duty to incorporate the entire footprint of the property for a long range plan. Although we're in expansion phases, you can break it up into many different phases. It breaks it up into more of a size – components - like building a wall [RW].

Lohiau Complex Site. The areas of concern - my grandmother, Juliet Rice Wichman was there when the County was going to bulldoze Lohi`au complex. She actually started right there in front of our house as we have the Pōhaku Kāne, the brother, the stone which is a fishing shrine is right in front of our house. The sister, which was on the reef, is now broken. She's in forty feet of water. But the County was going to bulldoze the boulder away; my grandmother laid in front of the bulldozer and stopped it. The bulldozer went down to the Lohi`au house site, was going to take it apart, my grandmother laid in front of it and stopped it from getting destroyed.... The Lohi`au house site is poorly mapped. And that the road is actually coming way too close to it. The car bumper is almost touching the thing...so you need to put a larger buffer around that.... A larger buffer needs to be established around the Lohi`au house site [RW].



Photo 71. End of the road turn-around

Burial/Turn-Around Issue. In order for us to do the turn-around areas you're in the most sensitive of the burial areas. As you start to get that footprint between the Lohi`au house site and the bathroom you have a very tiny maneuvering room right there and also, quite frankly, problematic [RW].

Comfort Station Issue. We always have these problems with comfort stations in sacred zones, culturally we give up a lot for this. In that some of us are quite aware of the circumstances of the archaeology of the bathroom - it made a lot of people uncomfortable. So I'd hate to see more of it going on, and that the existing footprint right now needs to stay. But still close within it are the preserves, because we have burials that are right in there, below and around the bathroom area. But we can presume that it's going to run along a particular strip along the dune. So that's why I'm thinking that people can either walk along the beach, or they can walk along the path that brings you a little bit closer to the loko [RW].



Photo 72. Comfort Station

Foot Traffic/Pathways. Although we know we're dealing with a sacred area, there are certain sectors that are clearly more sacred than others. The pathway in which the human traffic is going through is absolutely critical that it goes around features not too close and not too far, and without going through any of the walls. So there is a sensitive approach that you really need to put the overall paths in there. Because anybody who has any understanding of Hawaiiiana and they see the path not properly placed within the landscape, will cause problems. But I think in that sensitivity right there...right from the get-go will help things a great deal.



Photo 73. Footpath through dune

We know where the burial areas are, we know this by the hard way....well, we knew it already...but then again people needed to learn the hard way exactly where it was. So I think cross-culturally enough people know where they are right now. So we know where the pathways can be leading. I think I made the suggestion that the pathways are leading along the edge of the

loko, on the belief that most of the burials are there within the dunes. And they may not be right on the edge of the loko, but at the same time these are beautiful views...and also not only enhances culturally but also within the visitor...from the visitor's standpoint to the beauty of it is going to be really cool [RW].

Fishponds. These can also end up being working fishponds too. And so that could be another aspect under the fisheries in not only managing the kai fisheries but the wai fisheries also. So those are there as far as expansion capabilities. It would be nice to have it as a larger master planand step by step work up to it [RW].



Photo 74. Fishpond Area

Parking Lot/ Auwai Impact. What this plans shows...and maybe this is another concern...it shows the *auwai* being restored and running through the parking lot. While that might sound good, the problem would be drainage and what's going to happen with all the runoff from this paved parking lot - assuming it's paved - maybe there's other ways to deal with it. But if you got all kinds of oil and brake fluid, dust, asbestos dust from brake pads...washing in to the *auwai* from the parking lot...that would have hundreds of cars a day parked in it...it could be really bad for the health...I mean you're talking about food production [CW].

auwai-Lo'i Expansion. The water is going to be coming from Limahuli Stream. Right now, I know, it's tapped up above the road. In Limahuli it actually comes down through the *auwai*, crosses underneath the culvert, and reenters into the *auwai* that starts to feed the *lo'i*' that are actually down there. That water has been flowing for awhile now. We may want to take another look at the water supply Hui Maka'āinana expanding their footprint. Right now the last time I saw it there were four big *lo'i*, however I know that Thomas Hashimoto had two or three other *lo'i* in the areas...and I know he wanted to open up too. So I think in visioning a larger master plan for the actual footprint that Hui Maka'āinana can expand their *lo'i*'s, with the foot-trails that are coming through there...that we keep it pretty safe...the terrain itself is not necessarily really difficult; although slightly undulating, the view plains through here are absolutely stunning [RW].

Parking Lot/Lo'i Issues. On the other hand, I guess, if you graded it away from that and maybe had a permeable surface paving...you know not everybody is going green...we know that hardscape is not a good thing...the more permeable surfaces we can create the better. The problem with a lot of these, though, is intensity of use. This park gets a huge intensity of use. So things like grass-green, grass paving, and materials like that would not be functional...the high rainfall we get in Hā'ena. But maybe there's...they have permeable cement and permeable asphalt...there's gravel paved systems. There's different things that could be looked at. This is probably the logical

place, because it already has been destroyed and disturbed, to keep a parking lot. But I think environmentally how we deal with those issues in terms of the *lo'i*, I think, is going to be really important because the *lo'i* are going to be a really important part of the cultural landscape of the Park [CW].



Photo 75. Parking Lot in Hā'ena State Park.

I think one can easily vision the areas that Hui Maka'āinana o Makana can expand to taro patches. I think we can begin to envision what the experience of our visitors is going to be when they arrive there. That immediate connection into the taro patches to begin with, I think is going to be important. Having a trail that actually loops around the ocean front and actually makes a full circle from the internal parking lot, which we know is going to have to be expanded and is not enough [RW].

Level of Recreation Use. Actually a lot of effort went into this Plan. The biggest compromise we had with this Plan was the State continuing to say that it had to be a “recreational” park, and trying to define what “recreational” meant because of the funding that they had received when they bought it. What’s good about this plan is that it more or less preserved and sought to restore the primary cultural features within in the park and to protect the *iwi kupuna* in the dune system. So I’d say probably the only thing that, maybe, I would have a concern with in here would be the level of recreational use. I’m trying to remember, I think there were bike paths and stuff like that. I think people need to have access throughout the park, I’m not sure that we gotta necessarily have bike paths throughout the park. I’d say that’s just something we’d probably want to re-look at...the location of those paths and access ways [CW].

Tourist Guides. Like before, when the guy was drawing this thing up, the Master Plan, the first time they were talking they were gonna take guides - going get guides for take the tourists inside there go look the taro, go look the canoe, had the canoe down the beach, they had the canoe house on the beach side below the taro patch, and all that. I don’t know because when these guys get meeting about this Master Plan thing eh, I don’t go *maha’oi*. All Jeff and Kawika, Chipper, all those guys they go look. I know they had one meeting not too long about this Master Plan thing. For me I’m willing to dakine, but if they make funny kind like that eh they kill my fight too, even with this fishery thing too you know. They gotta cooperate too. Chipper went get me involved with that [TH].

Walking vs Driving. This Plan actually has a gate right here, so cars have to stop here. But this is such a short walk people should be able to just walk down. It’s really beautiful. In fact, when there’s no vehicles driving here--the problem there isn’t a shoulder on the side of the road so it’s dangerous to walk on the road now with the cars on it [CW].

How you’re going to transfer everybody from the parking lots...quite the distance. I don’t know if it’s 300 or 400 yards or more - quite a bit more than that between the parking lot - it’s a long walk for people [RW].

Base Yard/Helipad. The location of the base yard...I think once they have a little bit better of the footprint in mind, we need to take a better look at it. They are pretty close to a cliff line right there, and they’re on the high side. The toll booth thing and exactly the placement and how that’s going to happen, that’s still yet to come. The helicopter pad is pretty important. I was there when there was a helicopter crash...rotated on the reef in front of the *heiau*. And for the FAA we collected and kept the helicopter from being washed out to sea, so they could investigate the cause of the accident. Helicopters, I’ve seen them make several emergency landings in this area. Although I understand we will probably have to chop out a taro patch to put a helicopter field in there, but yet the emergency pad right there - we need it.... We know the helicopter pad’s got to go in there...we know that certain portions of this is going to have to be data recovered as you might be taking out a couple lo’i in order to actually put in the basic infrastructures that you need right there [RW].

I feel the loss of the Hawaiian things that can be kept; I don’t see that we need to be over captured by *hula* and the modern *auwana* rather than the *kahiko*. I don’t see why we have to go the “Hawaiian-Jamaican” style thing. But in Hā`ena, maybe I’m asking too much, I don’t know of any of it can be totally recovered, but I think a lot of it could be. But I’d like to see a lot more respect for these places. You know the DLNR is supposedly in charge of all of these things, but I’d like to see a lot more respect from them. I would like to see them really working with the people who are trying to keep things going. Like maintaining the *heiau* there.... It’s like the end of the road here, I hate to argue, but it would be great if they would close off the road, which I understand they have - at the parking lot where the heliport is and let people walk in from there. It’s a quarter of a mile at most. And then, ‘Oh, you can’t do that, people are not going to do it!’ Well, if they really don’t want to do it, then fine, let them turn around and go home! [FBW]

Resource Structure. One of the things, though, that this Plan doesn't show on it is there's a house in this area in here, which this guy Rusty used to live in this house long time ago. It's really really run down. I'm not sure if it's at the point where you could still salvage it or not, you might be able to, but I think this Plan is kind of completely absent on it...and there's a road that goes down to there. And I think it is an under-recognized resource because within the context of this Park and the cultural use of this Park, I think you're going to need to have places like that that are kind of like retreat centers where cultural groups could come...whether they stay there over night or not. But it's kind of like Kōke'e there's an outdoor education center up there and the nature center...I think having something like that in the Park here could be really important. Also the Hui Maka`āinana o Makana which has been the...we established a curatorship program with the State back in 1999 for the archaeological ...primarily for the *lo`i* complex. It would be really good for them to have a place where they could have meetings and functions related to their curatorship of the cultural sites within the park. So that is something that I would like to see changed or enhanced on this plan [CW].

Caretaker Structure. Now things get dangerous. The nights...I know the idea of the full position of a caretaker and that particular house...probably thinking that closer to the entrance. The caretaker is a traditional part of our culture, to have the caretaker close in. Security twenty-four hours a day would be nice, although I'm hard pressed at this particular time to actually point at the type of vandalism one would expect right there. However, the presence 24/7 in the zone is really good [RW].

Taylor Camp. I'm not really comfortable with not including the beach area that's in front of Taylor Camp into the whole scope of the park. I think you're defeating the purpose in the Master Plan by only taking a tiny portion which is the actual end of the road, and ignoring three-quarters of the land footprint in the planning process [RW].

Rockfall Liability Issue. Addressing the liability issues, I don't think we're going to get into this particular point, but I do know that it's serious with the rockfalls....that a good section of the road that you're walking or driving, is right next to a cliff. Therefore, the suggestion of leading the paths out and away from the parking lot and towards the ocean and doing the loop and so it keeps people into more of the open plains rather than along the edge of the cliff. Although the traffic, whether it's going to be shuttle buses - whatever the nature of the concessions they have in mind, I'm not really sure of how they are going to be doing it, they're going to still be using the road as a footprint [RW].



Photo 76. Rockfall

Park Concessions. I know there's discussions on the different natures of concessions, but then again that's concessions whether it's neighborhood driven or beyond at this particular point - naturally the first choice would be within the *ahupua`a* of Hā`ena and then Wainiha after that, and then expand out. I wouldn't mind seeing - I understand that the reason why SHPD, or being the State Parks, need the money that these parks can generate with the revenues, it would be nice for the first five years that fifty percent of the revenues stay in the park, after that then maybe twenty-five percent depending on the infrastructure. I think it's pretty reasonable to start the ball with expecting a hundred percent revenue to stay in the park. But some sort of arrangement as to a percentage based on years, either going up or going down over the years, needs to be discussed and broken down into the various - the methodology just in that alone, right! But to begin a discussion, I think fifty percent of it needs to stay or a certain length of time to allow some of the infrastructure to get settled in by the volunteer groups [RW].

4.7.5 Park Volunteer Issues

I know in the past the volunteer groups have been a blight on State Parks in that they've done...they have not been hospitable to any volunteer group so far that is willing to work on the

State Parks. It's been a hostile environment and I can attest to that. I sure hope some of the attitudes are going to change. Diplomatic management of these volunteer groups is absolutely critical.... I've been working on *heiau*, on State *heiau*, for how long now and I'm still treated like an enemy although I've done nothing to deserve this treatment. It's difficult. And it's really hard for me to bring in the pillars of the community to work on these things in a hostile environment created by State Parks. So I think the attitude has to change. We all know State Parks is broke but then again, at the same time, the hatred for the really good people - I know there's monkeys in there - the monkeys run free but the good people who are following the rules are constantly stymied and life is a lot more difficult. That attitude has got to change; otherwise it's never going to work. And naturally everything starts from above; the premise of which State Parks embarks on this community cooperation is going to be very important - that the State government is willing to undertake a project that is culturally rooted. 'Cause in my experience it's what lasts a long time. If it is within the psyche of the Hawaiian culture, we as a community will buy it because this is the way we live our lives. You put in a western methodology into this; you're going to have problems because it's very short-sighted. And at the same time, everybody is one large family but we all have our different jobs too. So it becomes more of a larger collective, but I do know the importance of State Parks to have somebody who has the diplomatic skills and the cultural knowledge and the historical knowledge in which to navigate this Hawaiian cultural psyche. We still live by the old ways in many respects. Our sense of hospitality hasn't changed one bit from the beginning of time. And we still carry on this hospitality to a very high degree, although a lot more difficult today to live because - these are the clashes of cultures. Generosity is considered a weakness but it isn't in the Hawaiian world. Generosity means wealth. There's room for many of the multi-disciplinary things, and I think that's the beauty and long range jewel that this park can have [RW].

Permitting Process/Volunteer Issues. The other one too, of course, which is the different varying jurisdictions that should be brought into one house. I think you have four or five different government jurisdictions here going on within the State Parks, consolidated into one. It would make it a lot easier in the permitting process which is essentially...the permitting process is what kills any volunteer activity in the end. It's just much too bureaucratic, much too time consuming as you go through all the different agencies. If you kept to one, I think, you'd be able to do things more on a timely basis. And it's the nature with volunteers that they're ready and willing to go right now, but to continually stand them down...you'll lose them. And then the momentum that comes out of communities are strong for a moment, they taper off for a little bit, they pick up again....it's like a tide...the tide comes in ...the tide goes out. But it's a continuous process....while the tide is coming in then lots of activities are occurring [RW].

4.7.6 Kapu Issue

I think you can get yourself confused with all the *kapu*. It all depends on your religious upbringing. Most of its Christian; those *kapu* are done by Christians...all Hawaiians, right. The Christians feared it, so the element of fear that permeates our culture has everything to do with that. That complete disassociation....you know, 'you touch heiau you're evil, you will die'. That's a Christian influence, that's not a Hawaiian influence. I have to preference here that the *kapu* here on Kaua'i is very different than it is on the Moku o Hawai'i. We have cookie-cut all Hawaiians into the Big Island Hawaiian mode, and no such thing is the case here.

I think it's in page 97 in Bennett's, 'Archaeology of Kaua'i', goes into depth as he explains all the unique characteristics culturally, artistically, spiritually, and in our *kapu* - Kaua'i's cultural identity. And in it he clearly states that the *kapu* here was far more inclusive of all classes. The people sought the balance between male and female. The females were involved in war, they're involved in art, in the artistry and all aspects of it, and they're also involved in religion. The whole point of it was to seek the balance between male and female. There were not these European patriarch notions that people are so caught up with. No such thing here, clearly a lot more matriarchal, on this island. So our *kapu* are different. Essentially what it is, is that it is a reminder to men that they cannot bleed each other on royal sacred grounds. There is a place to fight and

there is a place where you cannot spill man blood. The spilling of man blood on a *heiau* is the most profane thing in the world. Somehow we've gotten all confused in thinking that because of women's *ma'i*, that's profane. But that's actually ridiculous, because they've lost sight of the real intent of it. Men cannot bleed on the *heiau*. And naturally having worked on it for so many years, every time somebody catches a little bleeder or stuff like that, I'm always very quick to get them off. Under my watch nobody bleeds on the *heiau*. They've gotten off as quickly as possible. It's fairly rare that it happens here, but still I'm always watching out for that. So there was far more of an effort to seek the balance between male and female here on Kaua'i. Those *kapu* did not exist that everybody seems to be so overly caught up in.

So ultimately this is how I see the world. This is how I see the way the culture blends, balances and moves in through all of that. Not exclusive, much more inclusive of all classes and people. I'm saying this because it's important to - there are so many *kapu* running around - everybody's got a *kapu* of everything. But the bottom line really is that in 1819 after the death of Kamehameha, all the references that I was aware of at that particular part by Hawaiians, it was always mentioned as the 'lifting of the *kapu*' - even Malo. You know Malo doesn't use the word "break" until way later; it's always 'the lifting of the *kapu*'. I think he says it really good, I think Edith McKenzie in the back of her book writes that particular letter, 'Due to the industriousness and the hard work of the *maka'ainana*, the privileges that were once Ali'i are now everyone's. The *kapu* was lifted.' They lifted the *kapu*, so show me any culture in the world that came to terms with forty years of foreign impact to their gods and said they no longer work we have to put them to bed. They actually put them to bed. They lifted the *kapu*. The breaking of the *kapu* is an early Christian attempt to make them feel better like they did it, but they didn't. And it's not so simple as Ka'ahumanu sitting down with Liholiho eating, that's just a gross simplification of what really happened. Yes, there were some diehards, but the *kapu* was lifted. So in that particular time all the *kapu* that was running around was lifted, and made *noa*. Now in my mind it is up to us as a people, as we put back the *kapu*...but there is no real formal way and no real understanding by most people of just the fact that of the breaking of the *kapu* or lifting, just how much of a difference that really means. I'm saying this because I'm trying to explain my cultural viewpoint, of which I preface everything else on, of which I hand everything else on, on those basic premises. Seek the balance - far more inclusive of all cultures and class. The role of the male and female is clearly laid out in all of this, and we need to work a lot harder in reestablishing those [RW].

###

4.8.0 Anecdotal Stories

4.8.1 Kekela-Wichman House

I've got one story...another one of my spooky ones. My mother's house is just above... immediately above the house was the old 'around the island trail'. And when she first got the house, the house behind her as it turned out was built on this trail...lies the cookhouse, which was just the dining room and a kitchen. During the War the Army had taken over the house, and they'd gotten a whole bunch of beautiful stuff for the roof, only they put it on the floor instead of on the roof...so that everything from the floor up ...so my mother had to rebuild the house. And when she rebuilt it, she kept the cookhouse and turned it into two bedrooms. So that at one end you had a spring door that faced out towards the dry caves and a door between what was the kitchen and the old dining room and then a door leading out immediately to the house - you could go out either door or through. In my room - I took the old kitchen - that was about as far as you could get from everybody. I had my bed up against the window so that I could look out at the ocean. I kept having this feeling at night that people were walking past - you know that feeling - I thought I saw somebody out of the corner of my eye. I'm breaking my sleep all the time, so I moved the bed across the doorway to the dining room. And one night, I heard the screen door open and looked up to see who was there and nothing. But footsteps across the lauhala mat and I could see something stepping on to the mattress and footprints going down and I looked on the other side of me and somebody sitting on my chest, breathing on to my face. And then lifting off the weight, footsteps back to the floor, the door opens and shut and it open and shut again just a couple of minutes later.

I was really getting out of there. I never slept in that room again! I don't know what it was, but in the dining area my brother and sister-in-law put their oldest baby in there in the crib to get out of the way and the child would wake up just screaming and shortly after they'd put him down in there the baby would scream. After that incident mother just tore the place down - took both the kitchen and the dining room down because nobody would stay there. It was on the trail.

At her house she had several times somebody coming in and sprinkling salt and sprinkling around with ti leaves...there was just too much going on. But she was meant to be here.... We were living in Līhu'e and she had gotten the place fixed up to move out - this was early '48 - the summer of '48. I don't know why we were supposed to wait for awhile, but everything was ready and about 9:00 that night, moonlit, my mother looked at me and said, 'Let's go.' 'Let's go out.' No problem for me so we got into the car and we came out. At that time you had to stop along the road at the bottom of the stone wall, so we stopped there and as she stepped out of the car. The sky had gotten overcast but as she stepped out of the car this little rectangle of moonlight appeared and she stepped into it and it followed her. She opened the gate and I'm following right behind her and never got into the moonlight and this moonlight took her to the door of the house. But she walked from the road all the way up into the house in moonlight and I did not. It was weird! But just as she got to the door, we heard a voice out on the balcony. ("Uuuu, Uuuuu") That was weird...I told her the next morning at breakfast, "Were you aware that you walked in moonlight and I didn't?" She wasn't aware of it; she just said that she's got immense feeling of being welcomed. What that was, I don't know! Somebody's saying, 'Welcome to the place' [FBW].

4.8.2 Tsunami

I was 12 years old then. It was April Fools, April 1st, I was getting ready to go to school right before 7, and my brother was outside by the lanai, look down toward the corner, looking down, and he saw the water splashing on the coconut trees, right where the big white house, the football guy own now. Well it's kinda blocked by the fishtail farm that's why you couldn't see the house now, but anyway it's right close there in the Makua area. So we went down there, we went run down to the next place because the old man Hanohano and ___ they all live right next to us below us, so we went go tell them about the boat and the net. We had the boat and the net down at the Rice's. So we all went down there. When we got down there, the water was receding but we never know what the hell was going on. We were busy unloading the net because it was full with water in the big boat so we unloaded the net and drying em. We didn't know what the hell was going happen. By that time, the channel was all empty with water. Then we looked outside the bay, we could see Namoku right in the center of the bay, kinda on the outside. And then the water was dropping off from there like ____. We still never think nothing. So we kept on doing the net. Until we heard the wreck sound up above us, the wreck sound, bulldozing all the house up by the Rice's. When we looked up, we saw the waves grinding, grinding, grinding all these houses that were up there because there were a bunch of em, coming toward us. That's when we started to run, we left everything, we ran in the corner, and just about that time the Rice's had the place graded with the bulldozer, so went bulldoze all the guava trees against the kamani trees, we call them, but anyway, yeh the false kamani trees, so we climbed on that rubbish pile that was about 15 feet, and climbing the trees, the two old men went climb on the rubbish, and they went hold on to the tree and the water went catch them over there. But we were up in the tree. So after the water went recede, the big haul that they had right down came right on the side of us because was open inlet. Because they went bulldoze everything and nothing could hold em back - right on the side of us. After the water went recede we ran home. By that time our house was against the pear tree and the plum trees in back of our place. We went home go look for my mom, call, call, call but the house was up against the trees. Call, call, but no more. Then we hear one faint soft calling us far up. So we went over the hill - we went follow the sound - we went over the hill because my sister she get that little hill eh, so we went right behind there, my mom was there all nude because her pajamas went all rip from the barbed wire, and she was pregnant with my brother. She was all scratched. So I went go home grab one sheet so I could wrap my mom, let her wrap herself, because she and Julia they were all bust up inside the lantana and barbed wire behind our house, but they were safe - all scratch up. By that time, before the second wave came, we was on our

way across the fence way in the back of us, you know where the ___trail is? Below that there was a fence line, we went go climb on the fence line and swing across the place. That's kinda far you know, from here to in the back of my truck, I think that low in the back of the hill. So we went swing that part and we just got above that place, water came, sweeping down, by that time everybody was safe, we went climb on the hill to that Robinson's fence line and look down, there was no buildings, that YMCA was all flat. YMCA had about 8 cottages, and the theater and stuff was all flat, the stone theater over there was all flat and the kitchen, no more, all the roofs were all back against the hillside. So you can imagine how big that thing was. And then, we climbed further up; we look, all the hala trees were gone in back of the hillside. That's how that wave went wipe out all that hala because from the YMCA going to the Colony Resort that whole area was all hala trees, that's why they call that place Hala __. 1946, the wave wiped that whole place out. But little bit been grow back, little bit. Most of the thing went smash, just like the wave went pound right on em, just like one bulldozer went right through that place. That's what happened.

In this area right here where the Rice place, that's where the water was coming down and we were over here and the wave went come around and wrap just like one back lash when we seen em pushing all these houses. But when we went run was one far run you know! We had to run fast because the wave was just coming down. They all flat - the water came from here and just like came this way. But actually when the water went reach here, this whole place here was all empty because here get the apapa, over here get the *apapa* - was dropping down from there. Over here was just like mountain, all the *apapa* was just like mountain, if the water was 40 feet, the mountain was standing 40 feet out there. That's how it was - was spooky.

And then we seen em again in **1957** when we went run away when all this thing was taking place. We seen that, because we waiting for the waves come. It was 8 o'clock, quarter to 8, came that time. That was the estimated time...from the Aleutians down to our place. That was the time of the arrival of the wave, and we were watching that in 1957...and we never know what the hell would happen. We were watching from Keaumele...right here this area. That's where the Wichman's are - Keaumele. Keaumele is right on that corner. Right in the back there we were standing up there and watching that [TH].

4.8.3 Pohakupukane and Pohakuloa.

Pohakupukane stay on the hill. Pōhakuloa stay right on the road right by the Wichman driveway, but stay covered with - you cannot see that because get sunflower growing right around em. It's right on the side of the road by the rubbish pile. That's Pōhakuloa. And then the sister I don't know what the name - stay inside the water - someplace inside, out here somewhere, inside a puka someplace out here. Whether the thing is the same distance, I don't know. I just assuming that the place you know, like the distance from Pōhakuloa to Pōhakupukane, maybe the same distance for this in the water. You know the legend for that eh? Was something about she didn't wanna stay on the land by-and-by the bird would shit on her, and then the brothers told her oh if you going in the ocean, the eel and all the fish going live under you. She never care. Or something like that. But Pōhakupukane I don't know. But actually they no belong here eh? These stones they come from Tahiti I hear. That's what the story was...you gotta look at the legend [TH].

4.8.4 Lohiau Stone Wall

Just so that you know, you know where Lohi`au's site is...that stone wall. My mother saved it. She was at home, right next door here. John Hanohano came to her and said that the County trucks were on their way to take the rocks from the [Lohi`au] house site. So he took her down there and she walked in and just leaned against the wall. And they brought out the bulldozers and the trucks and all that kind of stuff, and she refused to move. She said, 'You're going to take me first, before you touch one rock!' And she stood them off. And they finally called up Lihu`e and got some supervisor out here, who talked to her and turned around and ordered all the people to leave. 'Leave it! Leave it alone!' But it was there, they had the bulldozers and everything to do it with [FBW].

5.0 SUMMARIES AND ASSESSMENTS

This cultural impact assessment is based on two guiding documents: Act 50 and OEQC Guidelines (see Appendices A and C).

5.1.0 Act 50 State of Hawai`i 2000 H.B. NO. 2895 H.D.1 was passed by the 20th Legislature and approved by the Governor on April 26, 2000 as *Act 50*. The following excerpts illustrate the intent and mandates of this Act:

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit" in Hawai`i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

5.2.0 Summary of Findings

The following summaries are based on the information presented in the previous sections: the traditional and historical literature review in Section 3.0 and the ethnographic data and analyses in Section 4.0. References are not cited here unless it is new information and not already cited in the text above. These summaries condense the information above, but also serve to focus on a few significant individuals and events in Kaua`i's history in relation to the *ahupua`a* of Hā`ena in the traditional *moku* of Halele`a.

5.2.1 Summary of Significant People and Events: Project Area or Vicinity

5.2.1.1 Ancient or Mythical People

Hā`ena figures significantly in the legends of Hawai`i volcano goddess Pele and her sister Hi`iakaikapoliopele (Hi`iaka). Pele falls in love with the local chief Lohi`au and requests that her sister go to Kaua`i to bring him back to Hawai`i Island. The house ruins of Lohi`au still exists in Hā`ena today, as does the hula platform associated with him, where he paid tribute to Laka. What is not clear, is when, in relation to the ali`i below, Pele, Hi`iaka and Lohi`au are in Hā`ena. Other people during this period are Lohi`au's sister Kahuanui, his friend and companion Pā`oa, the Piliwale sisters, a *kupua* named Kapalae and mo`o wahine Kilioe and Kalanamainu`u who guarded the spirit body of Lohi`au in the cave and fought with Hi`iaka and her companion Wahine`ōma`o when they tried to take his spirit body.

The Menehune are said to be legendary as well, yet they appear to be a very real part of Kaua`i's history and said to have finally left the island from Hā`ena, as did the subsequent Mai`a people who were also connected to the early people of Kaua`i.

5.2.1.2 Significant Ancient Events

The significant ancient events connected to the project area (vicinity) include the origin of the *hula* -- the *hula halau* or school that included use of the lands of Kē`ē for practices, ceremonies and habitation; the spirit visit of Pele where she follows the sounds of the *hula* drum to Kē`ē, and manifested as a beautiful woman whom Lohi`au fell in love with; the visit by Hi`iaka sent by Pele to fetch Lohi`au who had died of a broken heart when Pele left Kē`ē; and the exodus of the Menehune and the Mai`a. Other than Lohi`au's house, the *hula* platform (*Ke Ahu A Laka*) and the heiau (*Ka Ulu o Paoa*), any evidence on the landscape connected to these events within the project area was most likely destroyed over time by both natural (storms surges, tsunami) and human means.

5.2.1.3 Ali`i nui

Kaua`i was first settled by descendants of Kumu-honua and Lalo-honua -- thirty-six generations before Papa was born. Chief Ka-māwae-lua-lani-moku traveled to Kaua`i with his wife, Kahiki-lau-lani, and her two paddlers Kō-nihinihi and Kō-nahenahe. Because of his good deeds, the great number of his descendants, and the prosperity of his reign, people began to call this island Kau-a`i (*Place of Abundance*). Then a few generations after Papa and Wakea (second son of Kahiko and Kū-pūlana-kehau) and also well before the descendants of Nana`ulu came to Kaua`i from the south of Hawai`i around the 6th century along with other families from Tahiti or Samoa who brought their Polynesian traditions, a voyaging canoe commanded by Kū`alu-nui-kini-akua landed on the west shores of Kaua`i, at the mouth of the Waimea River. His counselor named Pi`i-`ali`i came with him. They settled in Waimea along its bountiful river and surrounding valleys. Over time they expanded into nearby canyons, valleys and coasts, from Nāpali to Kōloa. Kū`alu-nui-paukū-mokumoku followed his father as leader of the people of Kona, Kaua`i and it was during his reign that he sent for a group of people called *Menehune* from his homeland. They helped to construct *heiau*, fishponds and irrigation systems for raising taro. His son Ola was responsible for having the *Menehune* construct the ditches of Pali-uli.

Over time other settlers inhabited all the Hawaiian Islands. Many genealogies of Hawaiian *ali`i* indicate that Nana`ulu and `Ulu (ca A.D. 830) were prominent ancient ancestors who settled all over the Pacific Islands. Around A.D. 1090 Puna-nui-ka-`āina arrived on Kaua`i, said to have come from the Marquesas Islands. Puna-nui-ka-`āina arrived when the chief with the deadly riddles, Ka-iki-pa`a-nānea, was ruler of Waimea. Puanui chose to settle along the banks of the Wailua River and this land came to be called Puna. This was the beginning of two chiefdoms on Kaua`i; Puna in the east, and Kona on the west.

Marriages between chiefly families on all islands are very common as families and alliances are strengthened. During the 1300s the Kona chiefdom is defeated by the Puna chiefdom. Mo`ikeha arrives on Kaua`i and enters a contest which he wins; his prize is the daughter of the Puna chief. His father-in-law orders the construction of Holoholokū (birthing stones of Wailua), for the birth of Moikeha's children. Mo`ikeha became the first ali`i aimoku of Kaua`i. When Mo`ikeha passed away his bones were kept in Kē`ē, at the end of the road for safe keeping, until La`amaikahiki's return.

Early in the 1400s the two chiefdoms were united during the reign of Kūkona, father of Mano-ka-lani-pō and Palekaluhi. Mano-ka-lani-pō married Nae-kapu-lani, the daughter of Kaua`i Kona chief Makali`i-nui-ku-a-ka-wai-ea. During the reign of Kūkona, Hawai`i Island chief Ka-lau-nui-o-Hua defeated Maui chief Ka-malu-o-Hua, Moloka`i chief Ka-haku-o-Hua, and O`ahu chief Hua-i-pou-leilei [their names imply they were related] and set out with his hostage chiefs to Kaua`i where he planned to defeat Kūkona. However, Ka-lau-nui-o-Hua was in turn defeated by Kūkona. The hostages were set free after promising never to attack Kaua`i again; the Hawai`i chief remained a prisoner for a while, but he too was later freed.

With Kaua`i kingdoms united, the new royal residence was set up at Wailua, but Waimea remained significant. It was during the reign of Mano-ka-lani-pō that Kaua`i prospered during its Golden Age; this was the period of fishponds and monumental *heiau* and complex irrigated *lo`i* or pond fields. This continued on to the mid-1500s and mid-1600s; this was also the beginning of the Kawelo line of *ali`i nui* on Kaua`i.

O`ahu *ali`i nui* Kū-ali`i was a descendant of the Kawelo line on his grandmother's side. During the battles of the Kawelo cousins Kawelo-lei-makua (Kawelo) and Kawelo-`Aikanaka (`Aikanaka) in the late 1600s, Kawelo ceded Kaua`i to Kū-ali`i if they should both die. Kawelo defeated the forces of `Aikanaka who escaped and hid in a cave. He was later found and supposedly thrown off the cliffs of Hanapēpē. However, Kawelo was also supposedly thrown off the cliff as well by his warriors who were afraid he was going crazy. Kū-ali`i came to Kaua`i and declared himself the ruling chief and installed his son Pele-i`ō-hōlani as governor. After Kū-ali`i died in Kailua, O`ahu in A.D. 1730, Pele-i`ō-hōlani left Kaua`i to become the ruling chief of O`ahu. He left his daughter Ka`apuawai as governor of Kaua`i.

Ka-`apuawai died before Pele-i`ō-hōlani so the government of Kaua`i passed to Ka-maka-helei who owed allegiance to her grandfather Pele-i`ō-hōlani. She married Kiha, a Kaua`i chief, and had three children: a daughter, Lele-māhoa-lani, a son, Keawe, and another daughter, Ka-lau-i-pihana. Pele-i`ō-hōlani sent his grandson Ka-neoneo to Kaua`i to ensure the island would remain loyal to him. Ka-neoneo and Ka-maka-helei were first cousins and Ka-maka-helei set Kiha aside and took Ka-neoneo for her husband.

During this time, Maui ruling chief Kahekili won several skirmishes with Pele-i`ō-hōlani who then sent for Ka-neoneo to help him on O`ahu. This left Ka-maka-helei vulnerable. Kahekili took advantage of this and sent his half-brother Ka`eo-kūlani to Kaua`i to woo Ka-maka-helei; she married Ka`eo and they later had Ka-umu-ali`i, who was to become the last ruling chief of Kaua`i.

5.2.1.4 Ancient Practices

Changes occurred during 1300-1600s that brought about a uniquely Hawaiian culture, documented by the material culture found in archaeological sites. Kaua`i developed a unique form of poi pounder such as *pōhaku ku`i poi* (ring and stirrup pounders), double-grooved stone club heads, and a broad anvil *kapa* beater. The early culture evolved as the population grew, and many of the changes were related to significant socio-economic changes.

There are several ancient practices connected to the project area and vicinity. As stated above, the *hula* was an ancient practice connected to Kē`ē, and greater Hā`ena, as were the ancient practices of fishing, fishpond aquaculture, taro cultivation, sand dune burials and cave burials. Lohi`au was said to be buried in a cave until retrieved by Hi`iaka and the bones of Mo`ikeha were buried in Kē`ē until La`amaikahiki returned to collect them and take them to Kahiki. Ancient *`iwi* (bones) are still in Kē`ē sand dunes although relative dating has not been done of their vicinity. Ancient voyaging practices can also be implied to be connected to the area because, according to the *mo`olelo*, the Menehune and Mai`a departed from Hā`ena to sail back to their homelands. And the ancient ceremony of throwing fire brands (*ōahi*) off the mountain was performed at the top of Mauna Makana - the project area is located at the northern base of this mountain.

5.2.1.5 Historic People

One of the first significant historic people to land on Kaua`i shores was Captain James Cook who landed at the mouth of Waimea River, the same place as Kaua`i's first legendary Polynesian settlers, centuries before. His contact with the people of Kaua`i would have far reaching and devastating effects. Cook gave Ka-maka-helei and Ka`eo and others gifts, including goats, sheep and a new breed of pig. Cook's

men also gave the people of Kaua`i venereal disease. Many more foreign ships made contact with the island people of Kaua`i; some stayed and became residents. In 1820, the first missionaries landed in Hawai`i; they brought Humehume back with them. He was the oldest son of Kaumuali`i, who had been sent by his father to the mainland to obtain an education. Since he had not been heard from in years, it was assumed that he was dead. Kaumuali`i later converted and gave the missionaries lands to build a church and school.

Kaumuali`i was later coerced into ceding Kaua`i to Kamehameha I who had conquered the other island kingdoms, but Kaumuali`i was allowed to continue to rule Kaua`i. A couple of years after the death of Kamehameha I, his son and heir Liholiho (Kamehameha II) visited his cousin Kaumuali`i on Kaua`i. Kaumuali`i was subsequently “kidnapped” by Liholiho and taken to O`ahu, never to return to Kaua`i or to his family. He was also coerced into marrying his cousin Ka`ahumanu, former queen of Kamehameha I and *kuhina nui* or regent to Liholiho. Kaumuali`i died a few years later.

During the reign of Kamehameha III, lands were assigned to and claimed by lesser chiefs and *konohiki* in what was called *The Great Mahele* (ca. AD 1846-1856). The lands of Hā`ena with the exception of *kuleana* lands, were awarded to Abner Pākī, grandson of Maui mo`i Kamehameha Nui (older brother of Kahekili and Ka`eo), father of Princess Bernice Pauahi Bishop and cousin of Ka-umu-ali`i. Pākī's *konohiki* was E. Kekela, sister of Pākī's mother, and wife of half-brother of Kamehameha I. After her husband's death, she became the wife of Kamaholelani, ohana of Kau`muali`i. After Pākī's death (1855) the lands went to his daughter Princess Pauahi. In 1858 Princess Pauahi sold her Hā`ena lands to W. H. Pease.

5.2.1.6 Historic Events

Historic events connected to Hā`ena would have included the awarding of the ahupua`a to Abner Pākī, which were managed by his aunt and *konohiki* Kekela; the visit by Hawai`i Island *ali`i* Moku`ohai who claimed lands at Hā`ena. The awarding of *kuleana* lands to Haole (#7998- `Ili of Kē`ē) by Moku`ohai in 1846, formerly cultivated by Ho`oleali`i; Kanehakili (#7996 - `Ili of Kapihae) by Kekela in 1839; Nanahu (#8200B `Ili of Naia, located between Loko Naia and Loko Kē`ē); Moku`ohai (#8200C/RP #7091 - `Ili of Kē`ē /Naia) by Kekela in 1840 and 1844 (his grandchild and heir Kaenaku inherited it); Naiwa (#10941/RP #6388 - `Ili of Kamookhalu) by *konohiki* pre-839 and Kekela in 1839; Pea (#10675 - `Ili of Pa`akala) a tenant during pre-Kekela). After the death of W.H. Pease (1866) his lands were purchased by William H. Kinney (1872); and in 1875, Hā`ena was conveyed to Hui Kū`ai `Āina o Hā`ena (Andrade 2008:99).

5.3.0 Summary of Interviewee Concerns/Mana`o

- ❖ The lower slope of the dunes had houses/hale...artifacts found when Mo and Alan did their inventory survey.
- ❖ Hā`ena is really old and any loss is significant...this is well-known.
- ❖ The age of the settlement is significant; the Menehune and Mu/Mai`a people left for their homeland from Kē`ē Beach as this was the doorway out...the safety area of Nāpali. It's [Hā`ena/Kē`ē] old...should get archaeological carbon dating; would be significant to know.
- ❖ I would think if I were a *kumu hula* to one of the most famous *hula halau* areas is some place that I could actually get to with my crew [students], would be something I'd want to do. And a few have done it in the past. But it's too dangerous right now. And too many people are going into it and lifting stones, and taking stones.... To me I think it should be cleaned up because when it's overgrown, the way it is now, the roots ... the trees and stuff...they're busting up all the rock

walls. In my opinion, they're desecrating it. The challenge is that when you clean it all off, then all the tourists are going to want to go up there. So how do you control...it's always a two-edged sword...that kind of thing.

- ❖ The Lohi`au is another one. It's overgrown its right by the trail head. It's an area that kind of needs to be cleaned up. I think it would be great to have it cleaned up and have better interpretive materials.
- ❖ The Lohi`au house site is poorly mapped...other things are not mapped.
- ❖ The road is actually coming way too close to it [Lohi`au site]. The car bumper is almost touching the thing...so you need to put a larger buffer around that.... A larger buffer needs to be established around the Lohi`au house site.
- ❖ In order for us to do the turn-around areas you're in the most sensitive of the burial areas. As you start to get that footprint between the Lohi`au house site and the bathroom you have a very tiny maneuvering room right there and also, quite frankly, problematic.
- ❖ Although we know we're dealing with a sacred area, there are certain sectors that are clearly more sacred than others. The pathway in which the human traffic is going through is absolutely critical that it goes around features not too close and not too far, and without going through any of the walls. So there is a sensitive approach that you really need to put the overall paths in there. Because anybody who has any understanding of Hawaiiana and they see the path not properly placed within the landscape, will cause problems. But I think in that sensitivity right there...right from the get-go will help things a great deal.
- ❖ The whole Park needs interpretive materials, it's really lacking, and it's one reason that most of the people come there. They just think it's a place to go swimming or lie on the beach, or throw their rubbish away in the bushes. They don't understand that in the ancient days this was like one of the Seven Wonders of the World with the `Ōahi ceremony and the heiau...this was a very special sacred area that in ancient days people made pilgrimages to come here.
- ❖ I think it's pretty ridiculous to even assume that one group can handle all aspects of this...so there's room for different groups...their *kuleana* are very separate, but yet all of them are focused and the goals are all the same.
- ❖ The wetland is there already – breathing...no need to convert anything; no need to clean it up; there will be a problem if effluence is pumped into the wetland....
- ❖ Comfort Station/Wetlands is really rich culturally; if they trench for a septic system it will go through quite a bit.
- ❖ The existing [CS] footprint right now needs to stay, but still close within it are the preserves - we have burials that are right in there, below and around the bathroom area.
- ❖ Sewage draining [into “wetlands”] is serious stuff; it will punch through the cultural layers to the burials...this will be highly contentious with the Hā`ena group...they all know about the burials and cultural layers.
- ❖ Comfort Station [is]...at edge of the fishpond...10-15 feet, plus right on water table.
- ❖ What this Plans shows...and maybe this is another concern...it shows the `auwai being restored and running through the parking lot. While that might sound good, the problem would be drainage and what's going to happen with all the runoff from this paved parking lot, assuming it's paved, maybe there's other ways to deal with it. But if you got all kinds of oil and brake fluid, dust, asbestos dust from brake pads...washing in to the `auwai from the parking lot...that would have

hundreds of cars a day parked in it...it could be really bad for the health....I mean you're talking about food production

- ❖ We just came back from Kē`ē, we had a grave site in Kē`ē, right near the sand dunes. I can't even recognize all that today. Ka`ilio nui yes, all around there. I guess that's old grave sites, because you folks remember sometimes when a big wave or *nalu*, you could see the skeletons.... I remember walking down, going down Kē`ē, pass Ka`ilio nui and then all these skeletons on the beach.
- ❖ Having a trail that actually loops around the ocean front and actually makes a full circle from the internal parking lot, which we know is going to have to be expanded and is not enough.
- ❖ I'd say probably the only thing that, maybe, I would have a concern with in here would be the level of recreational use. I'm trying to remember, I think there were bike paths and stuff like that. I think people need to have access throughout the park, I'm not sure that we gotta necessarily have bike paths throughout the park. I'd say that's just something we'd probably want to re-look at...the location of those paths and access ways.
- ❖ How you're going to transfer everybody from the parking lots...quite the distance. I don't know if it's 300 or 400 yards or more - quite a bit more than that between the parking lot - it's a long walk for people.
- ❖ The location of the base yard...I think once they have a little bit better of the footprint in mind, we need to take a better look at it. They are pretty close to a cliff line right there, and they're on the high side.
- ❖ Although I understand we will probably have to chop out a taro patch to put a helicopter field in there, but yet the emergency pad right there - we need it.... We know the helicopter pad's got to go in there...we know that certain portions of this is going to have to be data recovered as you might be taking out a couple *lo`i* in order to actually put in the basic infrastructures that you need right there.
- ❖ The toll booth thing and exactly the placement and how that's going to happen, that's still yet to come.
- ❖ I'd like to see a lot more respect for these places. You know the DLNR is supposedly in charge of all of these things, but I'd like to see a lot more respect from them. I would like to see them really working with the people who are trying to keep things going. Like maintaining the *heiau* there.
- ❖ It's like the end of the road here, I hate to argue, but it would be great if they would close off the road, which I understand they have - at the parking lot where the heliport is and let people walk in from there. It's a quarter of a mile at most. And then, 'Oh, you can't do that, people are not going to do it!' Well, if they really don't want to do it, then fine, let them turn around and go home!
- ❖ In the past the volunteer groups have been a blight on State Parks in that they've done...they have not been hospitable to any volunteer group so far that is willing to work on the State Parks. It's been a hostile environment and I can attest to that. I sure hope some of the attitudes are going to change. Diplomatic management of these volunteer groups is absolutely critical.... The premise of which State Parks embarks on this community cooperation is going to be very important - that the State government is willing to undertake a project that is culturally rooted.... You put in a western methodology into this; you're going to have problems because it's very short-sighted.
- ❖ I do know the importance of State Parks to have somebody who has the diplomatic skills and the cultural knowledge and the historical knowledge in which to navigate this Hawaiian cultural psyche. We still live by the old ways in many respects. Our sense of hospitality hasn't changed one bit from the beginning of time. And we still carry on this hospitality to a very high degree,

although a lot more difficult today to live because - these are the clashes of cultures. Generosity is considered a weakness but it isn't in the Hawaiian world. Generosity means wealth. There's room for many of the multi-disciplinary things, and I think that's the beauty and long range jewel that this Park can have.

5.4.0 Guideline Criteria in Relation to Project Lands

According to the State of Hawai'i Environmental Council Guidelines, the types of cultural resources, practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, religious and spiritual customs.

5.4.1 Cultural Practices/Resources in Project Area

There were/are several cultural resources and cultural practices in the Hā'ena State Park lands as indicated below:

<u>Cultural Resources</u>	<u>Cultural Practice</u>	<u>Continuing Practice/Use</u>
Ka-Ulu-O-Paoa	ceremony/ritual	ho`okupu <i>wahi pana</i>
Ka-Ahu-O-Laka	hula/uniki	ho`okupu/hula/ <i>wahi pana</i>
Lohi`au Complex	house site/misc	<i>mo`olelo/wahi pana</i>
Sand Dune Burials	burials	<i>wahi pana</i>
<i>Loko Kē`ē</i> /Naia	aquaculture/ <i>ali`i</i> resource	want restoration
Taro <i>Lo`i</i>	food resource	some restored/more wanted
` <i>Auwai</i> System	Agriculture irrigation system	modified/in use
Pu`u Makana	` <i>Ōahi</i> Ceremony/Practice	<i>mo`olelo/wahi pana</i>
Waiakanaloa Cave	Sacred Waters of Kanaloa	<i>wahi pana</i> /healing waters
Waiakapala`e Cave	Mo`o mo`olelo	<i>mo`olelo/wahi pana</i>
Kalalau Trail	<i>huaka`i</i>	access trail
Kē`ē Beach Trail	ceremonial	access trail to <i>hula pā</i>
Limahuli Stream	multi-practices	multi-uses
Kē`ē Beach	multi-practices	multi-uses

5.5.0 Cultural Impact Assessment

5.5.1 Cultural Resources

This category entails sites or places associated with significant events and/or people important to the native Hawaiian patterns of prehistory; embody distinctive characteristics; or are likely to yield information important for research on the prehistory of Hawai'i. It also includes sites that yield resources important for native Hawaiian Cultural Practices, past and present; and items that are part of a cultural context. *Wahi Pana* or sacred places are important cultural resources to native Hawaiians regardless that the original sites that may have been there no longer exist.

The project lands were once a part of an ancient Hawaiian ahupua`a life-system as well as a support system for the *ali`i* who lived there and the *hula halau*. The physical evidence of multi-use ancient or traditional cultural practices still exists (e.g. Lohi`au's *hale*, *hula* platform, *heiau*, fishponds and *lo`i*), which not only indicate traditional land-use of the area, but that it (Kē`ē) was/is considered a *wahi pana*. The evidence also indicates that Hā'ena was not only well established, but part of ancient Hawaiian life-systems that included the traditional gods, goddesses, other significant deities, *ali`i nui*, officiating *kahuna* and people who lived and cared for the land. The *hale* or house complex of Lohi`au confirms that portions of Hā'ena were *ali`i* lands with all the necessary traditional infrastructure and required support

systems. According to several sources, there are burial grounds for ancient as well as historic Hawaiians. The project area also included fishponds, considered resource/property of the *ali`i nui* and an extensive taro *lo`i -`auwai* system with documented *ko`ele* or taro patches set aside for *ali`i nui*.

5.5.2 Cultural Practices

This category includes items that are essential to the practices that have cultural value to either native Hawaiians or other ethnic groups. Burials are considered a very significant cultural practice and both cave and sand dune burials are located within the project lands. The whole area of Kē`ē, Hā`ena, was once part of the original *hula halau* connected to Laka, and honored by Hā`ena *ali`i nui* Lohi`au whose *hale* or house is located at the base of Pu`u Makana, to current *kumu hula*. Other traditional practices included *`ōahi* (firebrand throwing), crop cultivation (e.g. taro, sweet potato and banana), salt water and stream fishing, marine gathering (e.g. seaweed or *limu*, limpets or *`opihi*, *wana*, *he`e* or octopus and sea cucumber), stream gathering of crayfish and *kupe`e*, forest gathering of medicinal plants, food plants and craft plants. Many of these latter practices continue to today.

5.5.3 Historic Resources

This category entails sites associated with significant events and/or people important to the broad patterns of history [post Western contact], which includes other ethnic groups; embodies distinctive characteristics of an historic era or master; or are likely to yield information important for research on the history of Hawai`i. There are historic burials within the project lands, but while people are no longer being buried there, their families continue to honor them, a filial practice that has been continuous. The poi mill foundation is all that exists of a historic cultural practice, however, some of the Hā`ena people would like to see it restored to be used in conjunction with ancient and historic taro *lo`i* that have been restored and re-cultivated within the last twelve years. The ancient fishponds were also used in historic times, but often modified to include non-traditional species such as introduced fish, ducks and rice. And although both Kē`ē fishponds were dis-continued years ago, some Hā`ena people would like to see them restored and utilized again as a community food and education resource.

5.6.0 Summary of Cultural Impact Assessment/Recommendations

5.6.1 Cultural Resources (Land, Water and Marine) Impact

The lands within Hā`ena State Park were impacted by natural and human activities of the 19th, 20th and 21st centuries. However, many cultural resources still exist as indicated above and many are associated with cultural practices that continue today. The Hā`ena State Park Master Plan should include preservation plans for the cultural resources, burial treatment plans for ancient and historic burials, interpretive plans, and cultural access strategies.

5.6.2 Cultural Practices/Access (Land) Impact

While there haven't been any recent (continuing) burials in the project area or functioning use of the fishpond, according to some of the consultants, traditional/ancient sand dune burials may be impacted by any modifications to the vicinity; lack of beach trail maintenance will impact cultural access to the *hula pā* for *hula halau*; and traditional unrestored *lo`i* may be impacted by the creation of permanent parking lots or helipads in the old *lo`i* areas. Therefore the Hā`ena State Park Master Plan should include strategies to keep current trails clear; to create culturally sensitive trails and buffers to ancient burial grounds; and to protect unrestored *lo`i kalo*, *`auwai* and fishponds.

5.6.3 Historic Resources (Land) Impact

This category overlaps Cultural Resources in that sand dune burials continued into the historic period, as did the use of fishponds, taro *lo`i*, *`auwai* systems, *hula pā* and Kalalau trail. While some of these resources may have been damaged by historic tsunamis, they still qualify as historic resources (religious/spiritual and subsistence example). There are a number of historic burial plots framed by concrete or other markers within Hā`ena State Park and remnants of a historic poi mill. There are also at least two historic structures (wooden houses) located in Hā`ena State Park or immediate vicinity that could be considered “historic” (over 50 years). The Hā`ena State Park Master Plan should include preservation plans to protect historic burials and provide access for families; the two historic wooden structures should be assessed on their integrity and possible future uses.

5.5.4 Historic Practices (Land and Water) Impact

The historic practice of sand dune burials was discontinued; the historic use of the fishpond aquaculture was also discontinued in Hā`ena. The restoration and continued practice of growing *kalo* (taro) has been revitalized in recent years in Hā`ena State Park and elsewhere in Hawai`i. Fishpond aquaculture has also been revitalized around Hawai`i and there is some hope that this will happen in Hā`ena State Park as well, for subsistence and cultural purposes. Several marine cultural practices continue today with some modifications. Limited fishing continues although hampered somewhat by the extensive use of the visiting tourist who use the beaches and snorkel in the protected Kē`ē lagoon. Use of the reef is discouraged so there is little likelihood of *limu* gathering there, although limited gathering of *`opihi* may still continue on shore-line.

5.7.0 Interviewees Master Plan Recommendations

When the ethnographic survey for the Master Plan/EIS CIA was conducted, the Comfort Station was already in the very early stages of construction however, modifications for the Wetlands had not started. While a limited number of people were interviewed, they shared their many concerns regarding Hā`ena State Park and a long list of recommendations for the Hā`ena State Park Master Plan, which are re-capped below.

- ❖ **Restore/Use Cultural Sites** One of my dreams with this park here down at the end of the road. I would love to see the *halau*, the *hula halau* area, and *Ka Ulu o Paoa* -- I'd like to see it restored and used. My idea was over by the parking lot put in some sort of a building so that any *hula halau* in the State can perform on the *halau* platform with the understanding that they put on a program for the public which would be taped and begin a *hula* historical record -- a depository -- so that these things that are so ephemeral are not completely lost.... I think you could end up with something that would be for a nonprofit organization running that sort of thing. And then, of course, you'd have a source of income being able to charge something to go to the performance. The *halau*, in order to be able to use the place, the actual school, would be, I think, somewhat of a good thing.... To me the only way you're going to save this, is to use it...to me that should be directed to the practitioner's who use that [*hula* platform mad *heiau*].
- ❖ A larger buffer needs to be established around the Lohi`au house site.
- ❖ **Special Use Cultural Park** I think the Master Plan has to address ways of protecting cultural areas from just being considered public domain. The whole western [mentality] is so...”It’s a State park and I’m a U.S. citizen, then I should be allowed to go anywhere I want in the State.” That’s not how this Park should be operating. But I do think it would be...it [*hula pā/heiau*] should be better maintained...it should be cleaned and better maintained - it’s a really impressive site.
- ❖ **Interpretation** The whole Park needs interpretive materials, it’s really lacking.

- ❖ **Sand Dune Field School** Maybe open the [project area sand dunes] area for field school...it's a rich eco-system.
- ❖ **Multi-Disciplinary Approach** I think that my main point is that some of the cultural methods that you may want to consider in this whole thing. Number One, this is multi-disciplinary.
- ❖ **Archaeology Preserve** This area [the park] should be reserved as an archaeological preserve and so therefore, for educational purposes, archaeology should be allowed, but that's separate in its own particular field.
- ❖ **Fishing House.** You have the fishing, so another house is controlling [fishing] - their only duty is to manage the fisheries of Hā`ena.... At this particular point I'm not going to put in any individual, I could say that, for example, Jeff Chandler, he's a fisherman. He has a great deal of knowledge that could be added to the world of fishing. For example, he would definitely be in the House of the Fisherman. His ideas and his participation in the fisheries, conferences and meetings, and everything like that, along with Thomas Hashimoto, they know what to do in regard to managing the fishing resources. I think he would be really good with that.
- ❖ These can also end up being working fishponds too and so that could be another aspect under the fisheries in not only managing the kai fisheries but the wai fisheries also. So those are there as far as expansion capabilities. It would be nice to have it as a larger Master Planand step by step work up to it
- ❖ **Marine Biology House** Another house is going to be Marine Biology, which is the study of reefs; that needs to go on.
- ❖ **Taro House** Another house would be the taro, such as Hui Maka`ainana, which is the taro growing aspects of it right there.
- ❖ **Lo`i Expansion/Water Supply** We may want to take another look at the water supply Hui Maka`ainana expanding their footprint. Right now the last time I saw it there were four big *lo`i*, however I know that Thomas Hashimoto had two or three other *lo`i* in the areas...and I know he wanted to open up too. So I think in visioning a larger Master Plan for the actual footprint that Hui Maka`ainana can expand their *lo`i*, with the foot-trails that are coming through there...that we keep it pretty safe...the terrain itself is not necessarily really difficult; although slightly undulating, the view plains through here are absolutely stunning.
- ❖ **Botany House** A lot of this stuff in here - the vegetation is *kamani* - there's a botany aspect to it too, so that's a separate house too. There's a whole *la`au lapa`au* aspect that could be done here too, which actually creates a whole another separate house of botany....again, a completely different discipline, and under different goals and objectives, but still important to the big picture
- ❖ **Protocol House** Then another house will be the house that actually is the *heiau* itself.... The group that would handle all the protocols and everything with the *heiau* that's different, that needs to be a specialized group...a specialized *kahuna pule* - the house itself - the protocols that need to go on in the *heiau* and all the activities need to be overseen by some very experienced people.
- ❖ **Mason House** We were able to do that in the new Loko Kai restoration Project, in that we created the Mason House in all the restoration work. The Mason House included both males and females. It was their job to decide how the stone walls were going to be built. Once they knew exactly what they were going to do, then they told the Kahuna Pule House, and then they're the ones who decided how to open the door....keep it open....keep everyone spiritually safe...and close the door after we're done. It was their job to protect the masons while they're working. The Third House was the Nā Pali Coast Ohana which both the masons and the Kahuna Pule knew exactly what to

do, and then it was our job that both of them got exactly what they needed whenever they needed it.

- ❖ **State Parks House.** The Fourth House was State Parks, which oversaw the whole thing to begin with. In the long run that methodology really helped focus the work and the energy. It kept people from being in too many places...and into discussions where they don't really belong. It facilitated things in the long run much better and made for a stronger more cohesive unit
- ❖ **Fundamental Groundwork** Number two, the cultural, educational, spiritual, philosophical reserve or preserve where all of that [the various Houses and their *kuleana*] is perpetuated. So there's a unique opportunity by laying the fundamental groundwork for the separation yet the unification of these separate houses. I think it would be well worth considering over a long range period. It keeps the arguments and everybody focused on their job, instead of one guy who is in every single camp, this just doesn't work in the long run.
- ❖ **Cultural Methodology** The main point...is to consider the culture methodology and the way you organize the different disciplines. I think it's going to help a great deal in the end.... Our cultural methodology and problem solving and work ties everyone together, keeps everyone focused, keeps the arguments, keeps everybody out of each other's hair, keeps everybody out of where they do not belong, but also gives everybody a sense of responsibility and a place - a sense of importance and a sense of a very specific responsibility. People need this to grow, but at the same time its symbiotic, if we don't seek the symbiotic relationships we're not following the lessons we're supposed to.
- ❖ **Ceremony/Cultural Protocols** The cultural protocols that demand this particular approach just because of the site you're dealing with. You're dealing with one of the most important religious, cultural, historical centers. Our ancestors deserve the best. Naturally when you're dealing with these elements it is much safer to be operating on a much higher elevation of ethics and protocols. And in the long run it's much safer for everyone. But at the same time it ends up as a spiritual experience because in the end it is a ceremony that binds us together. Now once we've experienced the ceremony together we have something in common. So the ceremony is actually critical. As far as I'm concerned, the more ceremonies that go on up there the better, but that elevated protocol is critical in keeping everyone safe and respectful
- ❖ **Continuing Negotiation** That place [Kē`ē] is horrible for traffic...no easy solution. Guarantee that negotiation won't do a bit of good because the State has a bad rap...years of nothing and a bad attitude...just won't cut it on Kaua`i. But they have to negotiate with the people in good faith.
- ❖ **Relocate Comfort Station** There is rancor of the residents regarding the Comfort Station; put it somewhere else--anywhere along the dunes is bad.... State is aware - no one wants the Comfort Station there...it should be moved to the parking lot area....
- ❖ **Parking Lot** If you graded it away from that and maybe had a permeable surface paving...we know that hardscape is not a good thing...the more permeable surfaces we can create the better. The problem with a lot of these, though, is intensity of use. This park gets a huge intensity of use. So things like grass-green, grass paving, and materials like that would not be functional...the high rainfall we get in Hā`ena. But maybe they have permeable cement and permeable asphalt...there's gravel paved systems - there's different things that could be looked at. This is probably the logical place, because it already has been destroyed and disturbed, to keep a parking lot. But I think environmentally how we deal with those issues in terms of the *lo`i*, I think, is going to be really important because the *lo`i* are going to be a really important part of the cultural landscape of the park.
- ❖ **Retreat Resource** One of the things, though, that this Plan doesn't show on it is there's a house in this area in here, which this guy Rusty used to live in this house long time ago. It's really really run down. I'm not sure if it's at the point where you could still salvage it or not, you might be able

to, but I think this Plan is kind of completely absent on it...and there's a road that goes down to there. And I think it is an under-recognized resource because within the context of this Park and the cultural use of this Park, I think you're going to need to have places like that that are kind of like retreat centers where cultural groups could come...whether they stay there over night or not. I think having something like that in the Park here could be really important. Also the Hui Maka`āinana Makana which we established a curatorship program with the State back in 1999 for the archaeology - primarily for the *lo`i* complex. It would be really good for them to have a place where they could have meetings and functions related to their curatorship of the cultural sites within the park. So that is something that I would like to see changed or enhanced on this Plan

- ❖ **Full-time Caretaker/Kahu** The nights...I know the idea of the full position of a caretaker and that particular house...probably thinking that closer to the entrance. The caretaker is a traditional part of our culture, to have the caretaker close in. Security twenty-four hours a day would be nice, although I'm hard pressed at this particular time to actually point at the type of vandalism one would expect right there. However, the presence 24/7 in the zone is really good.
- ❖ **Additional Beach Focus** I'm not really comfortable with not including the beach area that's in front of Taylor Camp into the whole scope of the park. I think you're defeating the purpose in the Master Plan by only taking a tiny portion which is the actual end of the road, and ignoring three-quarters of the land footprint in the planning process.
- ❖ **Safety/Loop Trail** Addressing the liability issues, I don't think we're going to get into this particular point, but I do know that it's serious with the rockfalls...that a good section of the road that you're walking or driving, is right next to a cliff. Therefore, the suggestion of leading the paths out and away from the parking lot and towards the ocean and doing the loop and so it keeps people into more of the open plains rather than along the edge of the cliff. Although the traffic, whether it's going to be shuttle buses - whatever the nature of the concessions they have in mind, I'm not really sure of how they are going to be doing it, they're going to still be using the road as a footprint.
- ❖ **Concessions/Revenues** I know there's discussions on the different natures of concessions, but then again that's concessions whether it's neighborhood driven or beyond at this particular point - naturally the first choice would be within the *ahupua`a* of Hā`ena and then Wainiha after that, and then expand out. I wouldn't mind seeing - I understand that the reason why SHPD, or being the State Parks, need the money that these parks can generate with the revenues, it would be nice for the first five years that fifty percent of the revenues stay in the park, after that then maybe twenty-five percent depending on the infrastructure. I think it's pretty reasonable to start the ball with expecting a hundred percent revenue to stay in the park. But some sort of arrangement as to a percentage based on years, either going up or going down over the years, needs to be discussed and broken down into the various - the methodology just in that alone, right! But to begin a discussion, I think fifty percent of it needs to stay or a certain length of time to allow some of the infrastructure to get settled in by the volunteer groups.

5.8.0 ADDITIONAL RECOMMENDATION

It is highly recommended that a Cultural Advisory Committee or Group be formed, hopefully including the interviewees, who would provide cultural expertise during the Master Plan/EIS process and during any later Park development projects. They can also provide direction in the likely event that more burials are uncovered during any future sub-surface activity within Hā`ena State Park.



Photo 77. Native plant in the park

REFERENCES CITED/REVIEWED

- n.a.
1994 *The Island of Kaua`i*. Hawaiian Service, Inc., Honolulu, Hawai`i.
- Alexander, W. D.
1891 "A Brief History of Land Titles in the Hawaiian Kingdom." *Hawaiian Annual for 1891*. (In Sterling 1998:63).
- Andrade, Carlos
2008 *Hā`ena: Through the Eyes of the Ancestors*. University of Hawai`i Press, Honolulu, Hawai`i.
- Arago, Jacques
1823 *Narrative of a Voyage Round the World...During the Years 1817...1820*. Vol I. Treuttel and Wurtz, London, England.
- Armitage, George T.
1944 Pōhaku-loa, Long Stone of Kaua`i *In Ghost Dog and other Hawaiian Legends*
- Armstrong, R. Warwick [Ed]
1983 *Atlas of Hawai`i*. University of Hawai`i, Honolulu, Hawai`i.
- Baker, Kekaulike and Baker, Haunani
1989 "The Great Mahele: 1848." *Ke`opi`o O Puna*, Pahoā.
- Barrere, Dorothy and Marion Kelly
1978 *Kē`ē, Hā`ena: Mythology and Sites with Extensive Notes on the Hula*. Prepared for the Department of Land and Natural Resources, Division of State Parks by the Department of Anthropology, Bishop Museum, Honolulu, Hawai`i.
- Beaglehole, J. C.
1999 *The Journals of Captain Cook*. For the Hakluyt Society, 1955-67 New York, N.Y., Penguin Books
1974 *The Life of Captain James Cook*. Stanford University Press. Stanford, California.
- Beckwith, Martha W.
1940 *Hawaiian Mythology*. Yale University Press, New Haven, Connecticut. [1970]
1951 *The Kumulipo: A Hawaiian Creation Chant*. University of Hawai`i Press, Honolulu, Hawai`i. [1990]
- Bellwood, Peter
1978 *The Polynesians: Prehistory of an Island People*. Thames and Hudson Ltd., London, England.
- Bennett, Wendell Clark
1931 *Archaeology of Kaua`i*. Bernice P. Bishop Museum Bulletin 80. Bishop Museum Press, Honolulu, Hawai`i.
- Bingham, Hiram A. M.
1847 *A Residence of 21 Years in the Sandwich Island*. Hezekiah Huntington, Hartford, Connecticut.
- Charlot, Jon
1983 *Chanting the Universe: Hawaiian Religious Culture*. Emphasis International, Honolulu, Hawai`i.

- Chinen, Jon J.
1958 *The Great Mahele: Hawai`i's Land Division of 1848*. University of Hawai`i Press, Honolulu, Hawai`i.
- Colum, Padric
1925 *The Bright Islands*. Yale University Press, New Haven, Connecticut.
1965 *The Fire Goddess In Legends of Hawai`i* Yale University Press, New Haven, Connecticut.
- Cook, James P.
1776-1779 *A Voyage to the Pacific Ocean-in His Majesty's Ships the Resolution and Discovery; in the years 1776, 1777, 1778, 1779 and 1780*, Vol II, G. Nicol and T. Cadell 1784 pp 192, 193, 244.
- Cordy, Ross
1973 "Traditional History of O`ahu Political Units: Its Use for Explaining the Origin of Complex Rank Cultural Systems in the Hawaiian Islands." Ms. January.
1996 "The Rise and Fall of the O`ahu Kingdom: A Brief Overview of O`ahu's History." In *Oceanic Culture History: Essays in Honor of Roger Green*, pp591-613. New Zealand Journal of Archaeology Special Publication.
- Coulter, Jon Wesley
1971 *Population and Utilization of Land and Sea in Hawai`i, 1835*. Bernice P. Bishop Museum Bulletin 88, Krauss Reprint Co., New York [Originally published by BPBM 1931]
- Day, A. Grove
1984 *History Makers of Hawai`i*. Mutual Publishing, Honolulu, Hawai`i. [On file at SHPD Library]
1992 *Hawai`i and Points South: True Island Tales*. Mutual Publishing, Honolulu, Hawai`i.
- Daws, Gavan
1974 *Shoal of Time: History of the Hawaiian Islands*. University of Hawai`i Press, Honolulu, Hawai`i.
- Dye, T.S.
2002 "Archaeological Assessment for a Residential Lot at Hā`ena, Kaua`i (TMK:5.9.02:62)" for Marilyn M. Browning of Calabasas, California.
- Earle, Timothy
1978 *Economic and Social Organization of a Complex Chiefdom: The Halele`a District, Kaua`i, Hawai`i*. Anthropological Papers, Museum of Anthropology, University of Michigan, No. 63. Ann Arbor, Michigan.
- Emerson, Nathaniel B.
1965 [1909] *Unwritten Literature of Hawai`i*. Charles E. Tuttle, Rutland, Vermont.
1978 *Pele and Hiiaka: a myth from Hawai`i*. C. E. Tuttle, Rutland, Vermont.
- Emory, Kenneth P.
1929 "Ruins at Kee, Hā`ena, Kaua`i: Famous Court of Lohiau" In *Hawaiian Annual for 1929*. Thos. G. Thrum, compiler and publisher, Honolulu, Hawai`i.
- Feher, Joseph [Compiled by Edward Jostring (Part I) and O.A. Bushnell (Part II) [Text By]
1969 *Hawai`i: A Pictorial History*. Bishop Museum Special Publication No. 58. Bishop Museum Press, Honolulu, Hawai`i.

- Fornander, Abraham
- 1880 *An Account of the Polynesian Race: Its Origins and Migrations and the Ancient History of the Hawaiian People to the Times of Kamehameha I.* Truer and Company, Legate Hill.
- 1915 *Fornander Collection of Hawaiian antiquities and folk-lore ... gathered from original sources by Abraham Fornander, with translations revised and illustrated with notes by Thomas G. Thrum.* Bishop Museum Press, Honolulu, Hawai'i.
- 1917 *Fornander Collection of Hawaiian Antiquities and Folk-Lore: Memoirs of the Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History Vol IV, Part II.* Bishop Museum Press, Honolulu, Hawai'i.
- 1959 *Selections from Fornander's Hawaiian Antiquities and Folklore.* Samuel H. Elbert, editor, Jean Charlot, illustrator. University of Hawai'i Press, Honolulu, Hawai'i.
- Green, Laura S.
- 1926 "The Shark Gods of Ka'ū" *In Folk-tales from Hawai'i.* Vassar College, Poughkeepsie, New York.
- 1929 *The Legend of Kawelo.* Vassar College, Poughkeepsie, New York.
- Greene, Linda W.
- 1993 A Cultural History of Three Traditional Hawaiian Sites on the West Coast of Hawai'i Island: Pu'ukoholā Heiau, National Historic Site, Kawaihae, Hawai'i, Kaloko-Honokōhau, National Historical Park, Kaloko-Honokōhau, Hawai'i, Pu'uhonua o Hōnaunau, National Historical Park, Hōnaunau, Hawai'i / by Linda Wedel Greene. National Park Service, Denver, Colorado.
- Griffin, P. Bion
- 1984 "Where Lohi'au Ruled: Excavations At Ha'ena, Halele'a, Kaua'i" *Hawaiian Archaeology*, Vol. 1(1) 1. University of Hawai'i, Honolulu, Hawai'i.
- Griffin, P. Bion, Richard M. Bordner, Hallett H. Hammatt, Maury E. Morgenstein and Catherine Stauder
- 1977 *Preliminary Archaeological Investigations at Hā'ena, Halele'a, Kaua'i Island.* Prepared for Barlow Chu by Archaeological Research Center Hawai'i, Inc., Lāwa'i, Kaua'i.
- Haig, Brian D.
- 1995 "Grounded Theory as Scientific Method" *Philosophy of Education Society* [1996-2001], University of Cambridge. http://www.ed.uiuc.edu/EPS/PES-Yearbook/95_docs/haig.html
- Hammatt, Hallett H. and Virgil W. Meeker
- 1979 *Archaeological and Ethnohistorical Investigation at Hā'ena, Halele'a, Kaua'i Island.* Prepared for Barlow Chu by Archaeological Research Center Hawai'i, Inc., Lāwa'i, Kaua'i.
- Hammatt, Hallett H., Myra J. Tomonari-Tuggle and Charles F. Streck
- 1978 *Archaeological Investigations at Hā'ena State Park, Halele'a, Kaua'i Island: Phase II: Excavations of Beach Localities and Visitors Facilities Area.* Prepared for the State of Hawai'i, DLNR, Division of State Parks by Archaeological Research Center Hawai'i, Inc., Lāwa'i, Kaua'i.
- Handy, E. S. Craighill
- 1940 *The Hawaiian Planter*, B.P. Bishop Museum Bulletin 161, Bishop Museum Press, Honolulu, Hawai'i. (also 1985)
- Handy, E.S. Craighill and Handy, Elizabeth Green [with Mary Kawena Pukui]
- 1972 *Native Planters in Old Hawai'i: Their Life, Lore, and Environment.* Bernice P. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu, Hawai'i. [1940 original *The Hawaiian Planter*]

- [HSPLS] Hawai`i State Public Library System (DOE) [Lillian Ching; Masae Gotanda, Ed]
 1989 *Hawaiian Legends Index* [Volumes I, II, III]. Board of Education, DOE, Honolulu, Hawai`i.
- Henry, Teuira
 1995 *Voyaging Chiefs of Hawai`i*. Kalamakū Press. Honolulu, Hawai`i.
- Hommon, Robert J.
 1976 *The Formation of Primitive States in Pre-Contact Hawai`i*. Ph.D. Dissertation, University of Arizona, Tucson, Arizona.
 1986 "Social Evolution in Ancient Hawai`i." In *Island Societies* [Ed] Patrick Vinton Kirch. Cambridge University Press, New York, New York.
- ʻŪi, John Papa [Translated by Mary Kawena Pukui; Edited by Dorothy B. Barrère]
 1982 *Fragments of Hawaiian History*. Bishop Museum Press, Honolulu, Hawai`i. [Original 1959. Translations of newspaper articles (*Kuokoa*) written in 1866-1870].
- Joestring, Edward
 1984 *Kaua`i: The Separate Kingdom*. University of Hawai`i Press and Kaua`i Museum Association, Limited.
- Juvik, Sonia P. and Juvik, James O.
 1998 *Atlas of Hawai`i*. University of Hawai`i Press, Honolulu, Hawai`i. [3rd edition]
- Kalākaua, His Hawaiian Majesty King David
 1990 *The Legends and Myths of Hawai`i: The Fables and Folklore of a Strange People*. Mutual Publishing, Honolulu, Hawai`i. [Original 1888 Charles L. Webster and Co., New York]
 1990 "Hawaiian Legends: Introduction" pp 11-65 [Original 1887]
 1990 "Hina, The Helen of Hawai`i" pp 68-94 [Original 1888]
 1990 "The Story of Laiekawai" pp 455-489
- Kamakau, Samuel Mānaiakalani
 1987 *Ka Po`e Kahiko: The People of Old*. Bishop Museum Special Publication 51. Bishop Museum Press. [From articles in *Ku`oko`a* and *Ke Au `Oko`a* from 1866 to 1871. Translated in 1931-34 by Mary Kawena Pukui; Arranged and edited by Dorothy B. Barrère in 1964.]
 1991 *Tales and Traditions of the People of Old: Nā Mo`olelo a Ka Po`e Kahiko*. Bishop Museum Press, Honolulu, Hawai`i. [From newspaper articles of 1868 and 1870, translated from newspapers *Ka Nupepa Kuokoa* and *Ke Au Okoa* by Mary Kawena Pukui; Edited by Dorothy B. Barrère]
 1992 *Ruling Chiefs of Hawai`i*. [Revised] Kamehameha Schools Press, Honolulu. [From newspaper articles of 1842 and 1870.] Original 1961.
- Kame`eleihiwa
 1992 *Native land and foreign desires: how shall we live in harmony?* Bishop Museum Press, Honolulu, Hawai`i.
- Kent, Noel J.
 1983 *Hawai`i: Islands Under the Influence*. Monthly Review Press, New York, New York.
- Kikuchi, William K., Kikuchi, Delores L., Stauder, Catherine, Cleeland, Byron and Frazier, Frances
 1978 "The Bicentennial of the Discovery of the Hawaiian Islands by Captain James Cook 1778-1978 Part II: The Western Discovery of the Hawaiian Islands 18 January 1778" In *Archaeology of Kaua`i* v7, No.1, Issue 21, January, Līhu`e, Kaua`i.

- Kirch, Patrick V.
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory.* University of Hawai'i Press, Honolulu, Hawai'i.
- Klieger, P. Christiaan
1998 *Moku'ula: Maui's Sacred Island.* Bishop Museum Press, Honolulu, Hawai'i.
- Knudsen, Eric A.
1946 *Teller of Hawaiian Tales.* Mutual Publishing, Honolulu.
"The phantom goat of Honopu" pp82-85
"The love of a chief" pp99-102
"Na Oahi o Kaua'i" pp143-146
- Kolb, Michael
1989 "A Research Design for Pi'ilanihale Heiau."(Ms) On file at SHPD. [Submitted February 1, 1989]
1991 *Social Power, Chiefly Authority, and Ceremonial Architecture, in an Island Polity, Maui, Hawai'i.* [Dissertation-Ms] University of California, Los Angeles, California.
- Krauss, Bob and Gleasner, Bill
1978 *Kaua'i.* Island Heritage Limited, Honolulu, Hawai'i.
- Kuykendall, Ralph S.
1938 *The Hawaiian Kingdom Volume I 1778-1854.* University Press of Hawai'i, Honolulu, Hawai'i.
- Kuykendall, Ralph S. and Day, A. Grove
1976 *Hawai'i: A History from Polynesian Kingdom to American State.* Prentice-Hall, Englewood.
- Lawrence, Mary Stebbins
1912 "The love of a chief" In *Stories of the Volcano Goddess.* Crossroads Bookshop, Honolulu, Hawai'i.
- Leib, Amos P. and Day, A. Grove
1979 *Hawai'i Legends in English: An Annotated Bibliography.* Second Edition. The University Press of Hawai'i, Honolulu, Hawai'i.
- Luomala, Katherine
1986 *Voices on the Wind: Polynesian Myths and Chants.* [Revised Edition] Bishop Museum Special Publication 75. Bishop Museum, Honolulu, Hawai'i.
- Macdonald, Gordon A.; Abbott, Agatin T.; and Peterson, Frank L.
1983 *Volcanoes in the Sea: The Geology of Hawai'i.* University of Hawai'i Press, Honolulu, Hawai'i.
- Major, Maurice and Alan Carpenter
2001 "Supplemental Archaeological Inventory: Hā'ena State Park, Kaua'i TMK: 5-9-06:14 and 5-9-08:1 through 19." Prepared for State of Hawai'i, Department of Land and Natural Resources, Division of State Parks.
- Malo, David
1971 *Hawaiian Antiquities.* Bishop Museum Press, Honolulu. [Original 1903-- translated by N.B. Emerson from Malo's works of early 1800s.]
- Maly, Kepa and Onaona
2003 "Hana Ka Lima, 'Ai Ka Waha' A Collection Of Historical Accounts And Oral History Interviews With Kama'āina Residents And Fisher-People Of Lands In The Halele'a-Nāpali Region On The

Island Of Kaua'i." Prepared for *Nature Conservancy, The National Tropical Botanical Gardens – Limahuli Gardens and Hui Maka'āinana o Makana*

- McKinzie, Edith Kawelohea [Edited by Ishmael W. Stagner, II]
1983 *Hawaiian Genealogies: Volume I.* University of Hawai'i Press, Honolulu, Hawai'i.

1986 *Hawaiian Genealogies: Volume II.* University of Hawai'i Press, Honolulu, Hawai'i.
- Mills, Peter R.
1996 Transformations of a Structure : The archaeology and ethnohistory of a Russian fort in a Hawaiian chiefdom, Waimea, Kaua'i. Thesis, UC-Berkeley, California.

2002 *Hawai'i's Russian Adventure.* University of Hawai'i Press, Honolulu, Hawai'i.
- Moffat, Riley M. and Fitzpatrick, Gary L.
1995 *Surveying the Mahele.* Editions Limited, Honolulu, Hawai'i.
- Murabayashi, Edwin T.
1973 *Kaua'i Lands Classified by Physical Qualities for Urban Usage – L.S.B. Circular No. 17,* September. Land Study Bureau, University of Hawai'i, Honolulu, Hawai'i.
- Nakuina, Emma Metcalf
1904 "Pele and Lohiau" *In Hawai'i, its People, their Legends.* Hawai'i Promotion Comm, Honolulu, Hawai'i.
- Olson, Storrs L. and James, Helen F.
1982 "Fossil Birds from the Hawaiian Islands: Evidence for Wholesale Extinction by Man before Western Contact." *Science* Vol. 217.
- Pacific Worlds
1995/2004 Hā'ena www.pacificworlds.com/Hā'ena
- Pandit, Naresh R.
1996 "The Creation of Theory: A Recent Application of the Grounded Theory Method." *The Qualitative Report*, Volume 2, Number 4, December.
<http://www.nova.edu/ssss/QT/QR2-4/pandit.html>
- Pukui, Mary Kawena
1983 *ʻŌlelo Noʻeau: Hawaiian Proverbs and Poetical Sayings.* Bernice P. Bishop Museum Special Publication No. 71. Bishop Museum Press, Honolulu, Hawai'i.

1994 "How the Menehune saved their fish" *In Tales of the Menehune.* KS Press, Honolulu, Hawai'i.
- Pukui, Mary Kawena, Elbert, Samuel E. and Mookini, Esther T.
1974 *Place Names of Hawai'i.* University of Hawai'i Press, Honolulu, Hawai'i.
- Rice, William Hyde
1977 *Hawaiian Legends.* Bishop Museum Press, Honolulu, Hawai'i.
"The Goddess Pele"
"The stones of Kane"
"The Menehunes"
"The story of Ola"
- Riley, Thomas J. and Jeffery Clark
1979 *Archaeological Testing and Excavations at Hā'ena, Kaua'i.* Department of Anthropology, University of Hawai'i, Manoa and University of Illinois, Urbana-Champaign

- Riley, T. J. and K. Ibsen-Riley
1979 "Taylor Camp, Hawaii: The life and death of a hippy community" *Field Museum of Natural History Bulletin* 50, 18.22.
- Rolett, Barry V.
1989 *University of Hawai'i Archaeological Research on Bellows Air Force Station: Report of the 1989 Field School and a Proposal for Further Research in 1990*. Dept of Anthropology-University of Hawai'i, Honolulu, Hawai'i.
- Silva, Carol
1995 *A Historical and Cultural Report of Hā'ena State Park, Halele'a, Kaua'i*. Draft report prepared for the State of Hawai'i, DLNR, Division of State Parks, Honolulu, Hawai'i.
- Skinner, Charles M.
1900 *Myths & Legends of our New Possessions & Protectorate*. J. B. Lippincott Company, Philadelphia, Pennsylvania.
- Speakman, Cummins E.
2001 *Mowee: A history of Maui the Magic Isle*. update by Jill Engledow Mutual Publishing, Honolulu, Hawai'i.
- Sterling, Elspeth P.
1964 *Index to Hawai'i Historical Review* Volume I (Numbers 1-12). [On file at UHM Hamilton Library-Hawaiian Collections].
- (TKC) The Keith Companies – Hawai'i, Inc. and Earthplan Planning and Design
2001 "Hā'ena State Park master Plan and Environmental Impact Statement" prepared for Division of State Parks, Department of land and Natural Resources, State of Hawai'i.
- Thrum, Thomas G.
1907 "Legends resembling Old Testament history" *In Hawaiian Folk Tales: A Collection of Native Legends*. A. C. McClung and Company, Chicago, Illinois.
1908 *Hawaiian Almanac and Annual for 1909*
1923 "Kila the undaunted" *In More Hawaiian Folk Tales; A Collection of Native Legends and Traditions, compiled by Thomas G. Thrum*. A. C. McClure & Co., Chicago, Illinois.
- Tuggle, H. David
1997 "Archaeological Research of Areas Proposed for Development of Military Family Housing and Expansion of Military Training at Bellows Air Force Station, O'ahu: Task 1:Literature Review of the Cultural Resources of the Bellows Area." International Archaeological Research Institute, Inc. Honolulu, Hawai'i.
- Tuggle, H. David and Spriggs, Matthew
2001 "The Age of the Bellows Dune Site 018, O'ahu, Hawai'i, and the Antiquity of Hawaiian Colonization." In *Asian Perspectives*, Vol 39, No. 11-2. pp. 165-188. University of Hawai'i Press, Honolulu, Hawai'i.
- Vancouver, George
1798 *A Voyage of Discovery to the North Pacific Ocean and Around the World...Performed in the Years 1790-95*. London, England.
- Waihona Aina Corporation
2000 Mahele Database, Honolulu, Hawai'i. www.waihona.com

- Wailuku Sugar Company (WSC)
 1962 *Wailuku Sugar Company Centennial 1862 November 1962: A Century of Progress in Sugar Cane Cultivation.* Maui Publishing Co., Ltd., Wailuku, Maui.
- Westervelt, W.D.
 1915 *Legends of old Honolulu.* G.H. Ellis Press, Boston, Massachusetts.
<http://www.sacred-texts.com/pac/hloh/index.htm>
- 1963 *Hawaiian legends of old Honolulu, collected and translated from the Hawaiian by W. D. Westervelt.* Charles E. Tuttle Co, Rutland, Vermont.
- 1999 “Pele’s long sleep” and “Lohiau” *In Hawaiian Legends of Volcanoes*
- 2001 “Laukaieie” *In Legends of Gods and Ghosts*
- Wichman, Frederick B.
 1984 *Kaua`i Tales.* Bamboo Ridge Press, Honolulu, Hawai`i.
- 1997 *More Kaua`i Tales.* Bamboo Ridge Press, Honolulu, Hawai`i.
 “Ka-wai-o-Palai”
 “Nā Kia Manu a me Nā Mai`a”
- 1998 *Kaua`i Ancient Place-Names and Their Stories.* University of Hawai`i Press, Honolulu, Hawai`i.
- 2003 *Nā Pua Ali`i O Kaua`i : Ruling Chiefs of Kaua`i.* University of Hawai`i Press, Honolulu, Hawai`i.
- Williamson, Eleanor et al.
 1984 “Preface” In *‘Olelo No`eau.* Pukui. Bishop Museum Publication No. 71. Bishop Museum Press, Honolulu, Hawai`i.
- Yent, Martha
 1980 *Preliminary Archaeological Testing of House 4, Ha`ena State Park, Halele`a, Kaua`i.* Honolulu: Division of State Parks, Department of Land and Natural Resources, State of Hawaii.
- Yent, Martha and Jason Ota
 1983 *Fieldcheck of duner erosion and exposed cultural materials at Hā`ena State Park, Hā`ena, Kaua`i, TMK: 5-908:18.* Memorandum to State Parks Administrator Roy Sue, State of Hawai`i, DLNR, Division of State Parks. May 2, 1983.

APPENDIX A

Act 50 - 2000
A BILL FOR AN ACT RELATING TO
ENVIRONMENTAL IMPACT STATEMENTS
[UNOFFICIAL VERSION]

HOUSE OF REPRESENTATIVES H.B. NO, 2895 H.D.1
TWENTIETH LEGISLATURE, 2000
STATE OF HAWAII

A BILL FOR AN ACT
RELATING TO ENVIRONMENTAL IMPACT STATEMENTS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

SECTION 1. The legislature finds that there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawai'i's culture, and traditional and customary rights.

The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit" in Hawai'i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.

Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.

The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.

SECTION 2. Section 343-2, Hawai'i Revised Statutes, is amended by amending the definitions of "environmental impact statement" or "statement" and "significant effect", to read as follows:

"Environmental impact statement" or "statement" means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic [and] welfare, social welfare, and cultural practices of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects.

The initial statement filed for public review shall be referred to as the draft statement and shall be distinguished from the final statement which is the document that has incorporated the public's comments and the responses to those comments. The final statement is the document that shall be evaluated for acceptability by the respective accepting authority.

"Significant effect" means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies or long-term environmental goals as established by law, or adversely affect the economic [or] welfare, social welfare[.], or cultural practices of the community and State."

SECTION 3. Statutory material to be repealed is bracketed. New statutory material is underscored.

SECTION 4. This Act shall take effect upon its approval.

Approved by the Governor as Act 50 on April 26, 2000

APPENDIX B

Scope of Work (SOW)

Cultural Impact Assessment [in accordance with OEQC Guidelines]

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua`a;
2. identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Methods

The specific tasks listed below expand on the above scope of work:

- ◆ Conduct historical and cultural background research (i.e., business records, land records; archival documents, literature, reports, letters, photographs, journals, or newspaper files) to locate material that will provide broad patterns of the history of the project area such as subsistence, religious, recreational, and commercial uses of the land; as well as settlement and residential patterns of the area and region; major family groups that inhabited, used or controlled lands within the project area and region; documented legends, myths, or traditional histories associated with the area; and descriptions of traditional practices, customs and beliefs associated with identified traditional cultural practices;
- ◆ Prepare a semi-structured ethnographic research instrument that will include questions that will generate general biographical information, association with and knowledge of the project area, its history and use
- ◆ Prepare a consent form to be used as written agreement with any individual interviewed concerning the review of content and use of information recorded during the interview
- ◆ Identify individuals knowledgeable with the project area.
- ◆ Conduct and record ethnographic interviews with knowledgeable individuals. If feasible individuals shall participate in field inspections (Makana to be given)
- ◆ Transcribe recorded interviews (Approximate time, 6-8 hrs/per hr of recording)
- ◆ Prepare a report that will include an overview of the archival material, and an analysis of the ethnographic data.

APPENDIX C

Guidelines for Assessing Cultural Impacts

Adopted by the Environmental Council, State of Hawai'i
November 19, 1997

I. INTRODUCTION

It is the policy of the State of Hawai'i under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

II. CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants [consultants], including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices.

The types of cultural resources The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua`a;
- 2 identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
4. conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;
5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified.

Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials are likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant [consultant] may provide information only on the condition that it remain in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

III. CULTURAL IMPACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

- 1.A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.
- 2.A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

3. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

4. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

5. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.

6. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

7. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.

8. An explanation of confidential information that has been withheld from public disclosure in the assessment.

9. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

10. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

11. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

**APPENDIX D
CONSENT FORM**

Agreement to Participate in this Cultural Impact Study/Assessment

Project Title: **Hā`ena State Park CIS/A
Hā`ena, Kē`ē and Limahuli**

Investigator: Maria “Kaimi” Orr, M.A. [(808) 375-3317]
Kaimipono Consulting Services LLC
kaimi@lava.net

You are being asked to participate in a cultural impact study/assessment [CIS/A] conducted by an independent investigator contracted by *PBR Hawai`i & Associates, Inc* as part of a larger Master Plan and Environmental Impact Statement they are conducting for Hā`ena State Park. The investigator will explain the purpose of this study, the procedures to be used, the potential benefits and possible risks of participating. You may ask the investigator any question(s) in order to help you to understand the study or procedures. A basic explanation of the study is written below. If you then decide to participate in the study, please sign on the second page of this form. You will be given a copy of this form to keep.

I. Nature and Purpose of the Study

The purpose of this cultural impact study/assessment is to gather information about the project lands of Hā`ena, through interviews with individuals who are knowledgeable about this area, and/or about traditional and historic information such as cultural practices, legends, songs, chants or other information. The objective of this study is to facilitate in the identification and location of any cultural resources and cultural practices in the area mentioned above, in accordance with applicable historic preservation laws, regulations, and guidelines, including: *Office of Environmental Quality Control [OEQC] Guidelines and Act 50 HB2895 [A.D.2000], HRS Chapter 343.*

II. Explanation of Procedures

After you have voluntarily agreed to participate and have signed the consent page, the investigator will tape record your interview and have it transcribed later. The investigator may also need to take notes and/or ask you to spell or clarify terms or names that are unclear. Data from the interview [ethnographic research] will be used in the CIS/A report.

III. Discomforts and Risks

Foreseeable discomforts and/or risks may include, but are not limited to the following: having to talk loudly for the recorder; being recorded and/or interviewed; providing information that may be used in reports which may be used in the future as a public reference; knowing that the information you give may conflict with information from others; your uncompensated dedication of time; possible miscommunication or misunderstanding in the transcribing of information; loss of privacy; and worry that your comment(s) may not be understood in the same way you understand them. It is not possible to identify all potential risks.

IV. Benefits

This study will give you the opportunity to express your thoughts (*mana`o*), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected **if you so desire**. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain “off-the-record.” In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, _____, understand that Maria “Kaimi” Orr, an independent investigator contracted by *PBR Hawai`i & Associates, Inc.* will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. **I also understand that if I don’t return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.**

_____ I am willing to participate.

_____ I am willing to participate, under the following conditions:

Signature

Date

Print Name

Phone

Address

ZipCode

Email Address

MAHALO NUI LOA

APPENDIX E
Ethnographic Instrument
Ethnographic Survey

Basic Research Instrument for Oral History Interviews

This research instrument includes basic information as well as research categories which will be asked in the form of open primary questions which allow the individual interviewed (Consultant) to answer in the manner he/she is most comfortable. Secondary or follow-up questions are asked based on what the Consultant has said and/or to clarify what was said. The idea is to have an interview based on a “talk-story” form of sharing information. Questions will NOT be asked in an interrogation style/method, NOR will they necessarily be asked in the order presented below. This research instrument is merely a *guide* for the investigator and simply reflects general categories of information sought in a semi-structured format. Questions will be asked more directly when necessary.

The Consultants were selected because they met one or more of the following criteria:

- ❖ Had/has Ties to Project Area/Vicinity
- ❖ Known Hawaiian Cultural Resource Person
- ❖ Known Hawaiian Traditional Practitioner
- ❖ Referred By Other Cultural Resource People
- ❖ Referred By Client Staff

[NOTE: This part of the interview, #1-4 is mutual sharing and rapport building. Most of the information for research categories “Consultant Background” and “Consultant Demographics” come from this section, but not exclusively.]

1. *To start please tell me about yourself...Name? Where/When you were born?*

[This information can be addressed in a couple of ways. After the investigator first turns on the tape recorder, the following information will be recorded: Day/Date/Time/Place of Interview; Name of Consultant (if authorized by Consultant); Name of Investigator; Initial Questions: Have you read the Agreement to Participate? Do you have any questions before we begin? Will you please sign the Consent Page. The investigator will explain again the purpose of the interview.

The investigator will then ask the Consultant to “Please tell me about yourself--when/where were you born? Where did you grow up? Where did you go to school?” This general compound question allows the Consultant to share as much or as little as he/she wants without any pressure. Some of the information for #1 may already be known to the investigator.]

2. *History: Your `ohana/family background; Hawaiian connection (if any)?*

[Much of the information for questions #2, 3, and 4 usually comes from the “monologue” answer to Question #1. If it does not, then these questions will be asked. The answers in this section usually establish how the Consultant meets the criteria; how the Consultant developed his/her information base, etc.]

3. *Youth: Where lived? Grew up?* [This may have been answered in #1]

4. *Schooling? Where? When?* [This may have been answered in #1]

[NOTE: The next part of the interview, #5-7 reflects information sought for the following research categories: Land, Water, Marine, Cultural Resources and Use as well as Significant People and Events. The questions

are open-ended so as NOT to “put words in the mouths” of the Consultants. The answers will help in assessing if any cultural properties or practices (or access to them) will be impacted by the proposed project.]

5. *Please tell me what you know about the lands of Hā`ena, Ke`e and Limahuli?*

[NOTE: Generally when people share information about a specific topic/place, they usually state where their information came from. If it isn't volunteered, it is asked as a follow-up question(s). A map of the project area should be available to confirm that investigator and consultant are talking about the same place. Photos would also help if a field trip is not possible. The best scenario would be to be “on-site” at some part of the interview...although this is not always practical.]

6. *What are your recollections and/or personal experiences of this area?*

7. *Do you know any stories/legends/songs/chants associated with these areas?*

[NOTE: Possible follow-up questions if information not in their answers:

- How are you or your family connected to the lands of Hā`ena, Ke`e and/or Limahuli?
- What year(s) were you and/or your family associated with these lands?
- What was this place/area called when you were growing up? When you were working here?
- Can you describe what the area looked like--what kinds of natural and/or man made things?
- To your knowledge what kind of activities took place in this location?
- Do you know of any traditional gathering of plants, etc in the area?
- Please describe any other land/water use? Resources?
- What was the historic land use? Agriculture? Habitation? Dwellings? Military? Ranching?
- **[Have map ready for marking.]**
- Do you know about any burials in the project area? [last resort question]
- Do you know of any cultural sites in the project area or vicinity? [last resort question]

8. *Is there anyone you know who can also tell me about the project area?*

[NOTE: Usually in the course of the interview, Consultants suggest other people to interview.]

9. *As soon as the tape of this interview is transcribed I will send you two sets. Please review your transcript and make any corrections and/or additions, then sign both copies of the Release Forms thereby allowing the information to be used by the investigator, PBR Hawai`i & Associates, Inc. and Hā`ena State Park. Then mail one set back in the enclosed stamped-addressed envelope.*

10. *If your revised transcript is not returned within **two weeks** of date of receipt, it will be assumed that you are in concurrence with the transcript material and your information will then be incorporated into any draft reports. However, you can still make changes during the draft review process.*

MAHALO NUI LOA

**APPENDIX F
RELEASE FORM**

Part II: Personal Release of Interview Records

I, _____, have been interviewed by *Maria "Kaimi" Orr* of *Kaimipono Consulting Services LLC*, an independent investigator contracted by *PBR Hawai'i & Associates, Inc.* I have reviewed the transcripts of tape recordings of the interview and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

CLARIFICATION OR CORRECTIONS:

I further agree that KCS and/or PBR Hawai'i may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report to be made public, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."

SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:

Signature	Date
Print Name	Phone
Address	
Zipcode	

MAHALO NUI LOA

APPENDIX G

Ali`i Aimoku of Kaua`i

The monarchs of island Kaua`i like those of the other Hawaiian Islands, claim descent from Wakea and Papa. Nanaulu, a descendant in the fourteenth generation from Wakea, was the ancestor of Moikeha, 1st Alii Aimoku of Kaua`i , but his dynasty was supplanted after two generations. The second or Puna dynasty was established by La'amaikahiki, eleventh in descent from Puna who was twenty-fourth in descent from Wakea. O`ahu and Kaua`i are the most ancient. The last Ali`i `Aimoku of Kaua`i of the old uninterrupted line of Puna was Kawelo'a'maihunali'i. After his death the kingship of Kaua`i fell on Kūali'i, the Ali`i `Aimoku of O`ahu and cousin of Kawelo'a'maihunali'i. In 1810, King Kaumuali`i, the 23rd Ali`i `Aimoku of Kaua`i, ceded his kingdom to King Kamehameha I of Hawai`i, in an effort to avoid bloodshed. Thereafter, he ruled as a tributary, until kidnapped by King Kamehameha II and taken to Honolulu in 1821. After his death in 1824, his son and heir, George Humelemea attempted to re-establish his independence on Kaua`i, but was also eventually captured and taken to Honolulu. Ironically, the rights to the crown of the Hawaiian Islands now rest with Kaumuali`i's heirs the Kawanakoaas after the death of the Kamehamehas and Kalakauas.

List of Aii Aimoku of Kaua`i

- Ali'i nui [Moikeha](#) 1st Alii Aimoku of Kaua`i
- Ali'i nui [Haulanuiiaikea](#) 2nd Alii Aimoku of Kaua`i
- Ali'i nui [La'amaikahiki](#) 3rd Alii Aimoku of Kaua`i
- Ali'i nui [Ahukini-a-Laa](#) 4th Alii Aimoku of Kaua`i
- Ali'i nui [Kamahano](#) 5th Alii Aimoku of Kaua`i
- Ali'i nui [Luanu'u](#) 6th Alii Aimoku of Kaua`i
- Ali'i nui [Kukona](#) 7th Alii Aimoku of Kaua`i
- Ali'i nui [Manokalanipo](#) 8th Alii Aimoku of Kaua`i
- Ali'i nui [Kamakamano](#) 9th Alii Aimoku of Kaua`i
- Ali'i nui [Kahakuakane](#) 10th Alii Aimoku of Kaua`i
- Ali'i nui [Kuwalupaukamoku](#) 11th Alii Aimoku of Kaua`i
- Ali'i nui [Kahakumakapaweo](#) 12th Alii Aimoku of Kaua`i
- Ali'i nui [Kalanikukuma](#) 13th Alii Aimoku of Kaua`i
- Ali'i nui [Kahakumakalina](#) 14th Alii Aimoku of Kaua`i
- Ali'i nui [Kamakapu](#) 15th Alii Aimoku of Kaua`i
- Ali'i nui [Kawelomahamahaia](#) 16th Alii Aimoku of Kaua`i
- Ali'i nui [Kawelomakualua](#) 17th Alii Aimoku of Kaua`i
- Ali'i nui [Kaweloiakanaka](#) 18th Alii Aimoku of Kaua`i
- Ali'i nui [Kawelo'a'maihunali'i](#) 19th Alii Aimoku of Kaua`i
- Ali'i nui [Kuali'i](#) ? - 1730 20th Alii Aimoku of Kaua`i and 19th [Alii Aimoku of O`ahu](#)
- Ali'i nui [Peleioholani](#) 1730 - 1770 21st Alii Aimoku of Kaua`i and 22nd Alii of O`ahu
- Ali'i nui [Kamakahahele](#) 1770 - 1794, 22nd Alii Aimoku of Kaua`i
- Ali'i nui [Kaumuali'i](#) 1794 - 1810, 23rd Alii Aimoku of Kaua`i

http://en.wikipedia.org/wiki/Ali`i_`Aimoku_of_Kaua`i (2009)

**APPENDIX H
SIGNED CONSENT FORMS**

(Copies)

IV. Benefits

This study will give you the opportunity to express your thoughts (mana`o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

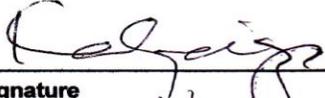
VII. Waiver

Part I: Agreement to Participate

I, _____, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

_____ I am willing to participate.
_____ I am willing to participate, under the following conditions:

	11/20/08
Signature	Date
Kapu Kiriwala-Alquiza	335-6466
Print Name	Phone
P.O. Box 49 Hanalei, HI	96716
Address	ZipCode
Kapu.alquiza@hawaiiantel.net	
Email Address	

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana`o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, _____, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

_____ I am willing to participate.
_____ I am willing to participate, under the following conditions:

Signature: *Thomas Ashimoto* Date: *11/22/08*
Print Name: *Thomas Ashimoto* Phone: *808-1206*
Address: *P.O. Box 412 Kilauea* ZipCode: _____
Email Address: _____

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Clarence A. Medeiros Jr. understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

I am willing to participate.
 I am willing to participate, under the following conditions:

Clarence A. Medeiros Jr. 5-20-10
Signature Date
Clarence A. Medeiros, Jr. 325-2074
Print Name Phone
86-3672 Govt. Main Road Captain Cook, HI 96704
Address ZipCode
CAMedeiros86@gmail.com
Email Address

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Chipper Wichman understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

I am willing to participate.
 I am willing to participate, under the following conditions:

Chipper Wichman 11/21/08
Signature Date
Chipper Wichman 651-41266
Print Name Phone
3535 Papalina Rd 96741
Address ZipCode
wichman@ntbg.org
Email Address

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Frederic B. Wichman, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

I am willing to participate.
 I am willing to participate, under the following conditions:

<u>Frederic B. Wichman</u>	<u>11/21/08</u>
Signature	Date
<u>FREDERIC B WICHMAN</u>	<u>826-7449</u>
Print Name	Phone
<u>P.O. Box 1850</u>	<u>Manala, HI 96714</u>
Address	ZipCode
<u>fwichman@etaha.net</u>	
Email Address	

MAHALO NUI LOA

IV. Benefits

This study will give you the opportunity to express your thoughts (mana'o), and your opinions will be listened to and shared; your knowledge may be instrumental in the preservation of significant cultural resources, practices and information.

V. Confidentiality

Your rights of privacy, confidentiality and/or anonymity will be protected if you so desire. You may request, for example, that your name and/or sex not be mentioned in write-ups, such as field notes, on tape, on files (disk or folders), drafts, reports, and future works; or you may request that some of the information you provide remain "off-the-record." In order to ensure protection of your privacy, confidentiality and/or anonymity, you should immediately advise the investigator of your desires. The investigator will ask you to specify the method of protection, and note it on this form below.

VI. Refusal/Withdrawal

You may, at any time during the interview process, chose to not participate any further and ask the investigator for the tape and/or notes. Please note that you will be given an opportunity to review your transcript, and to revise or delete any part of the interview.

VII. Waiver

Part I: Agreement to Participate

I, Randy Wichman, understand that Maria "Kaimi" Orr, an independent investigator contracted by PBR Hawaii & Associates, Inc. will be conducting oral history interviews with individuals knowledgeable about the project lands and vicinity. The oral history interviews are being conducted in order to collect information on possible pre-historic and/or historic cultural resources, as well as traditional cultural practices associated with these lands and access to these resources and practices.

I understand I will be provided the opportunity to review my interview to ensure that it accurately depicts what I meant to say. I also understand that if I don't return the revised transcripts after two weeks from date of receipt, my signature below will indicate my release of information for the draft report. I also understand that I will still have the opportunity to make revisions during the draft review process.

- I am willing to participate.
- I am willing to participate, under the following conditions:

Randy Wichman Signature NOV. 20 '08 Date

RANDY WICHMAN Print Name 482 0516 Phone

PO BOX 3740 Address 96766 ZipCode

RFWICHMAN@gmail.com Email Address

MAHALO NUI LOA

**APPENDIX I
SIGNED RELEASE FORMS**

(Copies)

Part II: Personal Release of Interview Records

I, Frederick B. Wichman, have been interviewed by Maria "Kaimi" Orr of Kaimipono Consulting Services LLC, an independent investigator contracted by PBR Hawaii & associates, Inc. I have reviewed the transcripts of tape recordings of the interview and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

CLARIFICATION OR CORRECTIONS:

I further agree that KCS and/or PBR Hawaii may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report to be made public, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."

SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:

I ask that the sections I have marked as "Please delete" not be used in any way.

<u>Frederick B. Wichman</u>	<u>2/26/09</u>
Signature	Date
<u>Frederick B. Wichman</u>	<u>826-7449</u>
Print Name	Phone
<u>P.O. Box 1050</u>	
Address	
<u>Hanalei Hawaii</u>	<u>96714</u>
	Zipcode

MAHALO NUI LOA

Part II: Personal Release of Interview Records

I, Clarence A. Meekins, Jr., have been interviewed by Maria "Kaimi" Orr of Kaimipono Consulting Services LLC, an independent investigator contracted by PBR Hawaii & associates, Inc. I have reviewed the transcripts of tape recordings of the interview and agree that said documentation is complete and accurate except for those matters specifically set forth below the heading "CLARIFICATION OR CORRECTIONS."

CLARIFICATION OR CORRECTIONS:

As indicated on corrected draft dated 3/16/2008 which was e-mailed to you on 12/9/2008

I further agree that KCS and/or PBR Hawaii may use and release my identity and other interview information, both oral and written, for the purpose of using such information in a report to be made public, subject to my specific objections, to release as set forth below under the heading "SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS."

SPECIFIC OBJECTIONS TO RELEASE OF INTERVIEW MATERIALS:

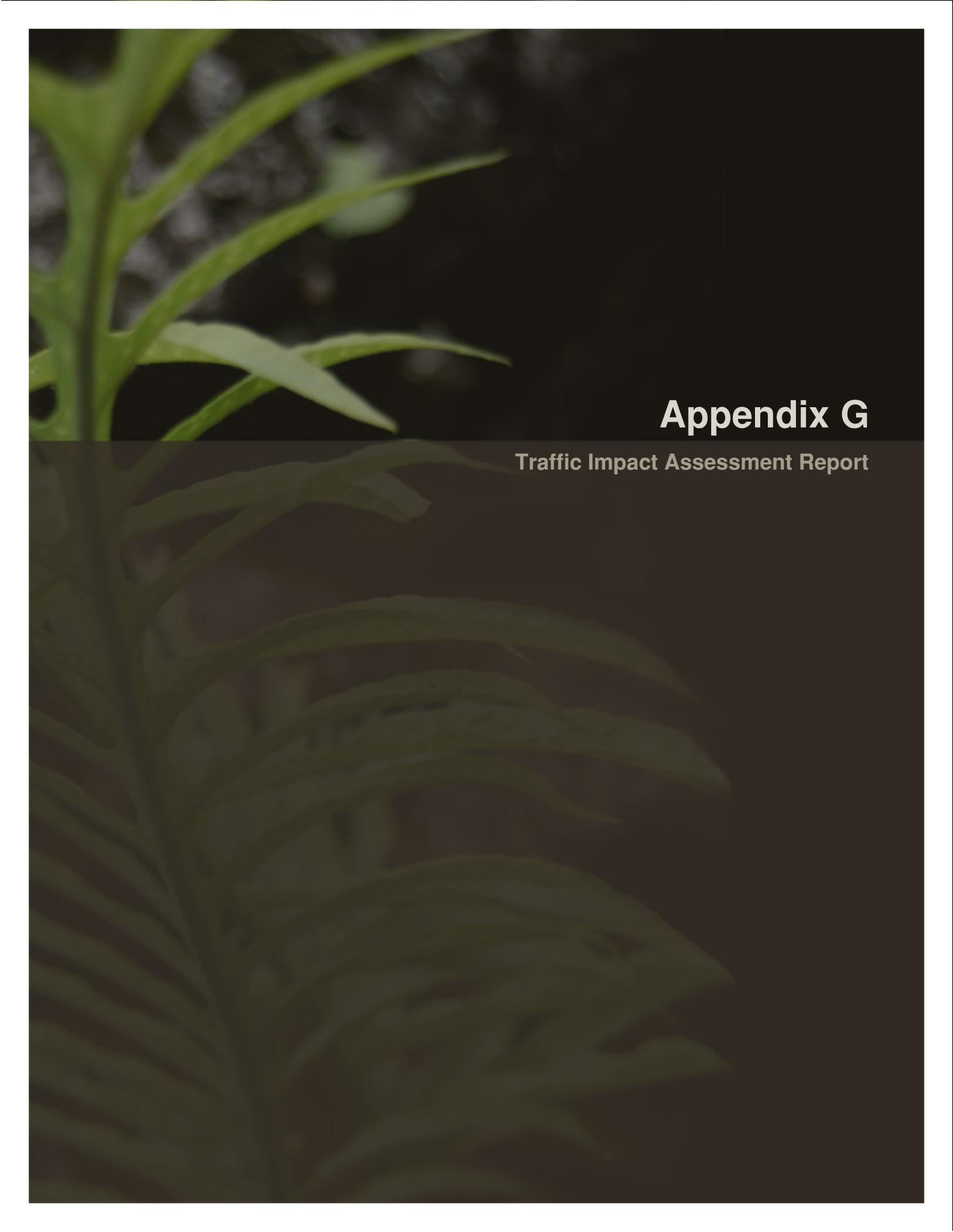
<u>Clarence A. Meekins, Jr.</u>	<u>5-28-10</u>
Signature	Date
<u>Clarence A. Meekins, Jr.</u>	<u>328-2074</u>
Print Name	Phone
<u>86-3672 Govt. Main Road</u>	
Address	
<u>Captain Cook, HI 96704</u>	<u></u>
	Zipcode

MAHALO NUI LOA



Photo 78. Kumu Hula and haumana end ceremony on hula pa.

P A U



Appendix G

Traffic Impact Assessment Report

TRAFFIC IMPACT ANALYSIS REPORT HĀ'ENA STATE PARK MASTER PLAN

Hā'ena, Kaua'i, Hawai'i

September 14, 2011
Revised June 17, 2013

Prepared for:

PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813



Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors

501 Sumner Street, Suite 521

Honolulu, Hawaii 96817-5031

Telephone: (808) 533-3646

Facsimile: (808) 526-1267

E-mail: atahnl@atahawaii.com

Honolulu • Wailuku • Hilo, Hawaii

TRAFFIC IMPACT ANALYSIS REPORT HĀ'ENA STATE PARK

Hā'ena, Kaua'i, Hawai'i

Prepared for:

PBR Hawaii, Inc.

Prepared by

Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

September 14, 2011

Revised June 17, 2013



TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION.....	1-5
A. Background.....	1
B. Location.....	2
C. Study Methodology.....	2
II. EXISTING CONDITIONS.....	6-8
A. Roadway System.....	6
B. Existing Traffic Conditions Analysis and Observations.....	6
III. SHUTTLE RESEARCH.....	9-13
A. Background.....	9
B. Case Studies.....	11
IV. ALTERNATIVES ANALYSIS.....	14-23
A. Traffic Analysis.....	14
B. Shuttle (Scenarios 2-5).....	15
C. Engineering Considerations.....	16
D. Cost Estimate.....	19
V. CONCLUSIONS.....	24
VI. RECOMMENDATIONS.....	25
VII. REFERENCES.....	26

TABLE OF CONTENTS
Cont'd

TABLES

1.	HAWAI'I ATS PARKS INFORMATION.....	10
2.	NATIONWIDE SHUTTLE USE AT NATIONAL PARKS	10-11
3.	CAPACITY ANALYSIS OF WAIPA BRIDGE DURING THE CRITICAL PM PEAK HOUR	15
4.	EXISTING BRIDGE CAPACITY	19
5.	COMPARISON OF ESTIMATED TRANSIT COSTS.....	23

FIGURES

1.	LOCATION MAP	3
2.	SITE PLAN	4
3.	PARKING PLAN	5
4.	VEHICLE ACCUMULATION CHART	8
5.	PEAK HOUR VOLUMES.....	18

APPENDICES

- A. TRAFFIC COUNT DATA
- B. CAPACITY ANALYSIS BASIS



TERRANCE S. ARASHIRO, P.E.
STANLEY T. WATANABE
IVAN K. NAKATSUKA, P.E.
ADRIENNE W. L. H. WONG, P.E., LEED AP
KEITH K. NIIYA, P.E.
DEANNA HAYASHI, P.E.
PAUL K. ARITA, P.E.

TRAFFIC IMPACT ANALYSIS REPORT

HĀ'ENA STATE PARK

Kaua'i, Hawai'i

I. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts resulting from the proposed Hā'ena State Park Master Plan (Project).

A. Background

The proposed Master Plan will be limiting the number of visitors and the amount of vehicular traffic into Hā'ena State Park to help improve safety, mitigate impacts to the unique cultural and natural resources, and enrich visitor experience at the park. The initial proposed visitor limit is 900 people per day but this number could be adjusted over time based on the impacts to the park. This daily visitor limit does not include the 60 overnight camping permits for the Kalalau Trail. This would represent a significant reduction from the park's current number of visitors, estimated at 2,000 visitors per day.

Similar to the previous Draft Master Plan, the proposed plan will have roughly 100 parking stalls in the main parking lot and an additional 13 special parking stalls at Kē'ē Beach. This report will also investigate the requirements for a shuttle service between Hā'ena State Park and a satellite parking area in Princeville that could be considered to support access to the park. The satellite parking area would be outside of the special flood hazard area as designated by the Federal Emergency Management Agency. This report will investigate existing



federal precedent, examples of similar applications, and estimate the cost of the proposed shuttle system (Shuttle).

This study will also analyze the traffic impacts of the proposed project and potential management options.

B. Location

Hā'ena State Park is situated on approximately 65.7 acres of land located on the north shore of the island of Kaua'i. The park is bordered to the east by the Limahuli Stream, to the south by cliffs and by the Pacific Ocean to the north and west.

Sole access to Hā'ena State Park is provided via Kūhiō Highway, which terminates at Kē'ē Beach.

See Figure 1 for the location of the Hā'ena State Park. See Figure 2 for the Project Site Plan. See Figure 3 for the proposed parking lot.

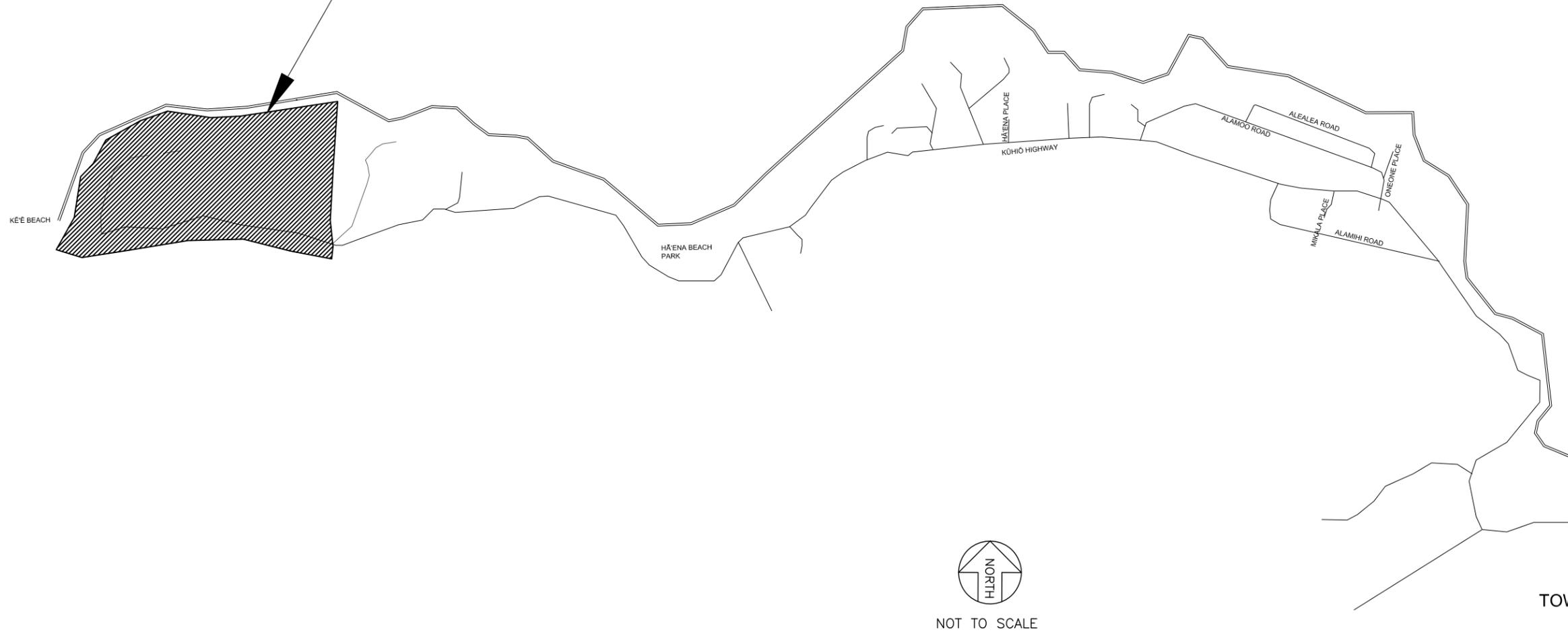
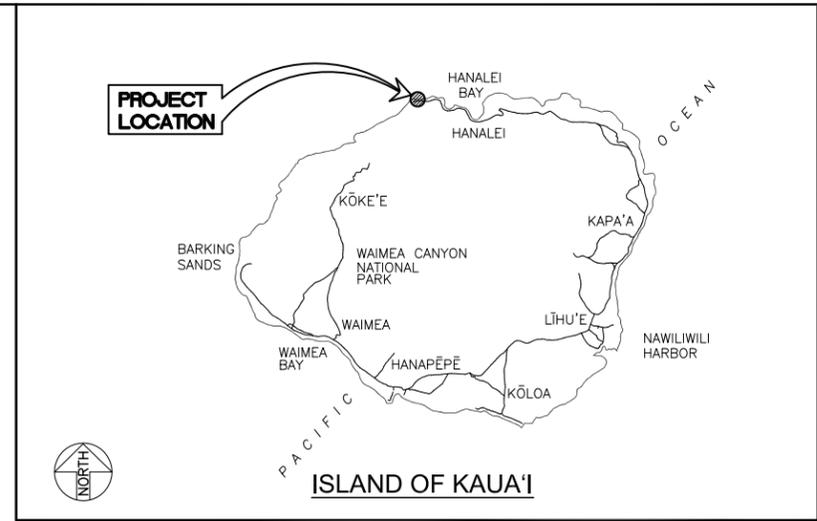
C. Study Methodology

This study will address the following:

1. Existing traffic operating conditions at key locations within the study area.
2. Existing precedent for shuttle services in state and/or national parks.
3. Estimation of shuttle operation costs.
4. Recommendations for shuttle operations.
5. Projected traffic impacts for the proposed master plan and management options.

HĀ'ENA STATE PARK

LEGEND
— EXISTING ROAD



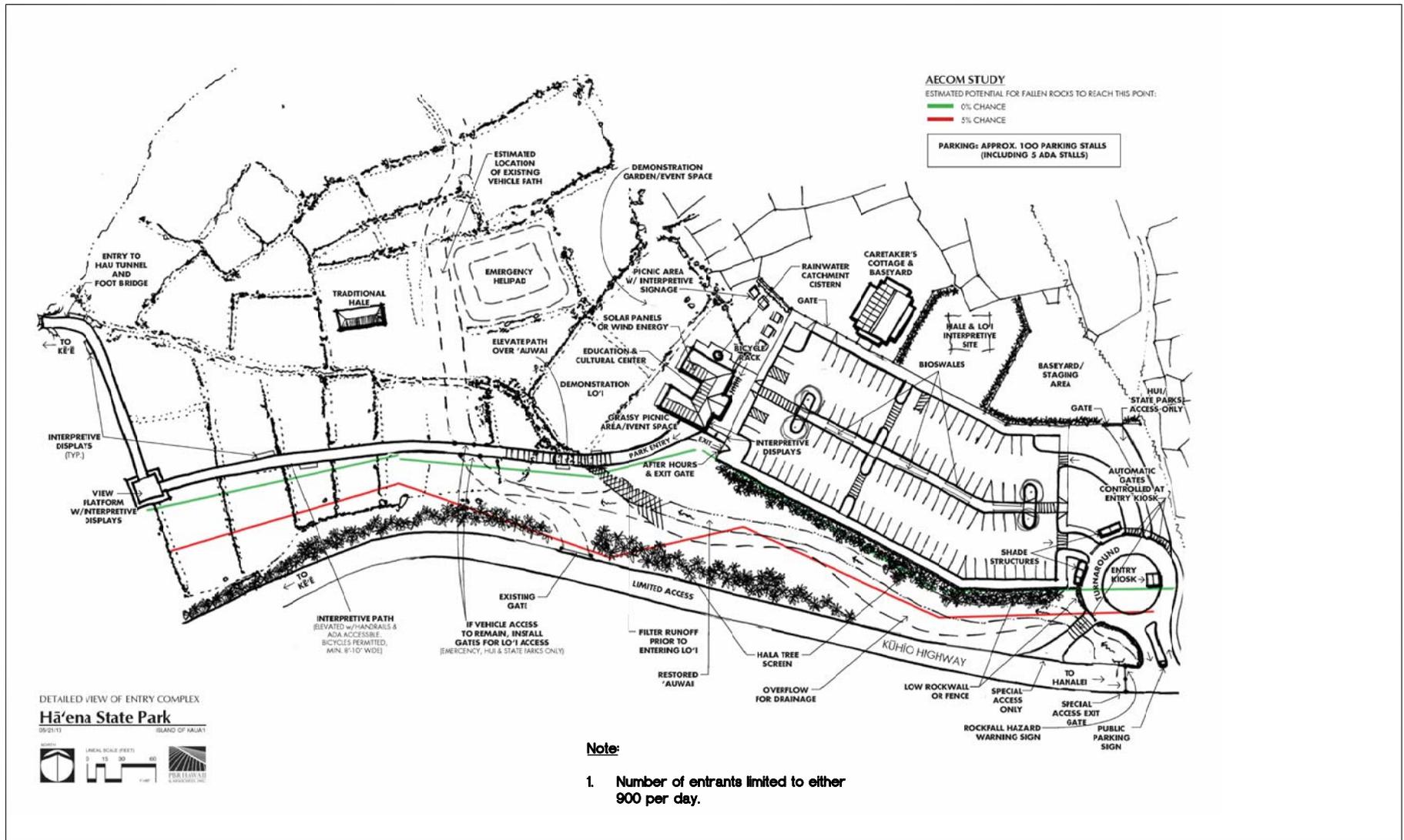
HĀ'ENA STATE PARK

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS HONOLULU, HAWAII

LOCATION MAP

FIGURE

1



HĀ'ENA STATE PARK

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
 ENGINEERS, SURVEYORS HONOLULU, HAWAII

PARKING PLAN

FIGURE
3



II. EXISTING CONDITIONS

A. Roadway System

Sole ingress and egress to Hā'ena State Park is provided via Kūhiō Highway, which in the vicinity of the park is a winding two-lane roadway that runs east-west and terminates near Kē'ē Beach. Ten (10) one-lane bridges slow traffic between Princeville and Hā'ena State Park. The Kaua'i County General Plan (2000) stated the county's intent to maintain them; the bridges are valued for their historic significance and "traffic slowing" effect.¹

Hā'ena State Park currently provides two parking lots. The first is approximately 750 feet west of the Hā'ena State Park entrance, and the second is where Kūhiō Highway terminates near Kē'ē beach. Due to the limited number of stalls, vehicles park along the road leading up to the beach. No sidewalks are provided for pedestrians.

B. Existing Traffic Conditions Analysis and Observations

Along Kūhiō Highway and leading up to the park, no significant congestion was observed. However, in the areas between Princeville and Hā'ena State Park, a maximum of 4-vehicle queues were observed to form as they waited to traverse the numerous narrow 1-lane bridges. Otherwise, traffic flowed smoothly, though cautiously, due to the relatively low volume.

It is estimated that Kuhio Highway operates at approximately 39 percent of capacity at the Waipa bridge based upon a bi-directional capacity of 1,250 vehicles per hour and a bi-directional volume of 487 vehicles per hour². Refer to Appendix B for derivation.

Upon entering the Hā'ena State Park driveway (Kūhiō Highway), vehicles generally travel slowly to avoid pedestrians and oncoming vehicles. An incoming driver will first encounter an unpaved and un-striped parking lot on the right (makai), approximately 750 from the entrance. Visitors that use this parking lot must walk approximately 1,500 feet along the roadway to reach the beach, as no

¹ County of Kaua'i Planning Department, *Kaua'i General Plan*. (2000). 2-11.

² Field observations indicate that capacity might be lower than 1,400 – however, traffic was observed to flow smoothly.



sidewalk is provided. At the end of the road, there is a turnaround area wherein a limited number of parking stalls are provided. Due to the stalls' comparatively favorable location, congestion occurs as vehicles wait for them to be vacated. Some visitors were observed waiting for over five (5) minutes for a stall.

The 24-hr traffic count data was collected via pneumatic tubes laid at the Hā'ena State Park entrance between August 14, 2008 and August 18, 2008; this included a long weekend for Statehood Day. According to 1993 data from County of Kaua'i Lifeguards, Hā'ena State Park experiences its highest attendance during month of August.⁴

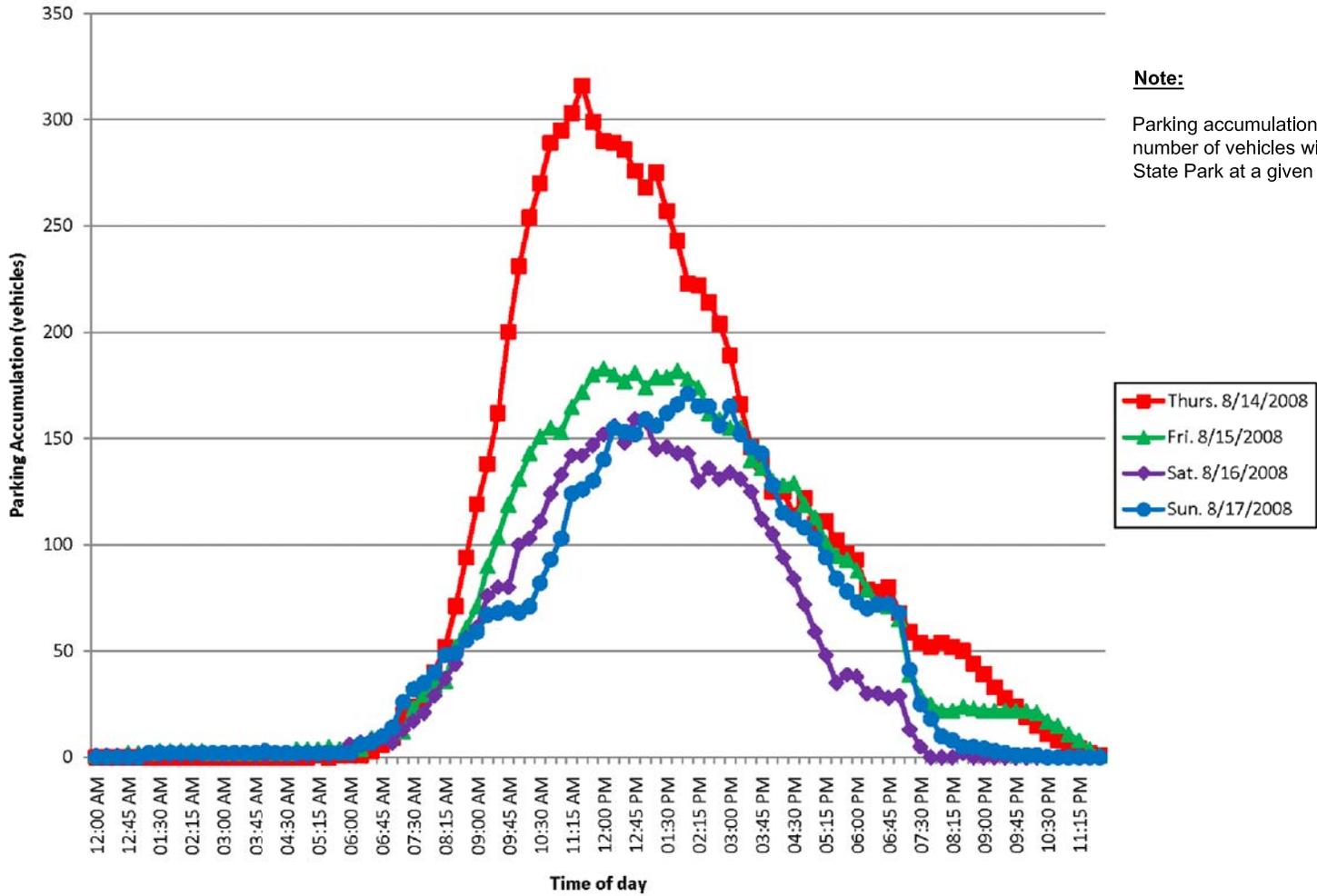
Approximately 1,550 vehicles per day were counted entering and exiting Hā'ena State Park (775 entering, 775 exiting). The heaviest hourly flow of traffic occurred on Thursday, August 14 between 1:15 and 2:15 PM, where 75 vehicles entered and 120 vehicles exited.

At the Hā'ena State Park entrance, the peak hours occurred towards the middle of the day. Near the Princeville Center, more typical commuter peak hours were observed. The traffic count data and respective peak hours are shown in Figure 5.

See Figure 4 for daily parking accumulation over a 5-day period.

⁴ The Keith Companies. V-5.

Haena State Park Vehicle Accumulation



HAENA STATE PARK
MASTER PLAN

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

VEHICLE ACCUMULATION CHART

FIGURE

4



III. SHUTTLE RESEARCH

A. Background

Alternative Transportation in Parks and Public Lands (ATTPL)

In 1997, the Department of the Interior and Department of Transportation signed a Memorandum of Understanding (MOU) to “develop a plan for a comprehensive effort to improve public transportation in the National Parks.”

Pursuant to this goal, the “Alternative Transportation in Parks and Public Lands” program has been initiated in 2005 – with the stated purpose “to enhance the protection of national parks and public lands and to increase the enjoyment of those visiting parks and public lands.” The program authorized \$97 million dollars in funding for Alternative Transportation Systems (ATS) projects between fiscal years 2006 and 2009.

The program – while primarily geared towards National and Tribal parks, also states that “also eligible to apply are state, tribal, or local governmental authorities with jurisdiction over land in the vicinity of an eligible area, acting with the consent of the FLMA, alone or in partnership with an FLMA or governmental or nongovernmental participant.”

Funding is directed only towards either planning (studies to identify the best alternative) or implementation (capital improvements, i.e. equipment purchases) projects.

According to its 2007 program manual the demand for funding is “highly competitive,” with only half of the 2006 applicants having been funded.

Federal Lands Alternative Transportation Systems Study (2001)

This report identified prospective sites for either new or improved ATS at 207 locations throughout the country, including those listed in Table 1 below:



Table 1: Hawai'i ATS Parks Information

	Annual Visitation (2001)	Annual Visitation (2010)	Current ATS	ATS improvements or new ATS proposed?
Haleakalā National Park	1.1 Mil.	1.1 Mil.	None	Yes
Hawai'i Volcanoes National Park	1.5 Mil.	1.3 Mil.	None	Yes
Kalaupapa National Historic Park	75,000	28,546	Plane	Yes
Pohakuloa Heiau National Park	200,000	124,061	None	Yes

It should be noted that ATS measures were recommended for all of the Hawai'i National Parks studied, though none have been implemented to-date for all but Kalaupapa National Historic Park.

The report identified that the following parks offered small or medium busses for use in shuttles as of 2001:

Table 2: Nationwide Shuttle Use at National Parks

Park	Annual Visitation	Existing ATS
Red Rock Canyon National Conservation Area	1,100,000	Small/medium bus
Kenai National Wildlife Refuge	400,000	Small/medium bus
Merritt Island National Wildlife Refuge	500,000	Small/medium bus
Adams National Historic Park	65,000	Historic trolley
Aztec Ruins National Monument	72,000	Small/medium bus
Cabrillo National Monument	1,200,000	Small/medium bus
Chiricahua National Monument	195,000	Small/medium bus
Devil's Postpile National Monument	125,000	Small/medium bus
Eugene O'Neill National Historic Site	5,000	Small/medium bus
Glacier National Park	1,800,000	Small/medium bus
Great Smoky Mountains National Park	10,000,000	Historic trolley
Hot Springs National Park	1,500,000	Historic trolley



Jefferson National Expansion Memorial	1,000,000	Small/medium bus
Kalaupapa National Historic Park	75,000	Small/medium bus
Lyndon B. Johnson National Historic Park	125,000	Small/medium bus
Natchez National Historic Park	41,000	Historic trolley
Organ Pipe Cactus National Park	300,000	Small/medium bus
Pinnacles National Monument	95,000	Small/medium bus
San Juan Island National Historical Park	250,000	Small/medium bus
Scotts Bluff National Monument	150,000	Small/medium bus
Sequoia and Kings Canyon National Parks	1,500,000	Small/medium bus
Shenandoah National Park	1,750,000	Small/medium bus
Tallgrass Prairie National Preserve	100,000	Small/medium bus
Tumacacori National Historic Park	62,500	Small/medium bus
Wolf Trap Farm Park for the Performing Arts	500,000	Small/medium bus

Budgetary and ridership information was not readily available for most of these sites.

B. Case Studies

Zion National Park (Utah)

Zion National Park served 2.7 million visitors in 2010, and implemented a mandatory shuttle system in 2000. In the year 2000, the shuttle transported 2,994 passengers per day. The annual operating costs of the system are estimated to be \$2.5 million, or \$1 per visitor. Capital improvements to initiate the program were \$27.4 million.



Source: <http://www.nps.gov/zion/planyourvisit/shuttle-system.htm>



Kalaeloa Homeless Shelter

Established in June, 2008, this program utilizes 2 full-sized busses and 1 van. The bus provides transit between Kalaeloa and the Kapolei Transit Station and is operational during the following hours:

- Monday-Friday: 7:00 AM-4:30 PM, with a headway of 60 minutes.
- Saturday & Sunday: 8:30 AM-4:00 PM, with a headway of 90 minutes.

The program operates on an annual budget of approximately \$152,000, but is also supplemented by the Hawai'i Helping the Hungry Have Hope (H-5) Program.

Kaua'i Bus System

The Kaua'i Bus system provides six (6) routes – with headways generally at 60 minutes between arrivals. Notable statistics⁵:

- Ridership for March 2011: 51,894 trips
- Annual Budget (2012): \$5,550,482
- Salaries and Wages (2012): \$2,500,464
- Bus Driver Wage: \$19.22/hour
- Hourly costs: \$69/service hour/bus

Speedishuttle

During this investigation, Speedishuttle was found to be the only shuttle operator on Kaua'i providing service between the Airport and hotel destinations. According to its website, the lowest one-way fare was \$9 per passenger.

⁵ County of Kaua'i Transportation Agency, 2012 Budget Presentation (2011). 3,7,9.



TheBus (Honolulu)

Honolulu's TheBus system operates with a \$125 Million subsidy and charges its approximately 73 Million riders \$2.50 each way, with special pricing for monthly, annual, senior, child, and student passes. Its busses carry between 63 and 103 passengers per bus.

The annual subsidy, divided by the number of passengers, equates to approximately \$3.40 for each round-trip ride. Added to the standard bus fare of \$5.00/round trip, the total cost for each round trip is approximately \$8.40, despite the fact that the carrying capacity is at least three times as great as the proposed Shuttle system.



IV. ALTERNATIVES ANALYSIS

As mentioned in the introduction, the proposed Master Plan will be limiting the number of visitors to 900 per day. The following scenarios were considered:

Scenario 1 – Limit the number of visitors to 900 persons per day and reduce the number of parking stalls to 100.

Scenario 2 – Limit the number of visitors to 900 persons per day, and reduce the number of parking stalls to 50. Provide a shuttle service between Princeville and Hā'ena State Park.

Scenario 3 – Limit the number of visitors to 900 persons per day, and eliminate the parking lot. Provide a shuttle service between Princeville and Hā'ena State Park.

Scenario 4 – Do not limit the number of visitors to Hā'ena State Park; reduce the number of parking stalls to 50. Provide a shuttle service between Princeville and Hā'ena State Park.

Scenario 5 – Do not limit the number of visitors to Hā'ena State Park; eliminate the parking lot. Provide a shuttle service between Princeville and Hā'ena State Park.

A. Traffic Analysis

Although some congestion currently occurs within the Hā'ena State Park site, traffic along the roadways leading up to Hā'ena State Park is relatively light. The proposed shuttle system would serve to significantly reduce the number of vehicles destined towards Hā'ena State Park. This impact would improve queuing while reducing the amount of traffic at all of the historic one-lane bridges between the Princeville Center (proposed shuttle terminus) and Hā'ena State Park to below the current 39 percent of capacity. See Table 3 for a comparative analysis of the scenarios during the critical PM peak hour of traffic. The Waipa bridge was analyzed as the measure of capacity because it is the longest one-lane span between Princeville and Hā'ena State Park, and is close to the HDOT count location used in this study.



Table 3: Capacity Analysis of Waipa Bridge During the Critical PM Peak Hour.

Scenario	Bi-directional Flow @ Waipa Bridge (veh./hr.)	Estimated Bridge Capacity (veh./hr.)	Volume-to-Capacity Ratio
Existing	487	1250	39%
Scenario 1	388	1250	31%
Scenario 1 w/carpooling (4 pers./veh.)	358	1250	29%
Scenario 2	323	1250	26%
Scenario 3	319	1250	26%
Scenario 4	337	1250	27%
Scenario 5	333	1250	27%

Note: Bridge capacity estimated based upon Simtraffic Analysis of existing conditions.

While vehicle occupancy rates are estimated to be approximately 2.5 persons/vehicle, “Scenario 1 w/carpooling” assesses the impact of increasing the occupancy to 4 persons per vehicle.

See Figure 5 for traffic volumes with and without the proposed shuttle system (scenario 1).

The shuttle system would also reduce traffic throughout the Hanalei and Princeville Area. However, the access point to the shuttle pick-up/drop-off terminus is anticipated to generate a maximum of 60, 70, 140, and 150 vehicles per hour entering/exiting the site, respectively for shuttle scenarios 2, 3, 4, and 5 (refer to section IV.D. for description). The arrivals are assumed to be relatively uniform as a result of the reservation system.

B. Shuttle (Scenarios 2-5)

It is proposed that the shuttle run between Hā’ena State Park and the Princeville Center with no stops in-between. The number of busses and proposed headways will be scenario-based and discussed in section III.C below.

It is anticipated that if the number of entrants into the park are limited, some form of communication or a reservation system will be needed to ensure against backlogs and long wait times at the shuttle’s entrance point. This could be accomplished through any combination of the following methods:

- **Online reservation system** – Tickets would have to be presented to ride the shuttle; walk-in’s would be accepted, but given last priority.



Ideally, the departure time would be reserved as well to ensure that long delays are prevented while leaving the park as well. The implementation cost of such a system is currently unknown, and will require further study.

- **Bus Driver Fare Collection Method** – Given that an online ticket reservation system might be costly to implement, it is possible that bus drivers could collect the money themselves. However, this would slightly increase the time required at stops. This method is not recommended where entry restrictions are enacted for Hā'ena State Park due to the potential for wasted trips and long wait times at the shuttle terminus.
- **Kiosk Fare Collection Method** – Would require a manned kiosk where ride fares could be collected and tickets distributed. The kiosk's operator could perform other tasks, such as:
 - Gather and disseminate information regarding current shuttle wait times; the information could be provided to hotels, or be managed via a website.
 - Serve as the hub of communication in the event of an emergency or compromised road conditions.

It is assumed that handicapped park entrants will be allowed to park in the parking lot at Hā'ena State Park.

It is recommended that a roadside sign be installed along Kūhiō Highway ahead of the Park and Ride to inform visitors that shuttle service to the park is required and that vehicles will not be allowed to park unless passes are purchased.

This will encourage visitors to plan their trips ahead of arrival and prevent visitors from parking throughout the surrounding neighborhoods and walking in.

C. Engineering Considerations

Due to the narrow and winding roadways between Hā'ena State Park and Princeville, it is recommended that as a maximum, only 15- or 20-passenger



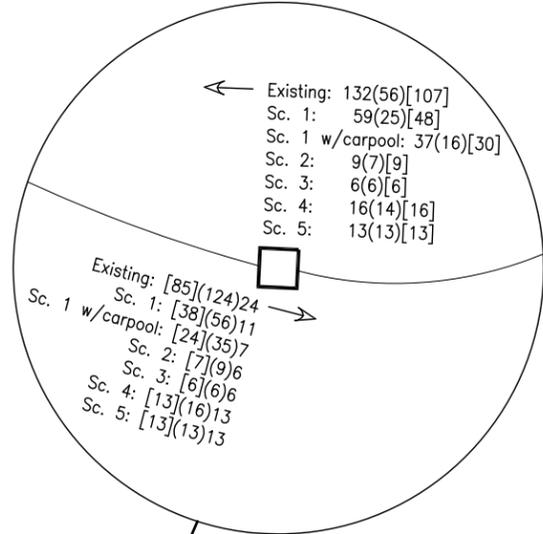
vehicles be used as shuttles, as vehicles of this size were reported to have been used along these routes during five days of filming of the Pirates of the Caribbean: On Stranger Tides movie in 2010. Parking was also available to the east of the County's Hā'ena Park. See Figure 5.

The following information was gleaned from the experience:

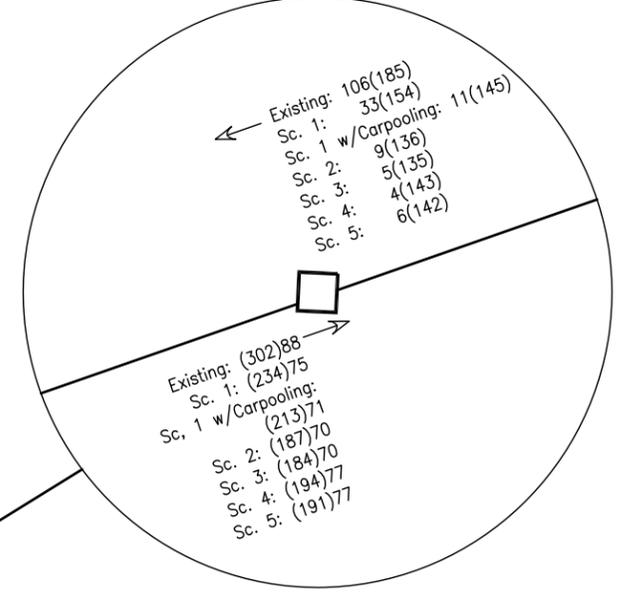
1. Flagmen and road signage were used to help the vehicles in areas streets were narrow and/or curvy. This could denote that there were issues with sight distance and or traversal of narrow segments.
2. Two 15-passenger and one wheelchair-ready 20-passenger van were used to shuttle beachgoers.

It should be noted that topographical survey data was not available at the time of this report, and therefore vehicle navigability was not explicitly considered. Further study and/or test runs may be necessary prior to implementation and could affect vehicle size/model selection.

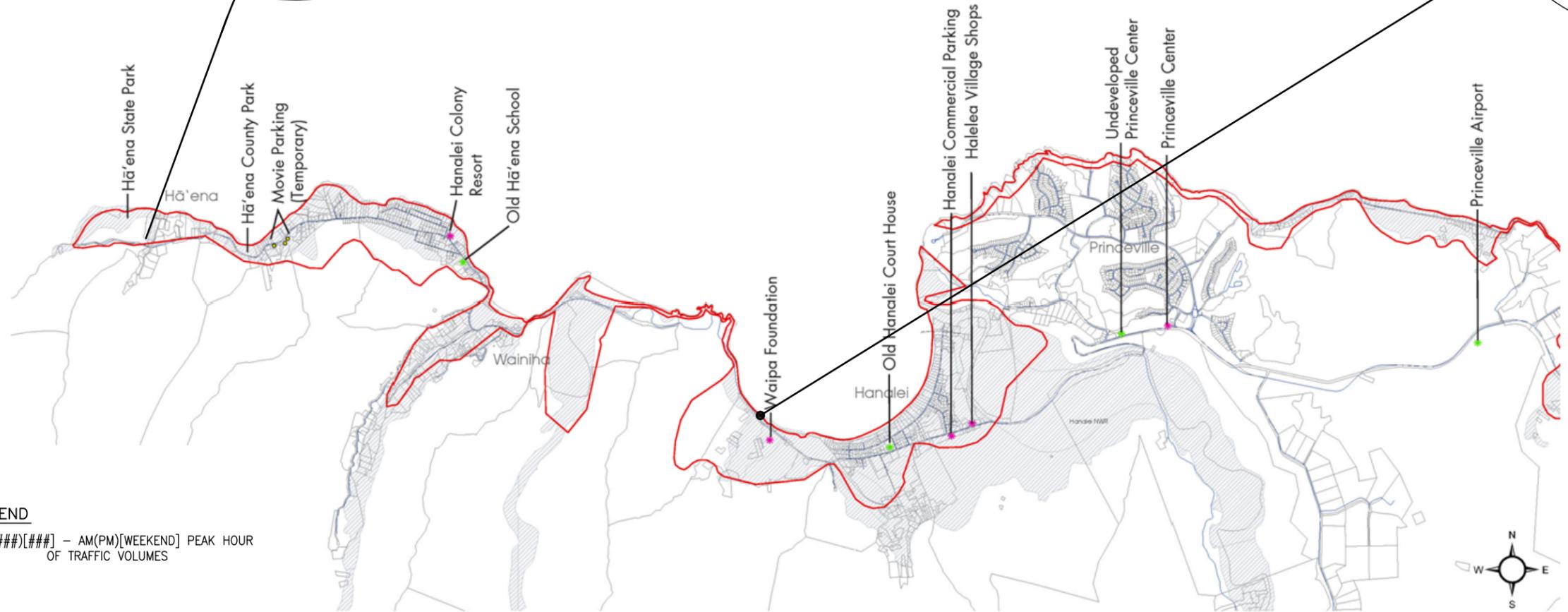
The 12 bridges along the proposed Shuttle route appear to offer sufficient theoretical carrying capacity to accommodate 15-20 passenger shuttles. See Table 4.



PEAK CONDITIONS FOR HAENA STATE PARK
 DATE OF COUNT
 AUGUST 13 2008 – AUGUST 18, 2008
 WEEKDAY AM PEAK HOUR: 9:45AM – 10:45 AM
 WEEKDAY PM PEAK HOUR: 1:15PM – 2:15 PM
 WEEKEND MIDDAY PEAK HOUR: 12:00 PM – 1:00 PM



PEAK CONDITIONS FOR WAIPA BRIDGE
 DATE OF COUNT
 JULY 14, 2011 (SOURCE: HAWAII DOT)
 WEEKDAY AM PEAK HOUR: 8:00 AM – 9:00 AM
 WEEKDAY PM PEAK HOUR: 3:00 PM – 4:00 PM



LEGEND
 ###(###)[###] – AM(PM)[WEEKEND] PEAK HOUR OF TRAFFIC VOLUMES



Table 4: Existing Bridge Capacity

Bridge Name	MP	Type	Year Constructed	Length (ft.)	Load Rating	Load Restriction (lbs.)*
Kaua'i Route 560						
Hanalei River Bridge	1.2	Steel Pratt Truss	1912	113	H-10	30,000
Wai'oli Bridge	3.39	R.C. Flat Slab	1912	90	H-15	16,000
Waipā Bridge	3.91	R.C. Flat Slab	1912	188	H-15	16,000
Waikoko Bridge	4.21	R.C. Flat Slab	1913	45	H-10	16,000
Lumaha'i Bridge	5.88	Cont. Concrete	1968	538	HS 20	32,000
Wainiha Bridge #1	6.4	Steel Truss Deck	1969	42	H10	16,000
Wainiha Bridge #2	6.86	Seel Truss Deck	1973	78	H15	16,000
Wainiha Bridge #3	6.7	Steel Truss Deck	1975	146	H15	16,000
Kaua'i Route 56						
Waiakalua Bridge	20.29	PrSt. Conc. Gdr	1967	39	HS20	40,000
Kīlauea Bridge	22.92	Prestressed Beam	1973	258	HS20	40,000
Structure #4	24.9	RC SlabBr.	1963	50	CHN	40,000
Kalihiwai Bridge	25.01	Prestressed Concrete	1963	798	RW	50,000

*Information provided by the Hawai'i Department of Transportation.

Typical 15- and 20- passenger vans have gross vehicle weights (includes passengers and load) of approximately 10,000 lbs.

D. Shuttle Cost Estimate

Assumptions

- Based on information collected in 2011.
- Per-van cost \$920/day
 - Driver cost: \$600/day
 - Van O&M: \$300/day
 - Van cost (amortized over 5 years): \$20/day
- Administrative costs:
 - Assume 2 positions (1 full-time, and 1 part-time) in addition to a web startup fee (not based upon any research). \$610/day with amortized web startup fee.
 - \$577/8 hours = \$72.12/hour for Administrator (incl. overhead cost).
 - \$33*365 days*5 years = \$60,000 for web startup fee.
- Round trip duration: 70 minutes
- ADA accessibility: It was assumed that an ADA-accessible van would render approximately 4-5 seats unusable. This will vary depending upon the make and model of the van.
- Van capacity: 15 persons (20-person van with reductions for wheelchair capability and partial occupancy).



- Visitor demand: Approximately 2,000 daily (in 1993, the demand was 750,000 persons/year ~ 2055 persons/day)
- Number of cars entering the park per day in 2008: 780 veh/day. (x2.5 = 1950 persons/day)
- Contingency:
 - Chosen based upon judgment. Realistically, there will be slow days and erratic arrivals when smaller revenue will be generated:
 - Rainy day
 - Cold/winter day
 - Economic problems
 - Road closures
 - Etc.
 - Shuttle contracts will often be 3-5 years instead of as-needed.
- No allowance made for park operations outside of administrative position. For example, no lease fees were included for parking at the Princeville Center.
- No explicit knowledge of website operation/administrative costs. This is considered a “best guess.”
- **Note: The estimates provided below portray minimalist costs. The Kaua’i Bus and Speedishuttle both operate with costs of approximately \$20 per round trip, but might have higher contingency costs. Note also that the Kaua’i Busses operate with greater carrying capacity per bus.**

Five scenarios were considered:

Scenario 1: 900-person limit with no shuttle – (No shuttle).

Scenario 2: 900-person limit with 50 stalls and shuttle – Shuttle ridership is estimated to be 775 per day, with the other 125 arriving via vehicles using day-long parking passes; 6 vans necessary to operate continuously to meet this demand.

- Assumes that people will be beholden to the shuttle schedule, and that there will be 10 trips/day (arrivals can only occur during 9 of them).
- Carrying capacity:
 - 6 ADA Vans x 15 persons/trip x 9 trips/day = 810 persons/day > 775 persons/day requirement.
- Cost

○ 6 vans @ \$920/day	=	\$5,520
○ Administrator w/web startup @ \$610/day	=	\$610
○ Total	=	\$6,130/day
○ Per rider @ 775 riders	=	\$7.91/person/day
○ With 30% contingency for low or sporadic ridership, etc.	=	\$10.28 /person/day



Scenario 3: 900-person limit without parking lot and with shuttle – Shuttle ridership is estimated to be 900 per day; 7 vans necessary to operate continuously to meet this demand.

- Assumes that people will be beholden to the shuttle schedule, and that there will be 10 trips/day (arrivals can only occur during 9 of them).
- Carrying capacity:
 - 7 ADA Vans x 15 persons/trip x 9 trips/day = 945 persons/day > 900 persons/day requirement.
- Cost

○ 7 vans @ \$920/day	=	\$6,440
○ Administrator w/web startup @ \$610/day	=	\$610
○ Total	=	\$7,050/day
○ Per rider @ 900 riders	=	\$7.83/person/day
○ With 30% contingency for low or sporadic ridership, etc.	=	\$10.18 /person/day

Scenario 4: Unconstrained with 50 stalls and shuttle – It is estimated that approximately 2,000 visitors per day visit Hā’ena State Park. During our field investigation, 775 vehicles per day were counted entering the park. Fourteen vans would be necessary to operate continuously in order to meet this demand.

- Assumes that the number of visitors remains constant at 2,000/day minus 125 persons that arrive by vehicle, but will be beholden to the bus schedule; no additional capacity allowed for peak demand. In essence, this is $1875/135 = 14$ vans.
- Cost

○ 14 vans @ \$920/day	=	\$12,880
○ Administrator w/web startup @ \$610/day	=	\$610
○ Total	=	\$13,490/day
○ Per rider @ 1,875 riders	=	\$7.19/person/day
○ With 50% contingency for low or sporadic ridership, etc. (higher due to increased demand volatility)	=	\$10.79/person/day

Scenario 5: Unconstrained without parking lot and with shuttle – It is estimated that approximately 2,000 visitors per day visit Hā’ena State Park. During our field investigation, 775 vehicles per day were counted entering the park. Fifteen (15) vans would be necessary to operate continuously in order to meet this demand.

- Assumes that the number of visitors remains constant at 2,000/day and will be beholden to the bus schedule; no additional capacity allowed for peak demand. In essence, this is $2000/135 = 15$ vans.



- Cost
 - 15 vans @ \$920/day = \$13,800
 - Administrator w/web startup = \$610
@ \$610/day
 - Total = \$14,410/day
 - Per rider @ 2,000 riders = \$7.21/person/day
 - With 50% contingency for low or = **\$10.80/person/day**
sporadic ridership, etc. (higher due to increased demand volatility)

Table 5 compares the estimated costs to those of other transit services.



Table 5: Comparison of Estimated Transit Costs

Name	Roundtrip Cost/Passenger	Cost/Bus/12-hour
HSP Shuttle -- Scenario 2 (900-Person Limit with 50 Stalls)	\$ 10.28	\$ 920.00
HSP Shuttle -- Scenario 3 (900-Person Limit without Parking Lot)	\$ 10.18	\$ 920.00
HSP Shuttle -- Scenario 4 (Unconstrained with 50 stalls)	\$ 10.79	\$ 920.00
HSP Shuttle -- Scenario 5 (Unconstrained without Parking Lot)	\$ 10.80	\$ 920.00
Kaua'i Bus	\$ 11.41*	\$ 828.00
SpeediShuttle	\$ 18.00	\$ 1305.99*
TheBus	\$ 8.40	\$ 609.46*

*Costs derived based on a ratio between Hā'ena State Park shuttle scenarios versus 12-hour cost per bus.



V. CONCLUSIONS

Traffic along Kūhiō Highway along the roads leading to Hā'ena State Park is relatively light. However, minor queuing exists at the 1-way historic bridges between Princeville and Hā'ena State Park. It is estimated that the bridges operate at approximately 39 percent of capacity.

The Hā'ena State Park Master plan seeks to:

1. Limit the number of daily visitors to 900 per day.
2. Reduce the number of on-site parking stalls to a maximum of 100.
3. Consider providing a shuttle between Hā'ena State Park and Princeville as an alternative.

Traffic Analysis

It is anticipated that the recommended improvements will reduce daily traffic through the 1-way historic bridges by as much as 35 percent during the critical PM peak hour of traffic, and improve operations along the 1-way historic bridges. Refer to Table 3 for a comparative analysis of the different scenarios.

Shuttle

Implementation of Scenarios 2-5 would require the creation of a shuttle service between Princeville and Hā'ena State Park.

The shuttle would consist of 20-passenger vans that would operate continuously between 6:00 AM and 6:00 PM, with a round-trip duration of 70 minutes. The cost of this service is estimated at between 10 and 11 dollars per round trip. This is consistent with the estimated \$11.41 person/round trip cost for the Kaua'i Bus.

It would appear that all of the bridges along the shuttle route would have adequate capacity to handle the gross vehicle weights.

The effect of the shuttle and vehicle access restrictions to the park would be a reduction in traffic along Kūhiō Highway.



VI. RECOMMENDATIONS

1. Implement scenarios 1, 2, or 3, described below. Options 4 and 5 are not recommended as they do not meet the objective of limiting the number of visitor arrivals to 900 persons/day.

Scenario 1: 900-person limit with 100 stalls without shuttle – It is recommended that parking passes be issued and that carpooling be encouraged.

Scenario 2: 900-person limit with 50 stalls and shuttle – Shuttle ridership is estimated to be 775 per day, with the other 125 arriving via vehicles using day-long parking passes; 6 vans necessary to operate continuously to meet this demand.

Scenario 3: 900-person limit without parking lot and with shuttle – Shuttle ridership is estimated to be 900 per day; 7 vans necessary to operate continuously to meet this demand.

2. Seek federal funding (if available) for the capital improvement costs.
3. (Scenarios 2-3) Install signage at the Princeville Park ‘n Ride location to inform visitors that they must catch the shuttle to visit Hā’ena State Park unless they have obtained a parking pass in advance. Recommend that no entry tickets or parking passes be distributed at the park.
4. Require all persons, even those with annual passes to obtain entry ticket prior to entering Hā’ena State Park. This can be done through receipts, wristbands, or ticket stubs. This will prevent visitors from parking in surrounding communities or other nearby parking lots.



VII. REFERENCES

1. County of Kaua'i Planning Department, Kaua'i General Plan, 2000.
2. County of Kaua'i Transportation Agency, 2012 Budget Presentation, 2011.
3. FHWA Work Zone, Traffic Analysis Tools Volume IX: Work Zone Modeling and Simulation – A Guide for Analysis, (date unknown).
4. Hawaii Department of Transportation, Kuhio Highway (Route 560) Historic Roadway Corridor Plan, 2005.
5. The Keith Companies, Master Plan and Draft Environmental Impact Statement, 2001.
6. Transportation Research Board, HCM2010: Highway Capacity Manual, 2010.



APPENDIX A

TRAFFIC COUNT DATA

Number	Date	Time	Wed.		Thu.		Fri. (Holiday)		Sat.		Sun.		Mon.	
			8/13/2008		8/14/2008		8/15/2008		8/16/2008		8/17/2008		8/18/2008	
			Enter (Channel 1)	Exit	Enter (Channel 1)	Exit	Enter (Channel 1)	Exit	Enter (Channel 1)	Exit	Enter (Channel 1)	Exit	Enter (Channel 1)	Exit
		12:00 AM			0	0	0	0	0	0	0	0	1	1
		12:15 AM			0	0	0	0	0	0	0	0	0	0
		12:30 AM			0	0	0	0	0	0	0	0	0	0
		12:45 AM			0	0	1	0	0	1	0	0	0	0
		01:00 AM			0	0	0	0	0	0	0	0	0	0
		01:15 AM			0	0	0	0	0	0	2	0	0	0
		01:30 AM			0	0	1	0	0	0	0	0	0	0
		01:45 AM			0	0	0	0	0	0	0	0	0	0
		02:00 AM			0	0	0	0	0	0	0	0	0	0
		02:15 AM			0	0	0	0	0	0	0	0	0	0
		02:30 AM			0	0	0	0	0	0	0	0	0	0
		02:45 AM			0	0	0	1	0	0	0	0	0	0
		03:00 AM			0	0	0	0	0	0	0	0	0	0
		03:15 AM			0	0	0	0	0	0	0	0	0	0
		03:30 AM			0	0	0	0	0	0	0	0	0	0
		03:45 AM			0	0	0	0	0	0	0	0	0	0
		04:00 AM			0	0	0	0	0	0	1	0	0	0
		04:15 AM			0	0	0	0	0	0	1	0	0	0
		04:30 AM			0	0	0	0	0	0	0	0	0	0
		04:45 AM			0	0	3	1	0	0	0	0	0	0
		05:00 AM			0	1	0	0	0	1	0	0	0	0
		05:15 AM			1	0	0	0	0	1	0	0	0	0
		05:30 AM			0	1	1	0	0	0	0	0	0	0
		05:45 AM			2	1	0	1	1	0	0	0	0	1
		06:00 AM			1	1	1	0	4	0	1	1	4	0
		06:15 AM			1	1	1	2	1	0	4	0	0	0
		06:30 AM			3	1	5	0	3	2	1	0	1	0
		06:45 AM			4	1	1	0	2	1	3	0	2	1
		07:00 AM			4	1	3	1	2	4	4	0	4	0
		07:15 AM			11	0	2	2	6	0	12	0	3	5
		07:30 AM			6	2	16	5	4	0	6	0	7	2
		07:45 AM			6	2	12	5	4	0	3	0	7	4
		08:00 AM			12	0	9	5	10	2	8	3	6	2
		08:15 AM			19	7	8	6	13	5	11	3	11	6
		08:30 AM			19	0	18	2	9	2	6	5	11	7
		08:45 AM			23	0	14	5	19	7	8	2	7	3
		09:00 AM			25	0	17	7	9	4	8	4	17	2
		09:15 AM			22	3	23	4	23	8	15	7	13	13
		09:30 AM			26	2	18	4	14	10	8	7	33	7
		09:45 AM			38	0	21	6	10	10	8	6		
		10:00 AM			38	7	22	10	30	10	10	12		
1	8/13/2008	10:15 AM	25	10	27	4	23	11	17	14	16	13		
2	8/13/2008	10:30 AM	27	11	29	13	15	7	18	10	21	10		
3	8/13/2008	10:45 AM	31	16	29	10	15	11	26	13	22	11		
4	8/13/2008	11:00 AM	31	23	28	22	18	20	22	13	16	6		
5	8/13/2008	11:15 AM	21	27	22	14	29	17	32	23	33	12		
6	8/13/2008	11:30 AM	21	24	33	20	23	16	18	18	24	22		
7	8/13/2008	11:45 AM	18	25	14	31	19	11	20	15	17	13		
8	8/13/2008	12:00 PM	20	18	22	31	23	20	26	21	27	17		
9	8/13/2008	12:15 PM	21	18	13	14	14	17	26	22	31	16		
10	8/13/2008	12:30 PM	21	20	18	21	18	21	20	28	24	26		
11	8/13/2008	12:45 PM	13	16	19	29	21	17	25	14	25	26		
12	8/13/2008	01:00 PM	26	29	18	26	12	19	24	25	25	18		
13	8/13/2008	01:15 PM	24	25	31	24	28	23	14	27	18	21		
14	8/13/2008	01:30 PM	19	15	14	32	15	15	18	17	27	21		
15	8/13/2008	01:45 PM	19	32	15	29	22	19	23	26	23	19		
16	8/13/2008	02:00 PM	21	27	15	35	23	27	27	27	27	22		
17	8/13/2008	02:15 PM	16	23	21	22	13	17	5	18	18	24		
18	8/13/2008	02:30 PM	16	23	15	23	10	22	26	20	18	18		
19	8/13/2008	02:45 PM	14	12	18	28	15	18	19	24	19	28		
20	8/13/2008	03:00 PM	18	26	11	26	15	19	19	16	29	20		
21	8/13/2008	03:15 PM	12	19	11	34	18	18	14	17	16	29		
22	8/13/2008	03:30 PM	17	30	16	36	11	26	18	24	19	25		
23	8/13/2008	03:45 PM	20	28	17	24	9	13	12	25	17	20		
24	8/13/2008	04:00 PM	12	25	4	18	12	18	18	25	6	21		
25	8/13/2008	04:15 PM	8	26	15	15	16	18	13	24	11	24		
26	8/13/2008	04:30 PM	16	26	8	19	12	11	20	30	12	15		
27	8/13/2008	04:45 PM	12	28	18	10	13	23	5	17	17	21		
28	8/13/2008	05:00 PM	10	14	9	21	13	19	8	21	14	19		
29	8/13/2008	05:15 PM	5	18	11	10	7	19	12	23	8	17		
30	8/13/2008	05:30 PM	11	12	6	15	10	16	3	16	11	21		
31	8/13/2008	05:45 PM	9	8	8	14	11	13	9	5	7	13		
32	8/13/2008	06:00 PM	14	9	4	7	5	10	7	8	12	17		
33	8/13/2008	06:15 PM	5	5	6	20	11	20	6	14	10	13		
34	8/13/2008	06:30 PM	10	1	7	8	9	16	5	5	12	10		
35	8/13/2008	06:45 PM	11	6	6	4	9	10	6	8	12	12		
36	8/13/2008	07:00 PM	12	2	5	17	4	10	6	5	7	11		
37	8/13/2008	07:15 PM	7	21	0	9	4	30	3	19	3	30		
38	8/13/2008	07:30 PM	2	22	2	7	1	11	1	9	1	17		
39	8/13/2008	07:45 PM	0	4	0	2	3	7	0	5	3	10		
40	8/13/2008	08:00 PM	0	1	3	1	0	3	2	2	0	8		
41	8/13/2008	08:15 PM	0	0	0	2	0	0	0	3	1	3		
42	8/13/2008	08:30 PM	1	1	0	2	2	0	3	1	0	3		
43	8/13/2008	08:45 PM	0	0	0	0	0	1	0	3	1	1		
44	8/13/2008	09:00 PM	0	0	1	0	0	1	0	0	0	1		
45	8/13/2008	09:15 PM	0	0	0	0	0	0	1	0	0	0		
46	8/13/2008	09:30 PM	0	0	0	0	1	1	0	0	0	0		
47	8/13/2008	09:45 PM	0	0	1	0	0	0	0	0	0	0		
48	8/13/2008	10:00 PM	0	0	0	0	1	1	1	1	1	0		
49	8/13/2008	10:15 PM	0	0	0	0	0	1	0	0	0	0		
50	8/13/2008	10:30 PM	0	0	0	1	0	2	0	0	0	1		
51	8/13/2008	10:45 PM	0	0	0	0	2	1	0	1	0	0		
52	8/13/2008	11:00 PM	0	0	0	0	0	2	0	0	0	0		
53	8/13/2008	11:15 PM	0	0	0	0	1	1	0	0	0	0		
54	8/13/2008	11:30 PM	0	0	0	0	0	0	0	2	0	0		
55	8/13/2008	11:45 PM	0	0	0	0	0	0	0	0	0	0		
Daily Total					831	781	753	736	761	773	780	776		
					1612		1489		1534		1556			



APPENDIX B

CAPACITY ANALYSIS BASIS

WORK ZONE MOBILITY AND SAFETY PROGRAM

**Traffic Analysis Tools Volume IX: Work Zone Modeling and Simulation
A Guide for Analysts**

Wisconsin DOT Work Zone Signal Optimization

Wisconsin DOT Work Zone Signal Optimization	
Work Zone Characteristics	
Transportation Analysis:	
Approach	Traffic Signal Optimization
Modeling Tools	Synchro/SimTraffic
Work Zones:	
Type	Type I and IV
Network Configuration	Isolated
Geographic Scale:	
Work Zone Size	Small
Analysis Area	Local

Use of Signal Optimization Tools in Work Zone Traffic Analysis

Signal optimization tools such as Passer, Synchro/SimTraffic, and Transyt 7F have a variety of applications for work zone analysis, especially in urban and suburban environments. Broadly speaking, these applications can be grouped in three categories:

1. Preparing timing plans for temporary signals used to manage traffic within a construction site.
2. Adjusting signal timing on corridors that are directly impacted by construction.
3. Adjusting signal timing to improve progression on corridors that serve as alternate routes or detours around a work zone.

Temporary Signals. Figure 29 shows an example of the use of Synchro/SimTraffic to optimize the timing of a temporary traffic signal. In this case, two-way one-lane operation will be in effect during a bridge construction project (in other words, eastbound and westbound traffic will be sharing a single lane). Synchro's Ring/Barrier Editor was used to create a configuration that mimics the operation of the temporary signal by alternately sending eastbound and westbound traffic along the restricted section. Synchro's signal optimization algorithm was then used to establish a timing plan that minimizes traffic delays. The analysis also provides an indication of the extent of queuing on the approaches to the one-lane segment, which is useful in determining when access to side roads will be blocked by queued traffic.

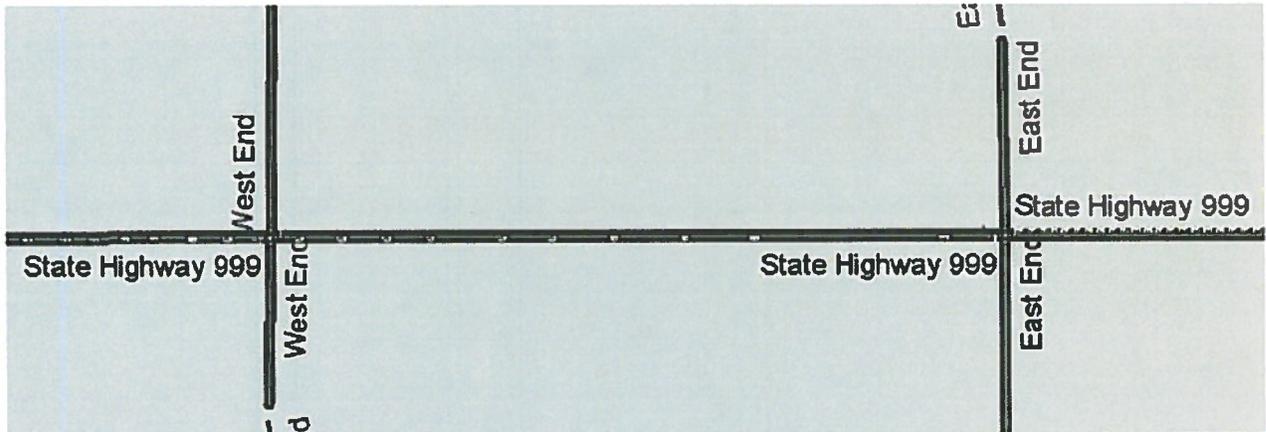
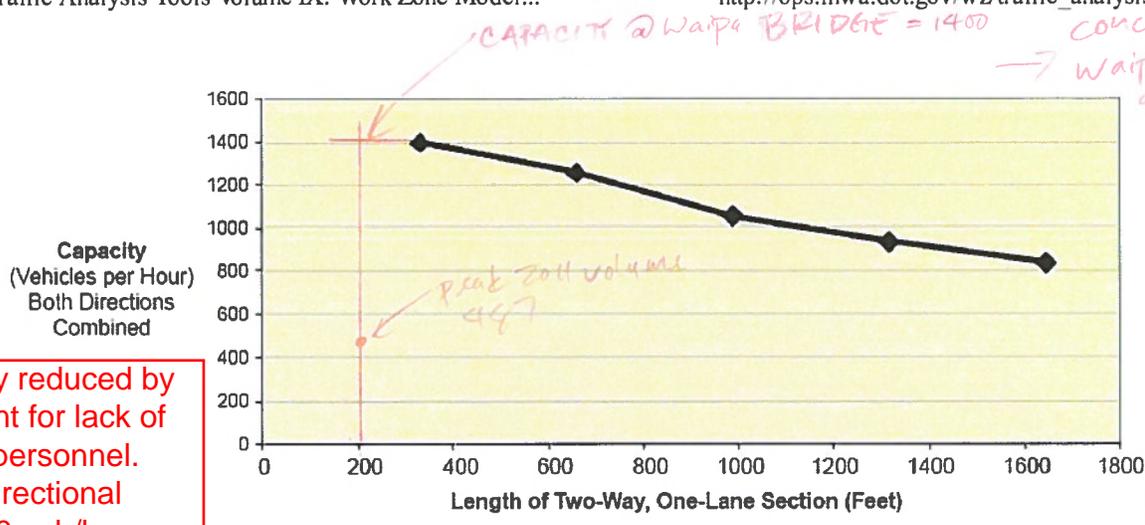


Figure 29 Synchro/SimTraffic Model of a Work Zone with Two-Way One-Lane Operation

*Note the westbound vehicles queuing while eastbound traffic is allowed to proceed.

This method can also be used to evaluate the impact of work zone length on capacity and throughput for sites with two-way one-lane operations. As shown Figure 30, the capacity of two-way one-lane sections is sensitive to the length of the restricted section. Therefore, in many cases there is a trade-off between what is convenient for construction operations and what is acceptable in terms of traffic impact.



Note: Capacity reduced by 10% to account for lack of traffic control personnel. Assumed bi-directional Capacity: 1250 veh/hr.

Figure 30 Capacity vs Length for Two-Way One-Lane Flagging Operations

Adjusting Timing on Corridors Affected by Construction. Normally, signal timing plans are developed based on the assumption that all of the lanes exist at each intersection will be available for traffic to use. This assumption may not be true during construction. For example, take an intersection where two of the three lanes have been closed to traffic. In this case, all traffic is directed to use the right lane, severely impacting the capacity of the signalized intersection.

In such situations, to avoid excessive queuing and delay it may be necessary to make fundamental changes in the signal timing at individual intersections along an entire corridor. In the example shown in the photo, it may be desirable to increase the cycle length to compensate for the fact that left, thru, and right turning vehicles are sharing a single lane. To maintain good traffic progression along the corridor, signal offsets may need to be adjusted to account for reduced travel speeds. In addition, temporary changes in access to business properties along the corridor may affect turn patterns, requiring adjustments in signal phasing and splits. The use of a signal optimization tool allows all of these variables to be addressed comprehensively.

Adjusting Timing on Parallel Routes. The Daniel Webster Hoan Memorial Bridge carries Interstate 794 over the Milwaukee River in Milwaukee, Wisconsin. As shown in Figure 31, on December 13, 2000 there was a structural failure on one span of the bridge. The failure required immediate lane closures, resulting diversion of all traffic to other routes.

To accommodate increased traffic on the arterial street that runs directly parallel to I-794, the City of Milwaukee used signal optimization tools to prepare a revised traffic signal timing plan for the Kinnickinnic Avenue/First Street corridor (WIS 32). The revised signal timing plan was implemented less than 48 hours after the incident occurred (and at minimal cost). It increased the green time allocated to north-south thru traffic, and reduced the amount of time allocated to side streets. The revised signal timing is believed to have been instrumental in reducing traffic delays and minimizing the overall impacts of the bridge failure and subsequent reconstruction activities.

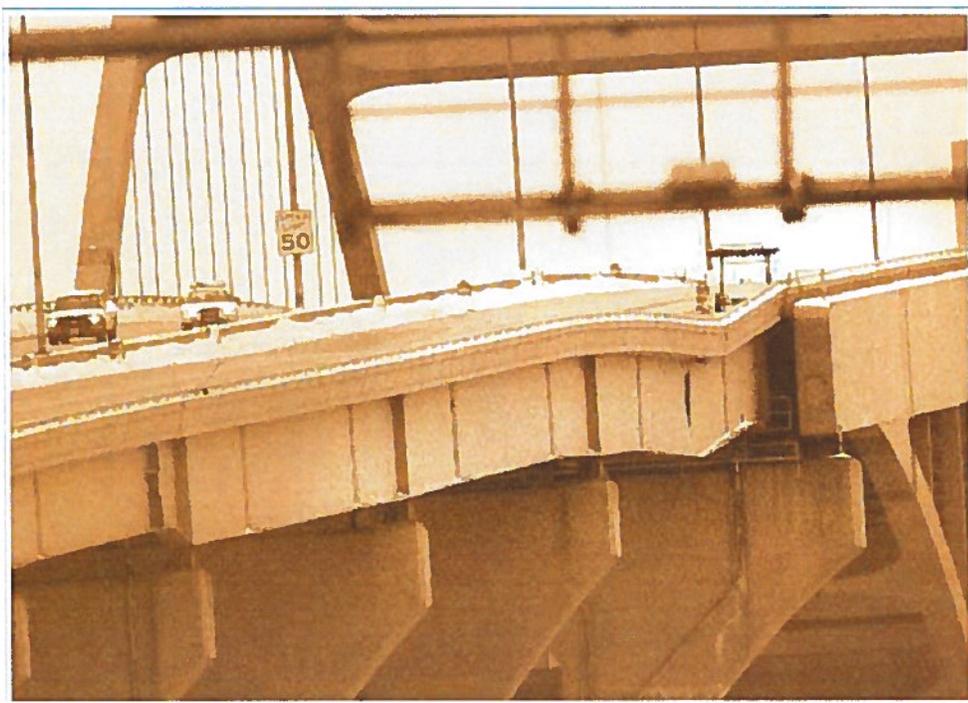


Figure 31 Structural failure on Daniel Webster Hoan Memorial Bridge, December 13, 2000.

[Table of Contents](#) | [Previous](#) | [Next](#)

Run Date: 2012/05/04

Hawaii Department of Transportation
Highways Division Highways Planning Survey Section

2011 Program Count - Summary

Site ID: B73056000391
Functional Class: RURAL:MAJOR COLLECTOR
Location: Kuhio Hwy b/t Waipa BR_end of stripe

Town: Kauai
Count Type: CLASS

DIR 1: +MP DIR 2: -MP
Counter Type: Tube

Final AADT: 0
Route No: 560

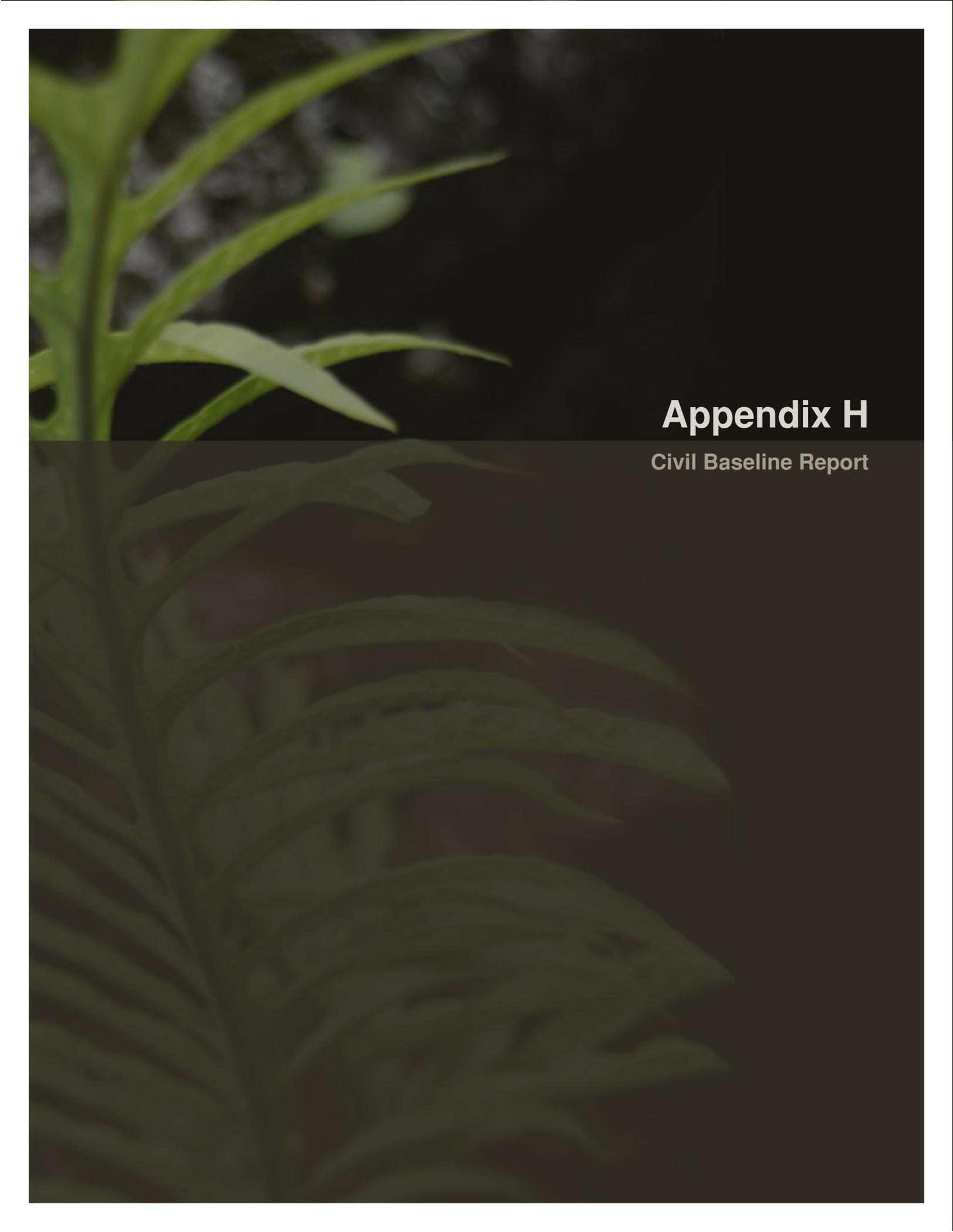
TIME-AM	DIR 1	DIR 2	TOTAL	TIME-AM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL	TIME-PM	DIR 1	DIR 2	TOTAL
DATE : 07/14/2011															
12:00-12:15	4	1	5	06:00-06:15	6	4	10	12:00-12:15	57	36	93	06:00-06:15	30	39	69
12:15-12:30	3	1	4	06:15-06:30	6	4	10	12:15-12:30	52	42	94	06:15-06:30	37	34	71
12:30-12:45	1	2	3	06:30-06:45	9	13	22	12:30-12:45	45	50	95	06:30-06:45	31	32	63
12:45-01:00	1	1	2	06:45-07:00	13	15	28	12:45-01:00	47	41	88	06:45-07:00	23	27	50
01:00-01:15	2	0	2	07:00-07:15	20	12	32	01:00-01:15	62	41	103	07:00-07:15	18	23	41
01:15-01:30	1	1	2	07:15-07:30	8	18	26	01:15-01:30	53	37	90	07:15-07:30	27	21	48
01:30-01:45	0	0	0	07:30-07:45	14	22	36	01:30-01:45	57	36	93	07:30-07:45	13	18	31
01:45-02:00	0	2	2	07:45-08:00	22	29	51	01:45-02:00	47	57	104	07:45-08:00	17	26	43
02:00-02:15	1	1	2	08:00-08:15	28	19	47	02:00-02:15	43	63	106	08:00-08:15	16	21	37
02:15-02:30	3	1	4	08:15-08:30	19	15	34	02:15-02:30	53	57	110	08:15-08:30	17	17	34
02:30-02:45	1	0	1	08:30-08:45	23	27	50	02:30-02:45	58	52	110	08:30-08:45	20	8	28
02:45-03:00	1	0	1	08:45-09:00	36	27	63	02:45-03:00	50	54	104	08:45-09:00	11	8	19
03:00-03:15	0	0	0	09:00-09:15	45	29	74	03:00-03:15	46	67	113	09:00-09:15	8	12	20
03:15-03:30	0	1	1	09:15-09:30	42	20	62	03:15-03:30	44	67	111	09:15-09:30	11	10	21
03:30-03:45	1	0	1	09:30-09:45	46	23	69	03:30-03:45	55	94	149	09:30-09:45	8	1	9
03:45-04:00	0	0	0	09:45-10:00	52	37	89	03:45-04:00	40	74	114	09:45-10:00	10	6	16
04:00-04:15	1	0	1	10:00-10:15	35	34	69	04:00-04:15	34	68	102	10:00-10:15	14	5	19
04:15-04:30	0	1	1	10:15-10:30	46	21	67	04:15-04:30	32	61	93	10:15-10:30	8	5	13
04:30-04:45	0	2	2	10:30-10:45	55	26	81	04:30-04:45	51	53	104	10:30-10:45	6	3	9
04:45-05:00	0	1	1	10:45-11:00	38	36	74	04:45-05:00	26	56	82	10:45-11:00	6	3	9
05:00-05:15	2	3	5	11:00-11:15	51	46	97	05:00-05:15	28	57	85	11:00-11:15	9	1	10
05:15-05:30	1	7	8	11:15-11:30	69	39	108	05:15-05:30	40	59	99	11:15-11:30	9	0	9
05:30-05:45	2	1	3	11:30-11:45	50	39	89	05:30-05:45	41	43	84	11:30-11:45	9	1	10
05:45-06:00	3	4	7	11:45-12:00	43	38	81	05:45-06:00	37	51	88	11:45-12:00	7	4	11

AM COMMUTER PERIOD (05:00-09:00)	DIR 1	DIR 2	PM COMMUTER PERIOD (15:00-19:00)	DIR 1	DIR 2
TWO DIRECTIONAL PEAK		TWO DIRECTIONAL PEAK			
AM - PEAK HR TIME		08:00 AM to 09:00 AM		PM - PEAK HR TIME	
AM - PEAK HR VOLUME		106	88	185	302
AM - K FACTOR (%)			4.28		10.75
AM - D (%)		54.64	45.36	37.99	62.01
DIRECTIONAL PEAK		DIRECTIONAL PEAK			
AM - PEAK HR TIME		08:00 AM to 09:00 AM	07:45 AM to 08:45 AM	03:00 PM to 04:00 PM	03:15 PM to 04:15 PM
AM - PEAK HR VOLUME		106	90	185	303

AM PERIOD (00:00-12:00)	PM PERIOD (12:00-24:00)
TWO DIRECTIONAL PEAK	
AM - PEAK HR TIME	
11:00 AM to 12:00 PM	
AM - PEAK HR VOLUME	
213	162
AM - K FACTOR (%)	
	8.28
AM - D (%)	
56.80	43.20
TWO DIRECTIONAL PEAK	
PM - PEAK HR TIME	
03:00 PM to 04:00 PM	
PM - PEAK HR VOLUME	
185	302
PM - K FACTOR (%)	
	10.75
PM - D (%)	
37.99	62.01

Peak Bi-directional Volume

NON-COMMUTER PERIOD (09:00-15:00)	6-HR, 12-HR, 24-HR PERIODS	DIR 1	DIR 2	Total	
TWO DIRECTIONAL PEAK					
PEAK HR TIME		01:45 PM to 02:45 PM			
PEAK HR VOLUME		201	229	430	
DIRECTIONAL PEAK					
PEAK HR TIME		01:00 PM to 02:00 PM			
PEAK HR VOLUME		219	229		
		AM 6-HR PERIOD (06:00-12:00)			
		776			
		AM 12-HR PERIOD (00:00-12:00)			
		804			
		PM 6-HR PERIOD (12:00-18:00)			
		1,098			
		PM 12-HR PERIOD (12:00-24:00)			
		1,463			
		24 HOUR PERIOD			
		2,267			
		D (%)			
		50.03			



Appendix H

Civil Baseline Report

I. INTRODUCTION

A. Project Location and Description

Haena State Park is located on the north shore of Kauai, at the end of Kuhio Highway. It is bounded by the Na Pali Cliffs to the west, the base of Makana to the south, Limahuli Stream to the east and the Pacific Ocean to the north.

There are three (3) TMK parcels within the Park boundary. The parcel north of Kuhio Highway is identified by TMK 5-9-008:001 and encompasses approximately 52 acres. South of Kuhio Highway, parcels TMK 5-9-001:022 and 025 encompass approximately 180 acres.

The parcels identified by TMK 5-9-008:001 and 5-9-001:022, are owned by the State of Hawaii. The third parcel, TMK 5-9-001:025 contains the Kauluapaoa Heiau and Keahualaka hula platform, is owned by the County of Kauai and managed by the State Historic Preservation Division (SHPD), Department of Land and Natural Resources (DLNR). Haena State Park utilizes approximately 65.7 acres of the coastal area for recreational uses.

The Park experiences heavy usage throughout the week and is considered one of the highest utilized parks in the State. It is used by the public for picnics, snorkeling, swimming and hiking. It is estimated approximately 708,400 visitors experienced the many geological and cultural features of this unique park in 2007.

II. EXISTING SITE CONDITIONS

A. Soils

Based on Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, five soil classes are present at Haena State Park. Its western coastline consists of Mokuleia fine sandy loam (Mr), while its northern coast is defined as Beach (BS). Marsh (MZ), Hanalei silty clay (HnA) and Hanalei silty clay with deep water table (HrB) are present further inland.

Beach soil extends up to 150 feet inland from the northern coast. This soil consists of light-colored sands resulting from the breakdown of coral and seashells.

Mokuleia fine sandy loam extends up to 800 feet inland from the western coast. Its surface layer contains 16 inches of fine sandy loam and its subsurface contains 34 to 48 inches of single-grain and loamy sand. This soil exhibits moderately rapid permeability in its surface layer and rapid permeability in its subsurface.

Marsh soil is present approximately 800 feet inland from the western coast of Haena State park. This soil type covers small, low-elevation areas where water

stands at the ground surface. Grasses, bulrushes and other herbaceous plants thrive in these areas.

Hanalei silty clay (HnA) soil is present in the western and inland portions of the Park. Its surface layer contains 13 inches of dark-gray, silty clay, of which the top 10 inches contain brown and red mottles. Its subsoil contains 13 inches of dark-gray and dark grayish-brown silty clay loam. The water table in this soil type is typically less than 3 feet below the ground surface. This soil experiences moderate permeability and is strongly acidic in its surface layer.

Hanalei silty clay with deep water table is present in the eastern and inland portions of the Park. This soil is similar to Hanalei silty clay; however it contains fewer mottles and is located in areas where the water table is greater than 3 feet below the ground surface.

Soil test borings and percolation tests were not performed specifically for this preliminary engineering report. Instead, the previously performed percolation test results at the existing comfort station are referenced to preliminarily size the disposal fields. A percolation rate of 4.14 minutes/inch was obtained in December 2009 for the constructed wetland project at the existing Ke'e comfort station.

B. Topography

The ground elevation in the area north of Kuhio Highway ranges from approximately 70.0 feet above mean sea level (MSL) at the entrance to the Park to sea level at the coast line. This area is where the majority of recreational and cultural activity and usage is currently occurring as the area is relatively level.

The ground elevation south of the Kuhio Highway rises sharply with steep slopes and forms the cliffs of Na Pali, beyond the shoulder of the roadway.

The 100-year base flood elevation ranges from sea level to elevation 24.0 feet above MSL.

C. Site Access, Roadways, Parking and Safety

Kuhio Highway is owned by the State of Hawaii, Department of Transportation (DOT) and provides the only access to and through Haena State Park. Prior to entering the Park, Kuhio Highway is a two lane roadway with gravel and AC pavement shoulders. Entry to the park requires crossing Limahuli Stream over a single lane, 10-foot wide x 12-foot long x 12-inch thick concrete bridge. Past the bridge, Kuhio Highway again becomes a two lane road, measuring approximately 24 feet wide, and continues approximately 0.5 miles to the end of the park at Ke'e Beach. The actual pavement structure within the roadway is not known, but is assumed to be a minimum of 2-1/2 inches of AC pavement over 8 inches of base course. It is in fair condition with some cracking and potholes in concentrated areas.

The paved shoulder lanes were added in 1985 under DOT Project No. 560A-01-86M, which resurfaced approximately 1.43 miles of Kuhio Highway. The guardrails were added in 2002 under DOT Project No. 560A-03-99 because the steep slopes on either side of Kuhio Highway and winding roads posed a threat to driver's safety. Kuhio Highway continues in an east-west direction through the southern portion of the Park until its termination at Ke'e Beach. The 2.0 foot shoulder pavement structure consists of a minimum of 1.5 inches of AC pavement over 6 inches of base course.



Figure 1: Haena State Park Entrance Crossing Limahuli Stream

Currently, pedestrian access to Haena State Park is limited. Within the Park, there are no pedestrian walkways along Kuhio Highway. Pedestrians typically walk on the side of the road or in the paved shoulder lane. However, there are many areas where rock slopes, vegetation, and/or guard rails force pedestrians to walk in the paved vehicular lanes.

Although a few hiking trails are scattered around the south areas of the site, there is only one marked pedestrian trail along the coast area traversing within the Park. It is an approximately 10-foot wide dirt trail beginning at the end of Kuhio Highway. The path is delineated with logs. The trail was intended to lead to other areas of the Park along the shoreline, but overgrown vegetation and fallen trees have blocked the path beyond the existing comfort station. Observations reveal visitors tend to walk in a direct path between the end of the paved road and the beach, in lieu of the dirt trail and do not venture into the overgrown areas.

Bicyclists encounter the same dangers as pedestrians due to similar reasons. There are currently no designated biking lanes or pathways in Haena State Park.

There are two authorized parking areas within Haena State Park, one approximately 800 feet from the entrance to the Park and one at the end of Kuhio

Highway. The parking lot near the entrance to the Park consists of a dirt and gravel clearing, approximately 30,000 square feet (sf) in area with a 12-foot wide driveway entrance from Kuhio Highway. The parking area is approximately 3.0 to 4.0 feet below the highway. Parking stall markings are non-existent and their absence causes inefficient usage of the designated parking areas. The parking area near Ke'e Beach is off-street parking, consisting of an approximately 10-foot wide cleared dirt strip to the north and south of Kuhio Highway. Although two parking areas are available, there is a shortage of parking stalls during high usage. Limited parking exacerbates the pedestrian and bicyclist safety problem. Currently, "No Parking" signs are present throughout Haena State Park along Kuhio Highway. However as parking fills up within the designated areas, visitors disregard posted signs and park in "No Parking" zones along the shoulder lanes. These vehicles force pedestrians to walk in vehicular lanes.

A helicopter landing area is currently located to the east of the gravel parking lot. The area is grassed, fenced and well maintained. Typically, it is used for emergency rescues and fires.

D. Drainage and Stormwater Management

The coastal areas of Haena State Park are located within the 100 year flood plain. Also, most of the Park is classified as estuarine and marine wetlands.

The only perennial stream within the Park is Limahuli Stream, but during periods of heavy rainfall, there are several intermittent streams flowing north through natural swales in the Park. During these times, storm water runoff is typically full of sediment, soil, stream fish, logs, plants and other debris material. The runoff creates a muddy plume at the stream outfall, but is part of the naturally occurring drain pattern in Haena State Park.

Drainage improvements on the site consist of five 18-inch RCP drain culverts that allow storm water to cross beneath Kuhio Highway from south to north. It is estimated approximately 56.8 cubic feet per second (cfs) and 37.9 cfs of runoff from approximately 14.2 acres above Kuhio Highway flows down Maunahou into the five culverts, during the 10-year and 2-year storm, respectively. See Appendix A for drainage calculations. Three 3'x4' drain inlets are located on the south edge of the roadway to collect runoff originating from the south and discharge through endwalls located along the north edge of Kuhio Highway. The other two culverts have concrete headwalls located on the south edge of the road and discharge through endwalls located immediately north of Kuhio Highway. The drain culverts satisfy the requirements set forth in the County of Kauai Department of Public Works Storm Drainage Standard.

The remainder of the site discharges stormwater runoff directly into the Pacific Ocean. It is estimated that approximately 7,300 cfs of runoff flows directly to the ocean during a 50-year storm. This includes the runoff from the west end of Maunahou that flows over Kuhio Highway and the entire area of the Park below Kuhio Highway. During heavy rain storms the entire Park is inundated with rushing waters from this surge of rainwater. The existing drainage improvements

do not have the capacity and were not designed to handle the larger storm events.



Figure 2: Typical Existing Drain Inlet along Kuhio Highway
Figure 3: Typical Existing Drain Outlet along Kuhio Highway with 3" Water Line and 3/4" Telephone Lines

E. Water System

1. Potable Water

The Kauai Department of Water provides potable water to the site through a 4-inch PVC water line that terminates at the entrance to the Park with a 1-inch water meter (Water Meter No. 083000140). Water is gravity fed from a 0.1 million gallon (MG) reservoir 1.1 miles away, located at ground elevation 126.5 feet above MSL. The spillway elevation is at 144 feet above MSL. In 1996, a standpipe pressure test was conducted by the Kauai Department of Water near Limahuli Stream. The test revealed a static pressure of 27 pounds per square inch (psi) and a 6 psi residual pressure at 103 gallons per minute (gpm) on the 4-inch pipe.

Within Haena State Park, a 3-inch galvanized iron pipe runs along the edge of Kuhio Highway in an east-west direction until its terminus at the Ke'e beach comfort station. Most of the 3-inch galvanized iron pipe within the Park is installed above ground. Buried pipe depths are unknown, but assumed to have a minimum cover of 3.0 feet. Existing 2-inch and 1-inch water laterals are assumed to have 1.5 feet of cover. At the parking lot entrance, the 3-inch water line is embedded under 1-inch of AC pavement.

Recorded water usage from October 2003 to November 2006 is documented to average 2,125 gallons per day (gpd).

At the comfort station, the existing water fixtures are currently being replaced under DLNR Job No. H10C663A with the following:

1. 2" PVC water lateral serving 3 water closets, 1 urinal, 2 lavatories, 1 drinking fountain with a drywell, and 2 hose bibs
2. 1" PVC water lateral serving an outdoor shower

These improvements were under construction in September 2008, but have since been completed. It is anticipated these new fixtures will decrease water demands by 4 gpm.



Figure 4: Ke'e Beach Comfort Station and Existing Leach Field Location

There is no fire protection water system within the Park. If needed, bucketing seawater is used. The last fire hydrant/standpipe on the potable water system is outside of the Park, 75 feet away.

2. Non-Potable Water

A non-potable, irrigation, gravity fed HDPE pipe diverts an average of 760,000 gpd of water from Limahuli Stream. The diversion was installed south of Kuhio Highway and discharges into the taro patches north of Kuhio Highway and west of the parking lot. The irrigation water line begins as an 8-inch HDPE line at elevation 95.9 feet above MSL and transitions to a 6-inch HDPE line at elevation 57.5 feet above MSL. It crosses Kuhio Highway through one of the 18-inch RCP drain pipes.

F. Wastewater System

The original comfort station at Ke'e Beach was constructed in 1979 under DLNR Job No. 54-KP-11. It consisted of 3 water closets, 1 urinal and 2 lavatories. These fixtures drained into a 6.0 to 8.0 foot diameter cesspool, approved by DOH.

In 2001, the cesspool was replaced by a 2,500 gallon septic tank and approximately 2,700 square foot (sf) leach field located to the north and east of the comfort station. Record drawings for the construction of the individual wastewater system replacement were not available.

In 2008, the existing comfort station was demolished and replaced, under DLNR Project No. H10C663A. The new comfort station retains the same fixture count as its predecessor; 3 water closets, 1 urinal and 2 lavatories, which is estimated to generate 2,016 gpd.

The outdoor shower is located to the south of the comfort station. Greywater from the showers is allowed to drain and infiltrate into the surrounding soils.

In the Fall of 2010, the wastewater system for Ke'e Beach comfort station will be modified and upgraded to add a subsurface constructed wetland to further treat and improve water quality of the wastewater before discharging into the ground, at the request of the community. The planned system consists of 4-inch diversion valves and piping; 2-1,500 gallon primary treatment fiberglass tanks with battery-operated alarm control and panel; 968 sf of constructed wetland and 1,358 sf of infiltration field and appurtenances. The existing septic tank and leach field will continue to serve as an emergency backup system in the event the constructed wetlands system goes down.

Electric power is currently not available anywhere within Haena State Park and has been a limiting factor in the development of other wastewater treatment options.

In addition to the existing wastewater system for the comfort station, an abandoned cesspool was found at the old house site near Limahuli Stream. The existing Allerton House and Caretaker's cottage should also have abandoned cesspool(s). If any of these facilities are renovated the wastewater systems should also be upgraded or abandoned completely.

The comfort station renovation drawings call for the installation of a 30-inch diameter drywell to service a relocated drinking fountain near Ke'e beach. This drywell was not constructed as of September 2008.

G. Electrical and Communication

There is no electrical service currently available on-site. Service stops at the entry to the Park.

A ¾-inch telephone line runs along the same alignment as the 3-inch water line. It services a payphone and an emergency phone at the end of the Park, near the existing comfort station.

H. Solid Waste

Trash receptacles and recycle bins are available and maintained in the Ke'e beach area.

III. MASTER PLAN IMPROVEMENTS

A. Site Access, Roadways, Parking and Safety

The Master Plan greatly improves the safety and experience of the Park for visitors by closing down Kuhio Highway beyond the existing parking lot. By allowing only emergency and maintenance vehicles beyond this point, pedestrians and bicycles can safely navigate the Park and enjoy its beauty without having to co-exist with vehicular traffic.

The proposed Plan also provided for a delineated parking areas and controlled access. The existing parking lot should be raised, leveled, stabilized and resurfaced with a pervious, geogrid surface to allow for drainage while not increasing runoff. It should be striped to maximize parking spaces and control traffic flow.

Well marked, stabilized pedestrian trails are proposed throughout the Park to provide access and visual appreciation to cultural sites, while protecting these significant sites from being disturbed. These trails, like the parking lot should be stabilized with a geogrid base.

The helicopter pad will remain where currently sited. No planned improvements are anticipated.

B. Recommended Areas for Development

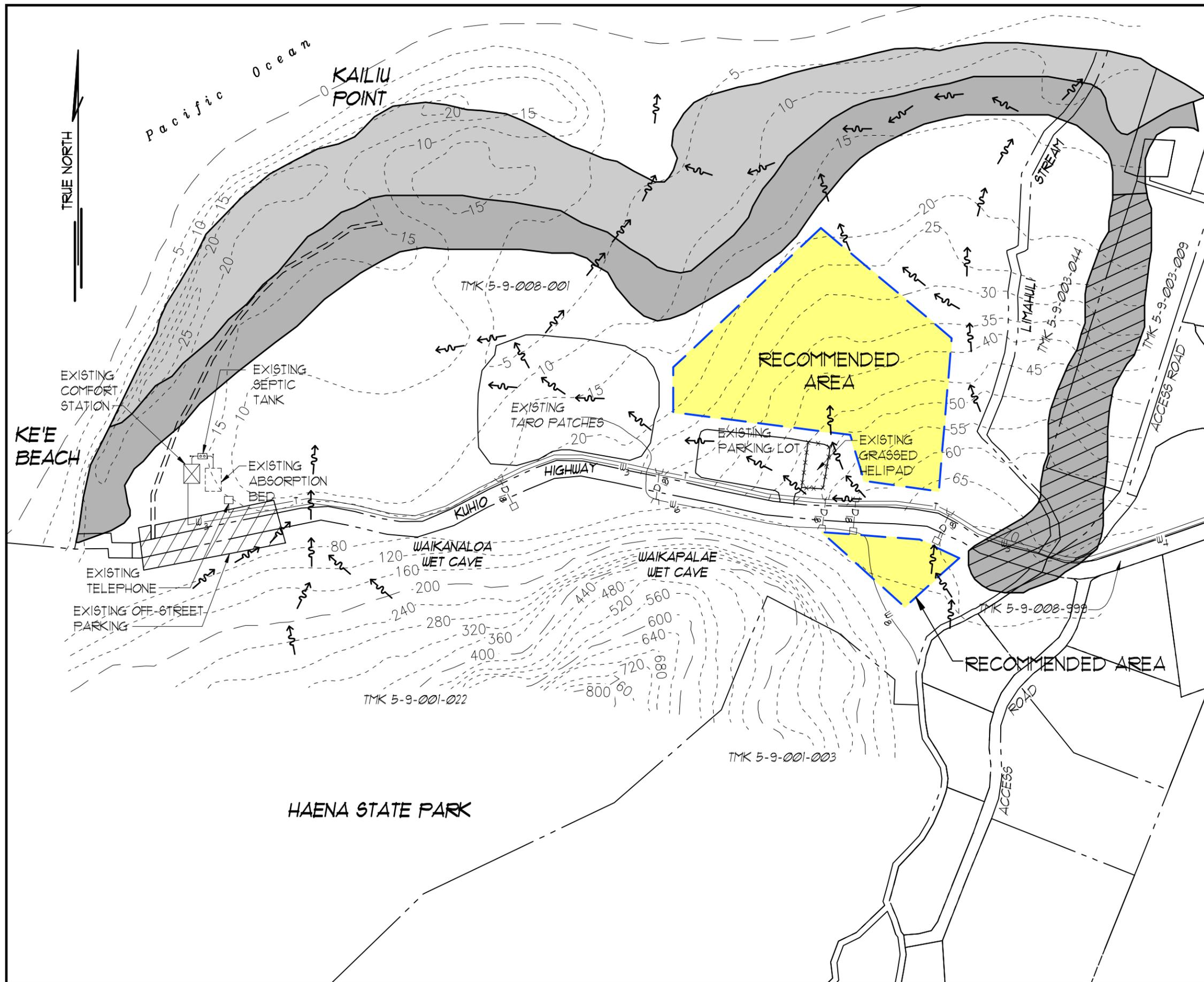
Areas recommended for development are based on avoiding existing low-lying and coastal areas subject to flooding and utilizing areas where the terrain is sloped less than 10% to avoid massive excavation. These areas include:

- 1.) The 100-year flood zone, which reaches elevations of 18 feet along the coastline, and
- 2.) The coastal 10-year flood zone with wave velocity hazards, which reaches elevations of 21 feet.

In addition, interior areas with elevations less than 15 feet above mean sea level and areas adjacent to stream flood plain zones were eliminated.

However, the location of Limahuli stream within the previous Master plan and on TMK maps differs from the location shown on FEMA maps, the Kauai Online Hazard Assessment (KOHA) database, and the Hawaii National Flood Insurance Program (NFIP) database. The Department of Land and Natural Resources (DLNR) is currently working out this issue with the Environmental Protection Agency (EPA) Region 9. Until this issue is resolved, it is not recommended that development be considered in the vicinity of Limahuli Stream.

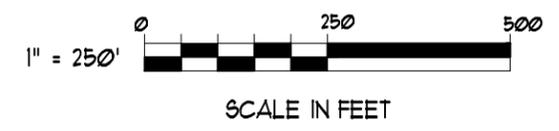
Figure 5 shows the limited area where these conditions apply and development can occur.



LEGEND

-  10-YEAR COASTAL FLOOD PLAIN WITH ADDITIONAL WAVE HAZARDS (FEMA)
-  100-YEAR FLOOD PLAIN (FEMA)
-  100-YEAR FLOOD PLAIN WITHOUT DETAILED STUDY (FEMA)
-  SEASONAL WATER CHANNEL WITH FLOW DIRECTION
-  ---25--- CONTOURS WITH ELEVATION
-  RECOMMENDED AREA FOR DEVELOPMENT
-  -D-□ EXISTING DRAINAGE CULVERT
-  -D-C EXISTING DRAINAGE CULVERT

GRAPHIC SCALE



HAENA STATE PARK
 MASTER PLAN
FIGURE: 5
RECOMMENDED AREA
FOR DEVELOPMENT MAP
 SCALE: 1"=250' JANUARY 2011

C. Drainage and Stormwater Management

Due to the minimal land disturbances recommended within the Park, the drainage systems will not be significantly affected. However, drainage discussions with the community included:

1. Restoration of the auwai (natural drainage patterns) where possible, including the one that flowed alongside Kuhio Highway, through the existing parking lot. This system is shown to be relocated north of the parking lot on the Master Plan;
2. Utilizing bioswales to define drainage courses and direct runoff away from proposed improvements and cultural sites; and
3. Reconfiguration of existing drainage inlets to a more natural state as done by the old Hawaiians. A natural state can be created by lowering the grates and lining it with stones. This should not create a traffic hazard because traffic along the interior roadway will decrease after implementation of the master plan. Pipe bollards should be placed around depressed inlets to warn pedestrians and maintenance traffic.

During moderate to heavy rainfall, stormwater management becomes very difficult. The wetland and lois typically serve as natural retention basins, but during surges of runoff, there is no way to protect coastal waters from sediment and debris. Constructed green spaces, native plants, bio-retention cells and bioswales can be used to help minimize the amount of stormwater and sediment leaving the site.

Haena State Park contains many ephemeral streams that flow only after moderate rainfall. The courses of these streams vary and are not delineated on available maps. If the addition of impervious area is minimized, diversion of stormwater around buildings should have a minimal effect on ephemeral streams.

D. Water System

1. Potable Water

The existing 3-inch water main with the Park should be sufficient for the proposed Master Plan as the population and activities within the Park will not increase. Relocation and maintenance of the water system may be required during the design phase, including adding backflow preventers.

2. Non-Potable Water

The use of non-potable water for irrigation and other possible alternatives is highly recommended. Beside the use of stream water, water reclamation from treated wastewater and greywater as well as rainwater catchment systems could support non-potable water needs. These alternatives should be explored during design.

E. Wastewater System

The proposed wastewater system is discussed under a separate cover, Wastewater Preliminary Engineering Report for Haena State Park Master Plan, dated November 2010. Recommendations are summarized as follows:

During the community meetings, it was agreed that any proposed wastewater system should treat the wastewater effluent for potential reuse, to protect the grounds and surrounding environment of the Park from any on-site disposal. It is believed by being good stewards of the Park, the environment will be preserved for future generations.

Therefore, at a minimum, aerobic treatment units with absorption beds should be considered. Beyond this, water resource management and reuse options should be seriously taken into consideration during design.

Also discussed at the community meeting were the following to be considered in the design:

1. Providing R-2 water quality effluent at the Orientation and Cultural Center, with additional treatment for reuse.
2. Placing the absorption bed under the parking lot to provide separation of effluent from ground water and avoid contamination of the loi patches.
3. Providing aeration to the existing constructed wetlands primary treatment tanks through the use of a photovoltaic system.
4. Considering compost toilets only for low usage areas, if at all.

F. Electrical and Communication

Electrical service currently terminates at the entrance to Haena State Park. In order to provide electrical service to the new Orientation and Cultural Center, approximately 1,000 feet of overhead electrical line must be installed. Kauai Island Utility Cooperative (KIUC) provided a budgetary construction cost of \$33,000 to install 1,000 feet of 1-phase, 2-wire primary conductor that will service the Orientation and Cultural Center (cost is KIUC cost only and does not include connections to the building). 3-phase service terminates at Hanalei and is not feasible for this project.

Due to the winding nature of Kuhio Highway, overhead electrical poles will require anchoring at all corners. Easements will need to be granted to KIUC before the line extension can be executed.

We recommend overhead electrical power be extended from the Park entrance to the Orientation and Cultural Center. Beyond that point, photovoltaic systems and other sustainable power sources should be utilized.

**APPENDIX A
CALCULATIONS**

By Michael Bungcayao Date 11/16/10 Project Haena State Park MP Project No. 1000711*00

Checked By Ramon Sera Date 11/17/10 Sheet 1 3

Find:

Flow entering the five (5) existing culverts, crossing Kuhio Highway within Haena State Park (2-year, 1-hour storm and 10-year, 1-hour storm)

References:

1. County of Kauai – Department of Public Works – Storm Drainage Standard, February 1972
2. County of Kauai – Department of Public Works – Storm Drainage Standard, July 2001*

*Section references within calculations refer to the July 2001 edition unless otherwise noted.

Assumptions:

1. Run-Off coefficients (Attachment 2) were calculated from the February 1972 version for a conservative, representative estimate.
2. Assume watercourse slope = 50%
3. Intensity of the 10-year storm was calculated from the February 1972 version. Intensity of the 10-year storm not provided in Reference 2.

Calculation:

Drainage Area = 14.17 Acres (Local Drainage System) [§ 1.7(m)]
 Although $T_m = 2$ years per Reference 2, [§ 3.3(c)(1)]
 Q will be calculated for both $T_m = 2$ years and $T_m = 10$ years
 Also, Rational Method shall be used ($Q = CIA$) [§ 3.3(d)(1)]

Where:

- Q = Flow Rate, in cubic feet per second
- C = Runoff Coefficient
- I = Rainfall Intensity, in inches per hour for a duration equal to time of concentration
- A = Drainage Area, in acres

Run-Off Coefficient, C (Attachment 2): [See Assumption 1]

For all zones –

Moderate Infiltration	0.07
Extreme Relief	0.08
Good Vegetal Cover	0.03
Agricultural	0.15
Total C = 0.07 + 0.08 + 0.03 + 0.15	
= 0.33	

Area, A (Attachment 1 and 1A):

Zone 1 Area = 3.43 Acres
 Zone 2 Area = 4.05 Acres
 Zone 3 Area = 2.55 Acres
 Zone 4 Area = 1.76 Acres
 Zone 5 Area = 2.38 Acres
 Total Area = 3.43+4.05+2.55+1.76+2.38
 = 14.17 Acres

Intensity, I: [§ 4.4.3]

Strip Length –

Zone 1 Strip Length = 1,251	Feet
Zone 2 Strip Length = 1,405	Feet
Zone 3 Strip Length = 824	Feet
Zone 4 Strip Length = 1,066	Feet
Zone 5 Strip Length = 742	Feet

By Michael Bungcayao Date 11/16/10 Project Haena State Park MP Project No. 1000711*00

Checked By Ramon Sera Date 11/17/10 Sheet 2 3

For All Zones –

Using Plate 1, (Attachment 3) –

First 300 feet of strip length, use *Forest with Heavy Ground Litter and Meadow*

Remaining Length, use *Grassed Waterway*

Velocity for first 300 feet = 1.8 feet per second

Velocity for remaining length = 11 feet per second

Time of Concentration, Tc:

$$\text{Zone 1 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{1,251 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 253 \text{ seconds}$$

$$\text{Zone 2 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{1,405 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 267 \text{ seconds}$$

$$\text{Zone 3 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{824 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 214 \text{ seconds}$$

$$\text{Zone 4 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{1,066 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 236 \text{ seconds}$$

$$\text{Zone 5 } T_c = \frac{300 \text{ ft}}{1.8 \text{ fps}} + \frac{742 \text{ ft} - 300 \text{ ft}}{11 \text{ fps}} = 207 \text{ seconds}$$

*Minimum Tc = 300 seconds (5 minutes)

Therefore for all zones, Tc = 5 minutes

For All Zones –

Using Plate 2, (Attachment 3)

Intensity correction factor = 2.7

Intensity, I –

From Plate 3, (Attachment 4)

Intensity of 1-hr Rainfall for a 2 year storm = 3 inches

2-year storm corrected intensity = 3 inches * 2.7

= 8.1 inches

From Plate 1, (Attachment 4A)

Intensity of 1-hr Rainfall for a 10 year storm = 4.5 inches

10-year storm corrected intensity = 4.5 inches * 2.7

= 12.2 inches

Flow Rate, Q = CIA

$$\text{Zone 1, 2-year storm flow rate} = 0.33 * 8.1 * 3.43$$

$$= 9.2 \text{ cubic feet per second}$$

$$\text{Zone 2, 2-year storm flow rate} = 0.33 * 8.1 * 4.05$$

$$= 10.8 \text{ cubic feet per second}$$

$$\text{Zone 3, 2-year storm flow rate} = 0.33 * 8.1 * 2.55$$

$$= 6.8 \text{ cubic feet per second}$$

$$\text{Zone 4, 2-year storm flow rate} = 0.33 * 8.1 * 1.76$$

$$= 4.7 \text{ cubic feet per second}$$

$$\text{Zone 5, 2-year storm flow rate} = 0.33 * 8.1 * 2.38$$

$$= 6.4 \text{ cubic feet per second}$$

2-year, 1 hour storm – Total Flow in all 5 Zones = 9.2 + 10.8 + 6.8 + 4.7 + 6.4 cubic feet per second
= 37.9 cubic feet per second

Kennedy/Jenks Consultants

By Michael Bungcayao Date 11/16/10 Project Haena State Park MP Project No. 1000711*00

Checked By Ramon Sera Date 11/17/10 Sheet 3 3

$$\begin{aligned} \text{Zone 1, 10-year flow rate} &= 0.33 * 12.15 * 3.43 \\ &= 13.8 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 2, 10-year flow rate} &= 0.33 * 12.15 * 4.05 \\ &= 16.2 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 3, 10-year flow rate} &= 0.33 * 12.15 * 2.55 \\ &= 10.2 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 4, 10-year flow rate} &= 0.33 * 12.15 * 1.76 \\ &= 7.1 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{Zone 5, 10-year flow rate} &= 0.33 * 12.15 * 2.38 \\ &= 9.5 \text{ cubic feet per second} \end{aligned}$$

$$\begin{aligned} \text{10-year, 1 hour storm - Total Flow in all 5 Zones} &= 13.8 + 16.2 + 10.2 + 7.1 + 9.5 \text{ cubic feet per second} \\ &= 56.8 \text{ cubic feet per second} \end{aligned}$$

Corral Reef

Kailiu Point

TRUE NORTH
SCALE: 1" = 500'

Kee Beach

ZONE 2
A = 4.05 ACRES
C = 0.33
I₂ = 8.1 INCHES
Q₂ = 10.8 CFS

ZONE 3
A = 2.55 ACRES
C = 0.33
I₂ = 8.1 INCHES
Q₂ = 6.8 CFS

ZONE 4
A = 1.16 ACRES
C = 0.33
I₂ = 8.1 INCHES
Q₂ = 4.7 CFS

ZONE 1
A = 3.43 ACRES
C = 0.33
I₂ = 8.1 INCHES
Q₂ = 9.2 CFS

ZONE 5
A = 2.38 ACRES
C = 0.33
I₂ = 8.1 INCHES
Q₂ = 6.4 CFS

HAENA STATE PARK MASTER PLAN
CIVIL BASELINE REPORT
DRAINAGE AREAS
2-YEAR STORM
ATTACHMENT 1
NOVEMBER 2010

Corral Reef

Kailiu Point

TRUE NORTH
SCALE: 1" = 500'

Kee Beach

ZONE 2
A = 4.05 ACRES
C = 0.33
 I_{10} = 12.15 INCHES
 Q_{10} = 16.2 CFS

ZONE 3
A = 2.55 ACRES
C = 0.33
 I_{10} = 12.15 INCHES
 Q_{10} = 10.2 CFS

ZONE 4
A = 1.76 ACRES
C = 0.33
 I_{10} = 12.15 INCHES
 Q_{10} = 7.1 CFS

ZONE 1
A = 3.43 ACRES
C = 0.33
 I_{10} = 12.15 INCHES
 Q_{10} = 13.8 CFS

ZONE 5
A = 2.38 ACRES
C = 0.33
 I_{10} = 12.15 INCHES
 Q_{10} = 9.5 CFS

HAENA STATE PARK MASTER PLAN
CIVIL BASELINE REPORT

DRAINAGE AREAS
10-YEAR STORM

ATTACHMENT 1A
NOVEMBER 2010

Table 1

GUIDE FOR THE DETERMINATION OF RUNOFF COEFFICIENTS FOR BUILT-UP AREAS*

WATERSHED CHARACTERISTICS	EXTREME	HIGH	MODERATE	LOW
INFILTRATION	NEGLIGIBLE 0.20	SLOW 0.14	MEDIUM 0.07	HIGH 0.0
RELIEF	STEEP (> 25%) 0.08	HILLY (15 - 25%) 0.06	ROLLING (5 - 15%) 0.03	FLAT (0 - 5%) 0.0
VEGETAL COVER	NONE 0.07	POOR (< 10%) 0.05	GOOD (10 - 50%) 0.03	HIGH (50 - 90%) 0.0
DEVELOPMENT TYPE	INDUSTRIAL & BUSINESS 0.55	HOTEL - APARTMENT 0.45	RESIDENTIAL 0.40	AGRICULTURAL 0.15

*NOTE: The design coefficient "c" must result from a total of the values for all four watershed characteristics of the site.

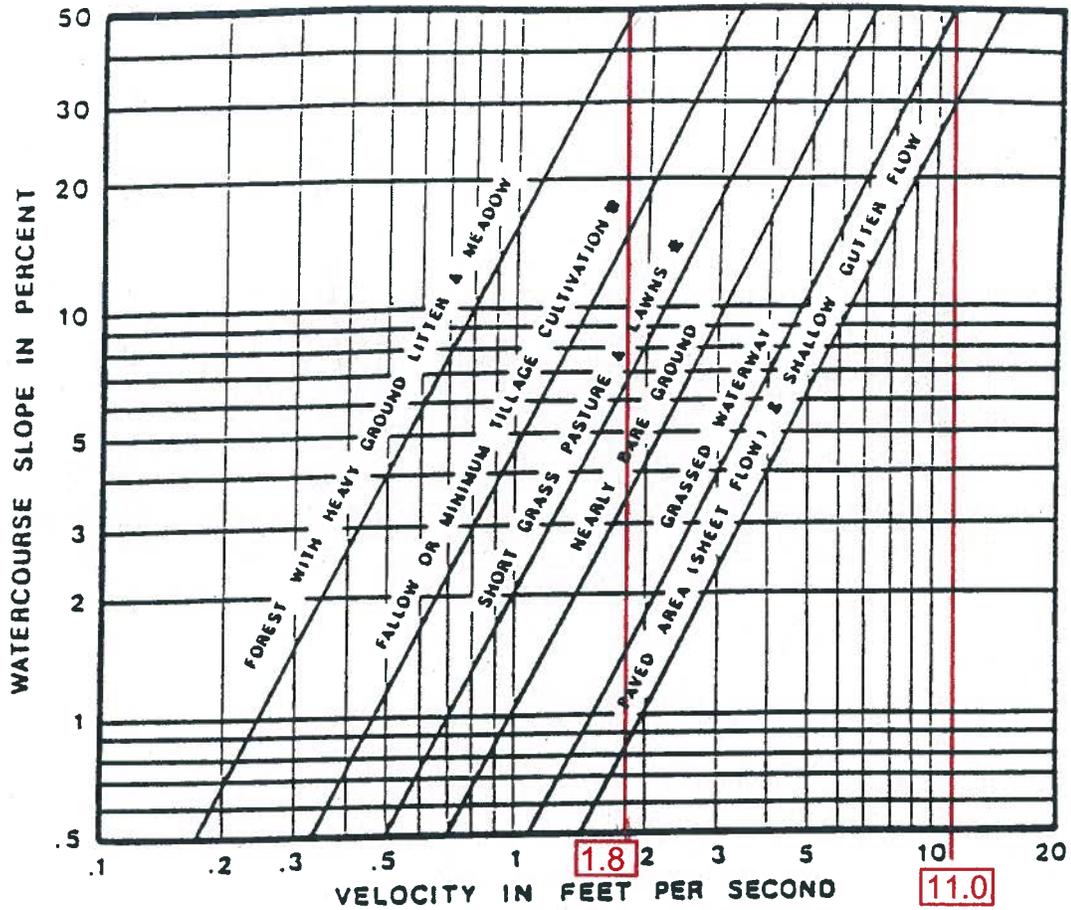
Table 2

APPROXIMATE AVERAGE VELOCITIES OF RUNOFF FOR CALCULATING TIME OF CONCENTRATION

TYPE OF FLOW	VELOCITY IN FPS FOR SLOPES (in percent) INDICATED			
	0-3%	4-7%	8-11%	12-15%
OVERLAND FLOW:				
Woodlands	1.0	2.0	3.0	3.5
Pastures	1.5	3.0	4.0	4.5
Cultivated	2.0	4.0	5.0	6.0
Pavements	5.0	12.0	15.0	18.0
OPEN CHANNEL FLOW:				
Improved Channels	Determine Velocity by Manning's Formula			
Natural Channel* (not well defined)	1.0	3.0	5.0	8.0

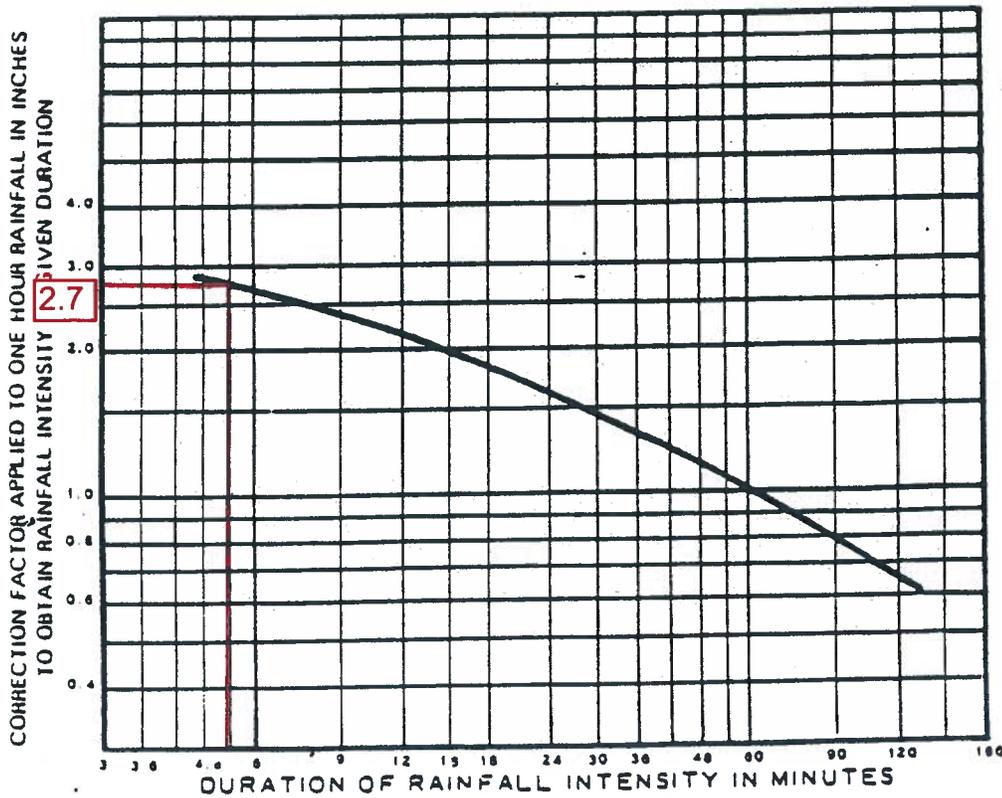
*These values vary with the channel size and other conditions so that the ones given are the averages of a wide range. Wherever possible, more accurate determinations should be made for particular conditions by Manning's formula.

PLATE 1



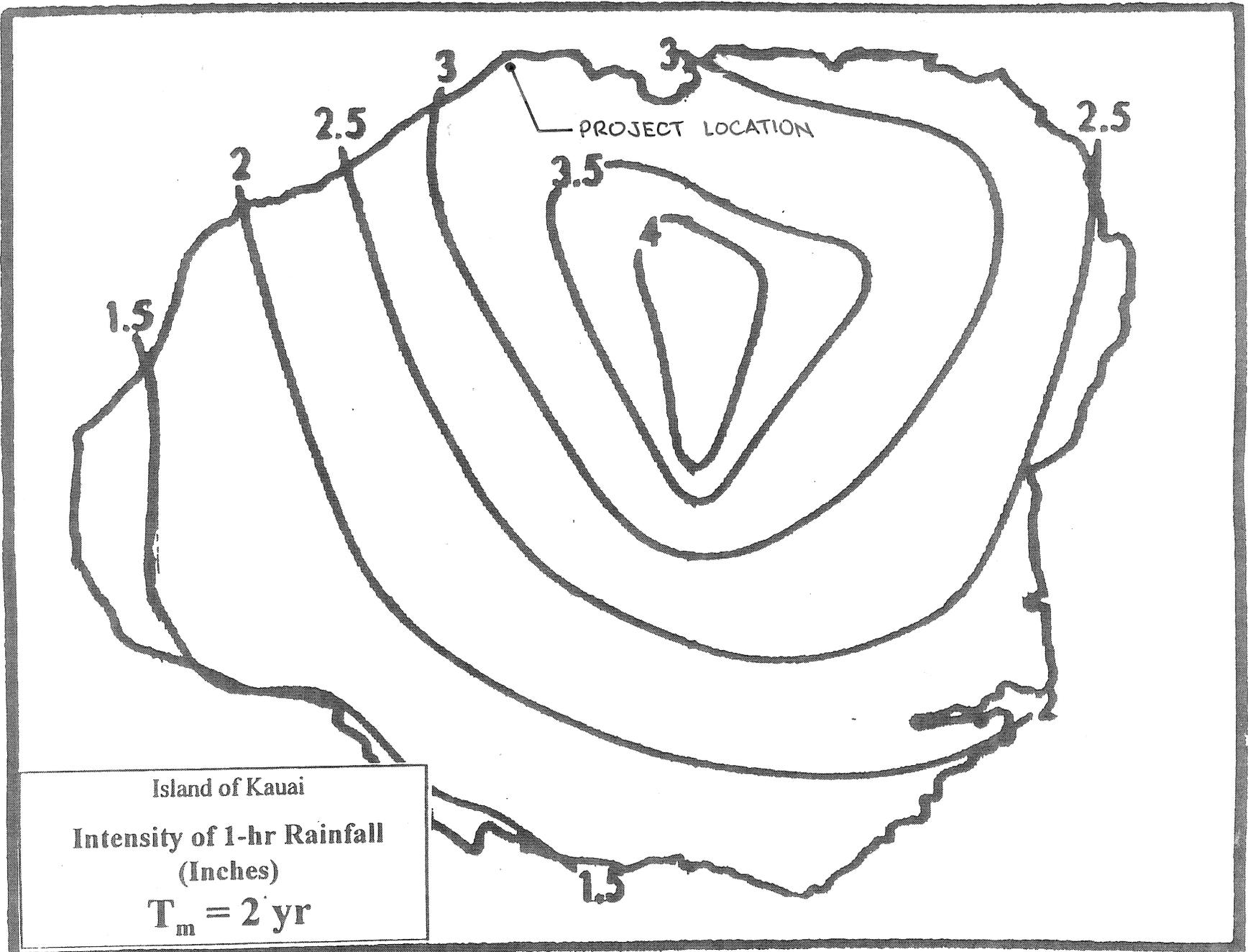
ESTIMATE OF AVERAGE FLOW VELOCITY FOR USE WITH THE RATIONAL FORMULA.

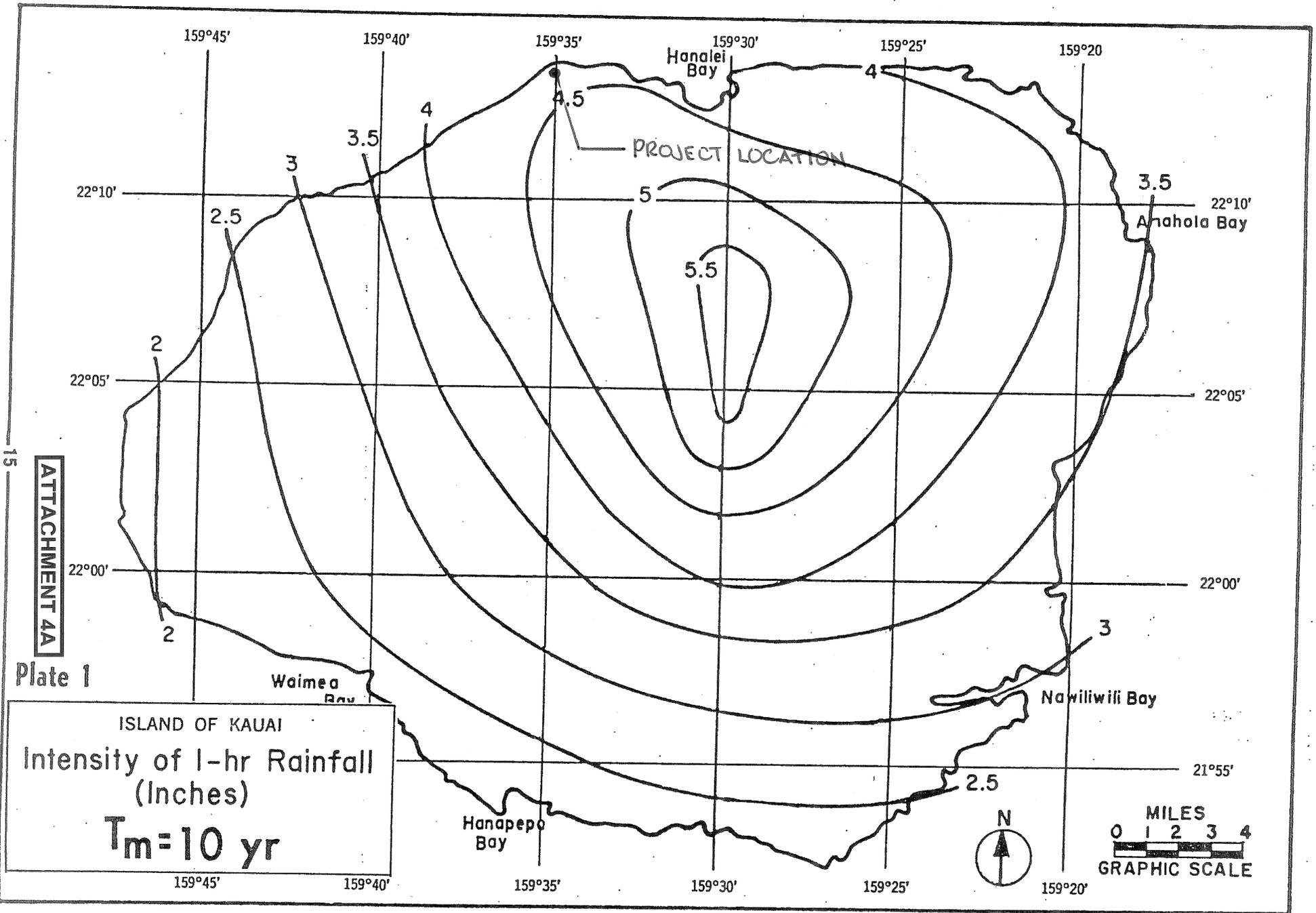
PLATE 2

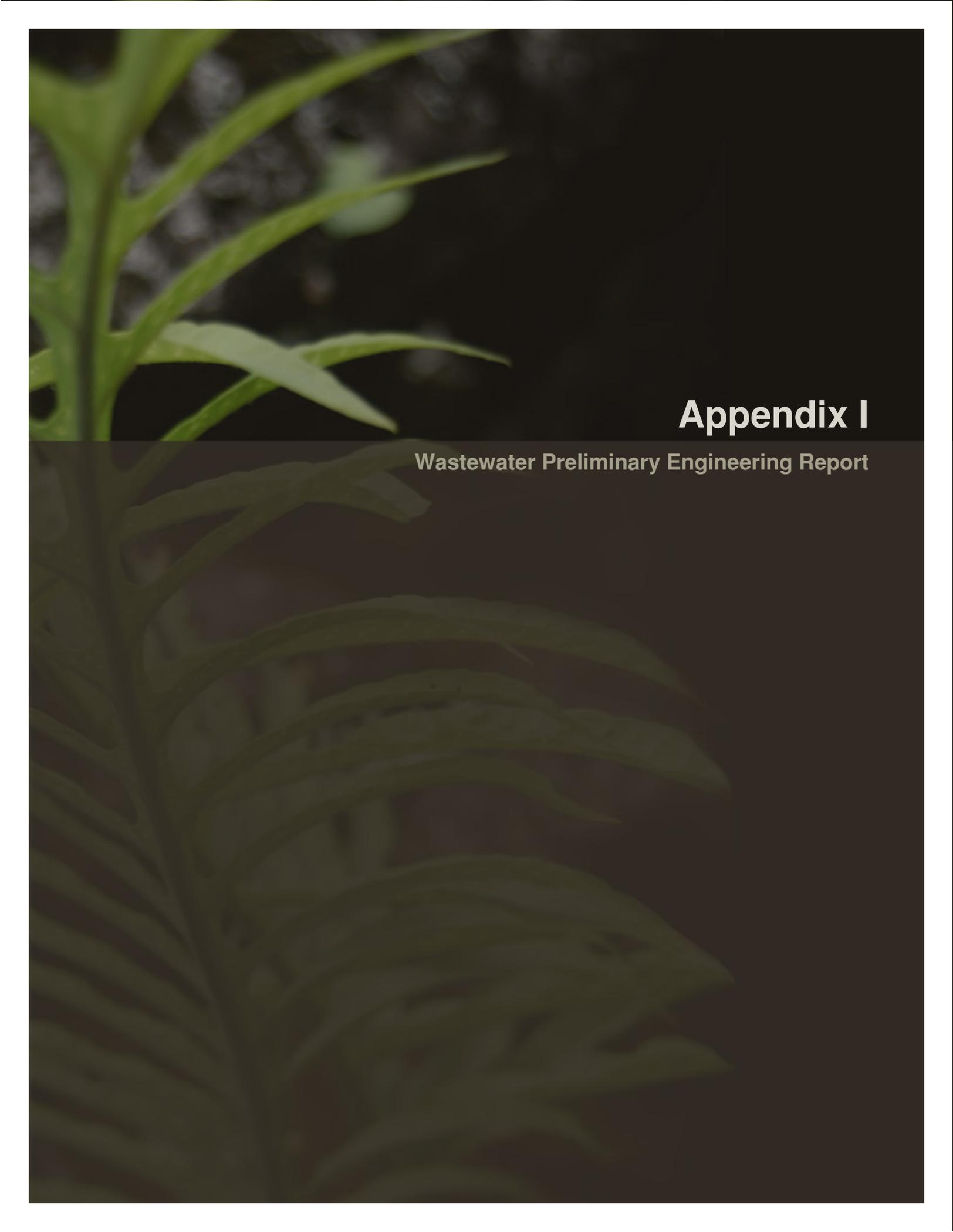


CORRECTION FACTOR FOR CONVERTING 1 HR. RAINFALL TO RAINFALL INTENSITY OF VARIOUS DURATIONS

TO BE USED FOR AREA LESS THAN 100 ACRES







Appendix I

Wastewater Preliminary Engineering Report

Kennedy/Jenks Consultants

Hawaii Office (formerly Engineering Solutions, Inc.)
98-1266 Kaahumanu Street, Suite 204
Pearl City, Hawaii 96782
808-485-2223
FAX: 808-488-3776

Wastewater Preliminary Engineering Report

Haena State Park Master Plan



Prepared for

PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

November 2010

K/J Project No. 1000711.00

**WASTEWATER PRELIMINARY ENGINEERING REPORT
HAENA STATE PARK MASTER PLAN**

TABLE OF CONTENT

I. INTRODUCTION	1
A. Project Location and Description	1
II. EXISTING SITE CONDITIONS	1
A. Soils	1
B. Topography	2
C. Wastewater System	2
III. DESIGN PARAMETERS	3
A. Existing Comfort Station and other Wastewater Facilities	3
B. Wastewater Flow	3
C. Water Quality and Reuse	4
IV. WASTEWATER TREATMENT ALTERNATIVES	4
A. Holding Tanks	4
B. Waterless/Low Flow Water Systems including Compost Toilets	5
C. Septic Tanks	6
D. Aerobic Treatment Units	7
E. Centralized Wastewater Treatment Systems	8
F. Natural Systems including Constructed Wetlands	8
V. WASTEWATER DISPOSAL ALTERNATIVES	9
A. Absorption Bed	9
B. Seepage Pit	9
C. Water Resource Management and Reuse	9
VI. SUMMARY AND EVALUATION OF ALTERNATIVES	10
VII. RECOMMENDATIONS	13
Appendix A: Table 3-1 Summary of Suitable Uses for Recycled Water (from <i>Guidelines for the Treatment and Use of Recycled Water</i> , May 15, 2002)	
Appendix B: Wastewater Treatment and Disposal Alternatives – Fact Sheets (from <i>On-Site Treatment Survey and Assessment Study</i> , January 2008)	

I. INTRODUCTION

A. Project Location and Description

Haena State Park is located on the north shore of Kauai, at the end of Kuhio Highway. It is bounded by the Na Pali Cliffs to the west, the base of Makana to the south, Limahuli Stream to the east and the Pacific Ocean to the north.

There are three (3) TMK parcels within the Park boundary. The parcel north of Kuhio Highway is identified by TMK 5-9-008:001 and encompasses approximately 52 acres. South of Kuhio Highway, parcels TMK 5-9-001:022 and 025, encompasses approximately 180 acres.

The parcels identified by TMK 5-9-008:001 and 5-9-001:022, are owned by the State of Hawaii. The third parcel, TMK 5-9-001:025 contains the Kauluapaoa Heiau and Keahualaka hula platform and is owned by the County of Kauai and managed by the State Historic Preservation Division (SHPD), Department of Land and Natural Resources (DLNR). Haena State Park utilizes approximately 65.7 acres of the coastal area for recreational uses.

The Park experiences heavy usage throughout the week and is considered one of the highest utilized parks in the State. It is used by the public for picnics, snorkeling, swimming and hiking. It is estimated approximately 708,400 visitors experienced the many geological and cultural features of this unique park in 2007.

II. EXISTING SITE CONDITIONS

A. Soil

Based on *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, five soil classes are present at Haena State Park. Its western coastline consists of Mokuleia fine sandy loam (Mr), while its northern coast is defined as Beach (BS). Marsh (MZ), Hanalei silty clay (HnA) and Hanalei silty clay with deep water table (HrB) are present further inland.

Beach soil extends up to 150 feet inland from the northern coast. This soil consists of light-colored sands resulting from the breakdown of coral and seashells.

Mokuleia fine sandy loam extends up to 800 feet inland from the western coast. Its surface layer contains 16 inches of fine sandy loam and its subsurface contains 34 to 48 inches of single-grain and loamy sand. This soil exhibits moderately rapid permeability in its surface layer and rapid permeability in its subsurface.

Marsh soil is present approximately 800 feet inland from the western coast of Haena State park. This soil type covers small, low-elevation areas where water stands at the ground surface. Grasses, bulrushes and other herbaceous plants thrive in these areas.

Hanalei silty clay (HnA) soil is present in the western and inland portions of the Park. Its surface layer contains 13 inches of dark-gray, silty clay, of which the top 10 inches

contain brown and red mottles. Its subsoil contains 13 inches of dark-gray and dark grayish-brown silty clay loam. The water table in this soil type is typically less than 3 feet below the ground surface. This soil experiences moderate permeability and is strongly acidic in its surface layer.

Hanalei silty clay with deep water table is present in the eastern and inland portions of the Park. This soil is similar to Hanalei silty clay; however it contains fewer mottles and is located in areas where the water table is greater than 3 feet below the ground surface.

Soil test borings and percolation tests were not performed specifically for this preliminary engineering report. Instead, the previously performed percolation test results at the existing comfort station are referenced to preliminarily size the disposal fields. Percolation rates test results of 4.14 minutes/inch were obtained in December 2009 for the constructed wetland project at the existing Ke'e comfort station.

B. Topography

The Master Plan incorporates improvements and facilities north of Kuhio Highway and leaves the areas south of Kuhio Highway virtually untouched. The ground elevation in this area ranges from sea level to approximate 70.0 feet above mean sea level (MSL) at the entrance to the Park.

The ground elevation south of the Kuhio Highway rises sharply with steep slopes and form the cliffs of Napali beyond the shoulder of the roadway.

The 100-year base flood elevation ranges from sea level to elevation 24.0 feet above MSL.

C. Wastewater System

The original comfort station at Ke'e Beach was constructed in 1979 under DLNR Job No. 54-KP-11. It consisted of 3 water closets, 1 urinal and 2 lavatories. These fixtures drained into a 6.0 to 8.0 foot diameter cesspool, approved by DOH.

In 2001, the cesspool was replaced by a 2,500 gallon septic tank and approximately 2,700 square foot (sf) leach field located to the north and east of the comfort station. Record drawings for the construction of the individual wastewater system replacement were not available.

In 2008, the existing comfort station was demolished and replaced, under DLNR Project No. H10C663A. The new comfort station retains the same fixture count as its predecessor; 3 water closets, 1 urinal and 2 lavatories, which is estimated to generate 2,016 gpd.

The outdoor shower is located to the south of the comfort station. Greywater from the showers is allowed to drain and infiltrate into the surrounding soils.

In the Fall of 2010, the wastewater system for Ke'e Beach comfort station will be modified and upgraded to add a subsurface constructed wetland to further treat and improve water quality of the wastewater before discharging into the ground, at the request of the community. The system consists of 4-inch diversion valves and piping; 2-

1,500 gallon primary treatment fiberglass tanks with battery-operated alarm control and panel; 968 sf of constructed wetland and 1,358 sf of infiltration field and appurtenances. The existing septic tank and leach field will continue to serve as an emergency backup system in the event the constructed wetlands system goes down.

Electric power is currently not available anywhere within Haena State Park and has been a limiting factor in the development of other wastewater treatment options.

In addition to the existing wastewater system for the comfort station, an abandoned cesspool was found at the old house site near Limahuli Stream. The existing Allerton House and Caretaker's cottage should also have abandoned cesspool(s). If any of these facilities are renovated the wastewater systems should also be upgraded or abandoned completely.

III. DESIGN PARAMETERS

In 2001, The Keith Companies developed a Community Preferred Master Plan for Haena State Park. The Community Preferred Master Plan and all other alternatives discussed proposed two (2) restroom facilities. This included restoration and retrofit of the existing comfort station at Ke'e Beach and a new facility near the visitors center consisting of either chemical or compost toilets. In addition, the wastewater facilities for the caretaker's cottage and the DLNR Park's baseyard would have had to be considered although they were not specifically discussed in the report.

The 2010 revised version of the 2001 draft Master Plan consolidates any new facilities to a central area around the existing parking lot, thereby consolidating the wastewater treatment and disposal system. In addition, electrical power will be brought in to the existing parking lot to service the new visitors center and other facilities.

Based on the new concept and on-going community meeting discussions, the following parameters were used to evaluate wastewater alternatives and provided initial guidelines and recommendations.

A. Existing Comfort Station and other Wastewater Facilities

The existing comfort station at Ke'e Beach and its individual wastewater system consisting of primary treatment tanks, constructed wetlands and infiltration field will remain in service. Other existing wastewater system on existing facilities, specifically cesspools, will be abandoned and not utilized even if the facility it is serving is renovated. A new individual wastewater system will be required.

B. Wastewater Flow

The treatment and disposal of wastewater is regulated by the State of Hawaii Department of Health, under the Hawaii Administrative Rules (HAR) Title 11, Chapter 62. Because there is no public county sewer system in the area, the State Department of Health (DOH) regulates and oversee the wastewater system at Haena State Park.

The existing comfort station at Ke'e Beach is sized to handle 2,016 gallons per day (gpd) which currently handles the entire population of the Park. Any additional restroom facilities would help reduce and split this flow amongst the various restroom facilities.

As it is the goal of the community to limit the usage of the Park and protect its ecology, the 2,016 gpd of generated wastewater flow should be initially used as the estimated quantity for design. This equates to approximately 403 visitors per day, based on 5 gallon per person per day for picnic parks (toilet wastes only) per DOH standards.

C. Water Quality and Reuse

To use treated wastewater for any other use then disposal is regulated the "Guidelines for the Treatment and Use of Reclaimed Water", prepared by Hawaii State Department of Health (DOH), Wastewater Branch, May 15, 2002. In essence the DOH recognizes three (3) levels of recycled water, simply defined as follows:

R-1 water, the highest level of treatment is wastewater treated by oxidation to secondary effluent (Biochemical Oxygen Demand (BOD) <30, Total Suspended Solid (TSS) <30), then filtered to 2 NTU turbidity and disinfected with fecal coliform shall not exceed 2.2 per 100 ml using 7 days of results, 23 per 100 ml in more than one sample in 30 day period and 200 per 100 ml in any sample.

R-2 water is disinfected, secondary treated wastewater with effluent fecal coliform shall not exceed 23 per 100 ml using 7 days of results and 200 per 100 ml in more than one sample in a 30 day period.

R-3 water is an undisinfected, oxidized, wastewater effluent.

A summary of suitable uses for the various levels of treated wastewater is provided on Table 3-1 from their Guidelines, which can be found in Appendix A.

IV. WASTEWATER TREATMENT ALTERNATIVES

The various possible wastewater treatment alternatives discussed below are summarized on fact sheets from the State of Hawaii, Department of Health, "On-Site Wastewater Treatment Survey and Assessment Study", January 2008. These fact sheets can be found in Appendix B.

A. Holding Tanks

Holding tanks do not provide any treatment, but also do not discharge treated wastewater effluent on-site. Holding vessels are sized to temporarily handle a few days' supply of wastewater and allow the pumper truck to periodically remove the wastewater from the Park.

Because of the remoteness of Haena State Park, narrow roadways and multiple one-lane bridges leading to the Park, this is not a very attractive option for pumper trucks and not economically viable.

B. Waterless/Low Water Systems including Compost Toilets

Composting toilets have been implemented in unsewered, rural, and suburban areas for over 30 years. These toilets do not require water and process human waste with aerobic digestion in unsaturated conditions. If used correctly, solid waste is reduced to 10 to 30% of its original volume. However, it takes a long period of time to decompose before it is suitable for soil amendment. They are not meant for high usage. In addition, the waste material may have to be removed by a septage vacuum pump truck periodically, therefore the toilets should be placed in an area accessible to a truck.

Composting toilets are environmentally friendly if used correctly. They have been installed at various places in Kauai, including trails at Hanakapi'ai, Hanakoa, and Kalalau as well as at the adjacent, Limahuli Garden.

Two main types of composting toilets are available, one with the decomposition chamber attached to the toilet and one with the chamber separated from the toilet. Aside from the two main types, there are many composting toilet modifications available to facilitate the aerobic treatment process. Oxygen is required for an aerobic treatment process and a constant supply and concentration of oxygen will accelerate the treatment process. Also, odor reductions incurred by the modifications also reduce vector (pest) attraction to fresh waste. Some of the available modifications are as follows:

- a. Waste can be periodically separated into different containers based on its age, allowing older wastes to continue the process of decomposition without being contaminated by fresh waste. Urine is evaporated while aerobic digestion decomposes fecal material.
- b. Electric fans can be added to facilitate the aerobic digestion process within the decomposition chamber by exchanging gaseous by-products of aerobic digestion with oxygen from outside of the chamber. The addition of a fan will require electric power to the site.
- c. A mechanical device can be installed to churn decomposing material to ensure an adequate oxygen supply for aerobic bacteria. The addition of a churning device will require electric power to the site.
- d. Cover materials including saw dust, peat moss, rotted leaves, straw, grass clippings and other organic materials can be used to soak up liquid and eliminate odors. This method separates the urine from the feces and allows fecal decomposition to continue without odors. Cover materials must be restocked as needed and users are given the responsibility of maintaining them.
- e. Separate chambers for urine and feces will allow urine to undergo nitrification. This process turns urine into an odor free and nearly pathogen free liquid. Fecal matter will still decompose through aerobic digestion.
- f. In the absence of electric service, non-electric toilets or solar power can be used. Non-electric toilets are limited to 4 persons a day for vacation use and 2 persons a day for continuous use, assuming 3 uses per person every day. A solar panel can be installed to power a ventilation fan. Solar powered toilets are limited to 6

persons a day for vacation use and 4 persons a day for continuous use, assuming 3 uses per person every day.

Composting toilets have an expected service life of over 25 years. Installation can be moderately priced, depending on the type and number of composting toilets. For electric versions, there is a small daily electric cost associated with powering the fans and churning equipment. Power consumption for the fans and churners typically range between 365 to 3000 kWh/year.

C. Septic Tanks

Septic tanks are the traditional way of disposing of on-site wastewater from remote locations. They are generally used to remove scum, grease and solids while providing some primary anaerobic treatment before discharge into the disposal system. Inert material, slow decomposing solids, grease and scum will accumulate in the septic tank and must be periodically removed. Septic tanks are sensitive to soaps, chemicals and large flows of water as the system relies on anaerobic bacteria growth to breakdown biological wastes. If the septic tank is upset due to these factors, wastewater will not receive normal treatment and effluent may shorten the lifespan of the disposal system.

There are two types of septic tanks available for commercial use, single chambered and double chambered. Both types of septic tanks rely on tank volume to provide wastewater detention times long enough to separation of solids from the wastewater flow. As wastewater influent enters the tank, its velocity is slowed to a rate where particles mixed with the water can settle out of the liquid either by sinking or floating. In a healthy septic tank, there are distinguishable sludge and scum layers on the bottom of the tank and on the water surface, respectively. A baffle on the effluent end of the septic tank allows clarified water, from between the sludge and scum layers in the tank, to drain into the disposal system.

Double chamber septic tanks are similar to single chamber tanks with the exception of a concrete separator that forces the wastewater to enter two chambers before leaving the tank. The first chamber typically utilizes the first two-thirds of the tank length and works similarly to a single chamber septic tank. Holes in the concrete separator at 40% the depth of the tank allows clarified water to enter the second chamber of the tank, while sludge and scum on the tank bottom and water surface are detained in the first chamber. The second chamber acts similarly to a single chamber septic tank, allowing some anaerobic treatment while remaining solids are allowed to separate from the wastewater. Much like the single chamber septic tank, a baffle is used on the effluent end of double chamber tanks. The result of using two chambers is a better quality effluent with less suspended solids that could "boil over" into the disposal system.

Commercial septic tanks in Hawaii are made of pre-cast concrete or fiberglass and are typically available in sizes between 750 and 5,000 gallons. Some sizes can be cast in Honolulu, but most must be shipped from the continental United States. Access to the site may be a limiting factor in the maximum size of tank provided.

Septic tanks have an expected service life of 50 years or more. The cost of installation and materials is moderate, depending on the type of tank and the site conditions present. Periodic maintenance costs include the removal of grease, scum and solids by a vacuum septic pump truck. Areas where septic tanks are installed must be accessible

by these trucks. Due to the differing conditions, some tanks may accumulate solids faster than others, making it difficult to determine a “rule-of-thumb” time period for pumping. Most public facilities should be initially pumped and monitored quarterly until a required frequency pattern is established.

D. Aerobic Treatment Units

Aerobic treatment units (ATU) are typically used when wastewater effluent quality must be higher than produced by septic tanks. ATU generally uses mechanical components to oxidize organic material, decrease suspended solids and reduce pathogens.

The standard aerobic treatment process consists of the following four stages:

- a. **Solid Removal** – A pre-loader receives wastewater from the building sewer before it reaches the aerobic treatment unit. The pre-loader works like a septic tank to remove solids from the wastewater flow.
- b. **Aeration** – After solid removal, the wastewater flows into the aerobic tank’s first compartment, where mechanical blowers introduce oxygen into the compartment to fuel the aerobic treatment of biological waste.
- c. **Settling** – Wastewater then flows into the next compartment, where activated sludge are allowed to settle out of the wastewater.
- d. **Disinfection** – The final stage is an optional disinfection stage. This stage can be implemented or omitted depending on the quality of effluent required or preferred before disposal. Disinfection is typically accomplished through the use of chlorine tablets. Other disinfection options include liquid chlorine or ultra-violet (UV) light. By providing disinfection, R-2 water quality is achieved.

Aerobic treatment unit efficiency is dependent on temperature, tank geometry, tank material, concentration of solids, and type of mixing/aeration device. It is also, highly sensitive to changes in wastewater composition.

Aerobic treatment unit mechanical components have a service life of 10 to 20 years. They cost significantly more than septic tanks because of the higher material costs and extra equipment that must be installed with the aerobic unit. Also, there is a small daily electric cost associated with the aeration equipment, pumps and disinfection equipment. Power consumption for an aerobic treatment unit is typically 700 to 3,600 kWh/year.

A form of an aerobic treatment unit is a sequence batch reactor (SBR), with the characterizing difference of a single chamber used for all processes including equalization, biological treatment, and secondary clarification. It is a fill-and-draw activated sludge system that requires two or more reactors in a pre-programmed sequence of operation of at least 4 steps.

The SBR produces better effluent quality than septic tanks and aerobic units, but requires sophisticated equipment and higher levels of maintenance. Electrical power is required for this alternative. According to the EPA, the SBR uses approximately 1100 to 3650 kWh/year.

E. Centralized Wastewater Treatment Systems

In a centralized treatment system, waste from each facility are collected, treated and disposed of at a central location. This alternative may require some sites to install a small pump station to lift the wastewater to the central treatment plant, if located at a lower elevation than the treatment plant and are not able to be piped by gravity.

A conventional package treatment plant, like the ATU and SBR, is able to provide reliable, high quality secondary effluent and with continuous disinfection, at least R-2 water for reuse. With additional filtration and disinfection, these systems could produce R-1 water.

They are available in concrete, fiberglass and corrosion control coated steel. Experienced labor and a certified wastewater operator are required to maintain a package treatment plant due its sophisticated control system and monitoring and recordkeeping requirements. Electrical power is required for this alternative. Mechanical components for the treatment plant and lift stations have service life of 10 to 20 years.

F. Natural Systems including Constructed Wetlands

Of the natural treatment systems, a constructed wetlands system as being installed at the existing comfort station was evaluated for its cost effectiveness treatment. There are two (2) types of constructed wetlands used in the United States as briefly described in "*Natural Systems for Wastewater Management and Treatment*", by Reed, Crites and Middlebrooks:

"Free-water surface (FWS) wetland. In this type, the water surface is exposed to the atmosphere, the bed contains emergent aquatic vegetation, a layer of soil to serve as a root media, a liner if necessary to protect the groundwater, and appropriate inlet and outlet structures. The water depth in this type of wetland can range from a few centimeters to 0.8 meter or more, depending on the purpose of the wetland. Normal depth of 0.3 m (1 foot) is typical.

Subsurface-flow (SF) wetland. In this case the excavated basin is filled with a porous media, usually gravel and the water level is maintained below the top of the gravel. The same species of vegetation are used in both types of wetlands. In the SF case the vegetation is planted in the upper part of the gravel media. A liner is also used, if necessary to protect groundwater quality. The depth of the media is typical 0.3-0.6 m (1-2 feet)."

These systems require pretreatment to remove the solids before biological treatment. Aeration is also recommended to improve water quality, if possible. These systems generally require more land area than most on-site systems, require start-up periods to establish vegetation and may require backup systems for rainfall.

Currently, there are no regulations in Hawaii governing the construction and management of these systems and require special approval on a case by case bases from DOH.

V. WASTEWATER DISPOSAL ALTERNATIVES

The various possible wastewater disposal alternatives discussed below are summarized on fact sheets from the State of Hawaii, Department of Health, "On-Site Wastewater Treatment Survey and Assessment Study", January 2008. These fact sheets can also be found in Appendix B.

A. Absorption Bed

An absorption bed is the typical disposal system for individual wastewater systems, unless conditions require a smaller disposal area. Synonymous to the term leach field, it consists of leaching chambers placed on a level sub-grade surface. Traditionally, perforated pipe with gravel beds had previously been used, but is no longer preferred as it tends to clog and eventually lead to failure. Perforated pipe also provides a lower available detention volume than leaching chambers. The size of the absorption bed is dependent on the amount of flow and the soil percolation rate in the installation area.

This disposal system can be used with septic tanks, aerobic units, natural systems and as redundant, backup systems for wastewater treatment with reuse. As with any constantly used systems, suspended solids in effluent and bacteria in the soil will accumulate in the absorption bed until the soil can no longer handle its hydraulic loading. This failure usually occurs 20 to 30 years after installation. However, the leaching chambers make this system easier to maintain and rehabilitate.

B. Seepage Pit

Seepage pits are not usually used unless special conditions warrant it. It is the preference of DOH to use absorption bed versus seepage pit for disposal as the absorption beds distributes the wastewater load over a larger area versus a concentrated discharge. Seepage pits are classified as underground injection wells in the State of Hawaii and may require yearly monitoring and sampling as determined by DOH.

Existing cesspools have been converted to seepage pits in cases where site area is limited and the groundwater table is not affected.

C. Water Resource Management and Reuse

The Kauai Department of Water provides potable water to the site through a 4-inch PVC water line that terminates at the entrance to the Park with a 1-inch water meter (Water Meter No. 083000140). Within Haena State Park, a 3-inch galvanized iron pipe runs along the edge of Kuhio Highway in an east-west direction until its terminus at the Ke'e beach comfort station. Recorded water usage from October 2003 to November 2006 is documented to average 2,125 gpd. It should be noted these records are before the showers were installed. The average usage matches closely to the estimated wastewater generated.

A non-potable, 6-inch HDPE pipe diverts an average of 760,000 gallons per day (gpd) of water from Limahuli Stream to irrigate the loi (taro patches) field north of Kuhio Highway

and west of the parking lot.

Besides these 2 water sources, rainwater and natural springs provide water for the abundant plant life around the Park.

Depending on the quality of the treated effluent, use of the reclaimed water for various irrigation and other non-potable uses can be identified and implemented with the Master Plan based on the DOH Recycled Water Table 3-1. Consideration should be given to the following:

1. Reusing treated wastewater for the landscaping around the new Visitors Center, Maintenance Baseyard and Caretaker's Cottage.
2. Reusing wastewater and stormwater off the existing parking lot for toilet flushing at the Visitors Center to conserve water.
3. Reducing stream diversion by collecting, storing and using rainwater.
4. Capturing and storing rainwater for non-potable uses.
5. Using non-potable water for fire protection.

VI. SUMMARY AND EVALUATION OF ALTERNATIVES

A matrix summarizing the various treatment alternatives advantage, disadvantage, impacts on the park and potential uses is provided on the following table.

Disposal options are limited and in this case dependent on the treatment option selected. In all cases where wastewater effluent disposal is on-site, an absorption bed will need to be provided.

**HAENA STATE PARK MASTER PLAN
WASTEWATER TREATMENT ALTERNATIVE MATRIX**

	HOLDING TANKS	COMPOSTING TOILETS	SEPTIC TANK	AEROBIC TREATMENT UNIT	CONSTRUCTED WETLANDS (Subsurface Flow)	GRAVITY SEWER AND PUMP STATIONS TO CENTRALIZED WASTEWATER PACKAGE PLANT FOR REUSE	RECIRCULATING SAND FILTER FOR REUSE (not discussed in report)
ADVANTAGES	<ul style="list-style-type: none"> • Electrical power not required. • Will not discharge nutrients or pathogens into the environment. 	<ul style="list-style-type: none"> • Does not require water. • Will not discharge nutrients or pathogens into the environment • Environmentally friendly. 	<ul style="list-style-type: none"> • Electrical power not required. • Simple operation. 	<ul style="list-style-type: none"> • Better quality effluent provided. • Effluent is allowed to be discharged to groundwater with disinfection. 	<ul style="list-style-type: none"> • Better quality effluent provided. • Subsurface design minimizes odors, vector attraction and potential of public contact within the wetlands. • Passive, natural treatment process. 	<ul style="list-style-type: none"> • Recycled water is considered zero discharge. • Highest quality effluent can be provided. • Effluent is allowed to be discharged to groundwater. • Reduces potable water demand for irrigation. 	<ul style="list-style-type: none"> • Recycled water is considered zero discharge. • High quality effluent provided. • Effluent is allowed to be discharged to groundwater. • Reduces potable water demand for irrigation.
DISADVANTAGES	<ul style="list-style-type: none"> • Content of tank must be pumped on a regular basis and disposed of off-site. • Must be monitored and routinely checked to assess water level. • No treatment provided. • Possible odors from wastewater going septic. 	<ul style="list-style-type: none"> • If not properly maintained, composting toilets have a potential for odors and vector attraction. • Purchase cost for specific organic materials to properly maintain the composting system. • Without proper ventilation or maintenance, odors may be generated. Requires power. • Possible odors from wastewater going septic. 	<ul style="list-style-type: none"> • Only primary treatment is provided. • Treatment process is easily upset with the introduction of toxic substances, like chemicals and bleach into wastewater; shortening the life of disposal systems. • DOH requires a 3 foot vertical separation between the disposal system and groundwater. • The soil absorption area in a septic system must remain unsaturated to function properly. 	<ul style="list-style-type: none"> • Electrical power is required for continuous operation of the aerobic units. • The aerobic treatment process is sensitive to temperature, location, tank geometry, tank material, concentration of solids, and type of mixing. • Treatment process is easily upset with the introduction of toxic substances, like chemicals and bleach into wastewater; shortening the life of disposal systems. • Increased operation and maintenance with the potential of equipment malfunctions and failures. 	<ul style="list-style-type: none"> • Large footprint required. • Phosphorus, metals and other organics removed from the wastewater are bound in wetland sediments and accumulate over time. • Requires pretreatment. • Effluent quality not totally dependable or consistent. • Requires startup times for plants to get established. 	<ul style="list-style-type: none"> • Electrical power is required as well as a standby generator. • Increased operation and maintenance with the potential of equipment malfunctions and failures. • Requires backup disposal and/or storage in the event of a system failure, per DOH. 	<ul style="list-style-type: none"> • Electrical power is required for recirculating pumps. • Cost of media. • Maintenance required for sand bed and pumps. • Requires pretreatment. • Requires backup disposal and/or storage in the event of a system failure, per DOH.
APPROPRIATE SIZE FOR USE	<ul style="list-style-type: none"> • Single family residences 	<ul style="list-style-type: none"> • Low use application only 	<ul style="list-style-type: none"> • Recommend flow range of 1,000 gpd to 5,000 gpd. • Existing comfort station design flow of 2,100 gpd based on fixture counts. 	<ul style="list-style-type: none"> • Recommend flow range of 1,000 gpd to 5,000 gpd • Existing comfort station design flow of 2,100 gpd based on fixture counts. 	<ul style="list-style-type: none"> • The larger the flow, the greater the land area required. The existing comfort station requires approximately 1,530 square feet of constructed wetlands. 	<ul style="list-style-type: none"> • Great benefit derived from sufficient flows. No limitation 	<ul style="list-style-type: none"> • Great benefit derived from sufficient flows.
IMPACT ON PARK FUNCTIONS AND OPERATION	None	None	None	None	Area must be fenced and will be restricted from park usage.	None	Areas where recycled water applied may be temporarily restricted from public use.
AREA OF DISTURBANCE	• Minimal	• Small	• Existing comfort station required 2,500 gallon septic tank and approximately 2,700 square feet leach field	• Same as for a septic tank and leach field	• Existing comfort station requires 2- 1500 gallon pre-treatment tanks, approximately 1,530 square feet of constructed wetlands and 1,360 square feet disposal field.	• Large	• Large
WATER QUALITY IMPACT ON ENVIRONMENT	None	None	Medium-High	Medium	Medium-High	Low	Medium
CONSTRUCTION COST IMPACTS	Low	Medium	Medium	Medium-High	Medium-High	High	Medium-High

**HAENA STATE PARK MASTER PLAN
WASTEWATER TREATMENT ALTERNATIVE MATRIX (Continued)**

	HOLDING TANKS	COMPOSTING TOILETS	SEPTIC TANK	AEROBIC TREATMENT UNIT	CONSTRUCTED WETLANDS (Subsurface Flow)	GRAVITY SEWER AND PUMP STATIONS TO CENTRALIZED WASTEWATER PACKAGE PLANT FOR REUSE	RECIRCULATING SAND FILTER FOR REUSE (not discussed in report)
OPERATION & MAINTENANCE COST IMPACTS	High	Medium-High	Low	Medium	Medium	High	Medium-High
SPECIAL MAINTENANCE REQUIREMENTS	None	Requires continuous ventilation	None	Requires continuous application of compressed air	Requires maintenance and upkeep of plants	Requires continuous maintenance of equipment Requires certified operator	Requires continuous energy consumption
REGULATORY IMPACTS (Monitoring, recording and special operations)	<ul style="list-style-type: none"> • Continuous monitoring of tank water level 	<ul style="list-style-type: none"> • Quarterly inspection 	<ul style="list-style-type: none"> • Annual inspections for residence • Quarterly inspections for public facilities 	<ul style="list-style-type: none"> • Quarterly inspections 	<ul style="list-style-type: none"> • Requires special approval from DOH. • Quarter inspections 	<ul style="list-style-type: none"> • Monitoring and recordkeeping of the treatment and water reuse required by the DOH. • A wastewater grade operator license is required. 	<ul style="list-style-type: none"> • Monitoring and recordkeeping required by the DOH. • A wastewater grade operator license is required.
APPLICABLE USAGE	<ul style="list-style-type: none"> • Maintenance Baseyard • Caretaker's Cottage 	<ul style="list-style-type: none"> • Maintenance Baseyard • Allerton's Caretaker's Cottage at trail head 	<ul style="list-style-type: none"> • All Facilities 	<ul style="list-style-type: none"> • All Facilities 	<ul style="list-style-type: none"> • Visitor Center / Comfort Station 	<ul style="list-style-type: none"> • All Facilities 	<ul style="list-style-type: none"> • Visitor Center / Comfort station

VII. RECOMMENDATIONS

During the community meetings, it was agreed that any wastewater system proposed treat the wastewater effluent for potential reuse, to protect the grounds and surrounding environment of the Park from any on-site disposal. It is believed by being good stewards of the Park, the environment will be preserved for future generations.

Therefore, at a minimum, aerobic treatment units with absorption beds should be consider. Beyond this, water resource management and reuse options as discussed hereinbefore should be seriously taken into consideration during design.

Also, specifically, discussed were:

1. R-2 water quality effluent be provided at the visitor's center, with additional treatment for reuse.
2. The absorption bed be placed under the parking lot to provide separation and avoid contamination of the loi patches.
3. Providing aeration to the existing constructed wetlands primary treatment tanks through the use of a photovoltaic system.
4. Compost toilets only be considered for low usage areas, if at all.

APPENDIX A

**TABLE 3-1 SUMMARY OF SUITABLE
USES FOR RECYCLED WATER**

*(from Guidelines for the Treatment and
Use of Recycled Water, May 15, 2002)*

TABLE 3-1 SUMMARY OF SUITABLE USES FOR RECYCLED WATER

SUITABLE USES OF RECYCLED WATER	R1	R2	R3
IRRIGATION: (S)pray, (D)rip & Surface, S(U)bsurface, (A)LL=S D & U, Spray with (B)uffer, (N)ot allowed, /=or			
Golf course landscapes	A	U/B	N
Freeway and cemetery landscapes	A	A	N
Food crops where recycled water contacts the edible portion of the crop, including all root crops	A*	N	N
Parks, elementary schoolyards, athletic fields and landscapes around some residential property	A	U	N
Roadside and median landscapes	A	U/B	N
Non-edible vegetation in areas with limited public exposure	A	AB	U
Sod farms	A	AB	N
Ornamental plants for commercial use	A	AB	N
Food crops above ground & not contacted by irrigation	A	U	N
Pastures for milking and other animals	A	U	N
Fodder, fiber, and seed crops not eaten by humans	A	AB	DU
Orchards and vineyards bearing food crops	A	D/U	DU
Orchards and vineyards not bearing food crops during irrigation	A	AB	DU
Timber and trees not bearing food crops	A	AB	DU
Food crops undergoing commercial pathogen destroying process before consumption	A	AB	DU
SUPPLY TO IMPOUNDMENTS: (A)llowed (N)ot allowed			
Restricted recreational impoundments	A	N	N
Basins at fish hatcheries	A	N	N
Landscape impoundments without decorative fountain	A	A	N
Landscape impoundments with decorative fountain	A	N	N
SUPPLY TO OTHER USES: (A)llowed (N)ot allowed			

TABLE 3-1 SUMMARY OF SUITABLE USES FOR RECYCLED WATER

SUITABLE USES OF RECYCLED WATER	R1	R2	R3
IRRIGATION: (S)pray, (D)rip & Surface, S(U)bsurface, (A)LL=S D & U, Spray with (B)uffer, (N)ot allowed, /=or			
Golf course landscapes	A	U/B	N
Freeway and cemetery landscapes	A	A	N
Food crops where recycled water contacts the edible portion of the crop, including all root crops	A*	N	N
Parks, elementary schoolyards, athletic fields and landscapes around some residential property	A	U	N
Roadside and median landscapes	A	U/B	N
Non-edible vegetation in areas with limited public exposure	A	AB	U
Sod farms	A	AB	N
Ornamental plants for commercial use	A	AB	N
Food crops above ground & not contacted by irrigation	A	U	N
Pastures for milking and other animals	A	U	N
Fodder, fiber, and seed crops not eaten by humans	A	AB	DU
Orchards and vineyards bearing food crops	A	D/U	DU
Orchards and vineyards not bearing food crops during irrigation	A	AB	DU
Timber and trees not bearing food crops	A	AB	DU
Food crops undergoing commercial pathogen destroying process before consumption	A	AB	DU
SUPPLY TO IMPOUNDMENTS: (A)llowed (N)ot allowed			
Restricted recreational impoundments	A	N	N
Basins at fish hatcheries	A	N	N
Landscape impoundments without decorative fountain	A	A	N
Landscape impoundments with decorative fountain	A	N	N
SUPPLY TO OTHER USES: (A)llowed (N)ot allowed			

APPENDIX B

**WASTEWATER TREATMENT AND
DISPOSAL ALTERNATIVES - FACT SHEETS**

*(from On-Site Wastewater Treatment Survey
and Assessment Study, January 2008)*

Table 5-1 Summary of Typical Onsite Wastewater Treatment System Effluent Water Quality

TREATMENT SYSTEM	BOD mg/L	TSS mg/L	Total Nitrogen mg/L	Total Phosphorus mg/L	Fecal Coliforms Per 100 mL	COMMENTS
Septic Tank	132 - 217	49 - 161	39 - 82	11 - 22	40,000 – 160 million	(USEPA, 2002 and Hallahan, 2002)
Low water/Waterless Toilets	-	-	-	-	-	No effluent. By-products require disposal/use outside scope of this handbook
Continuous Flow, Suspended Growth	10 - 50	15 - 60	30 - 40% removal	10 - 20% removal		(USEPA, 2002)
Continuous Flow w/ fixed internal packing	10	15	7 - 22			
Sequenced Batch Reactor ATU	5 - 15	10 - 30				
Single Pass Sand Filter	2 - 4	3 - 16	0.5 - 6	40% removal	60-1500	
Recirculating Sand Filter	3 - 10	3 - 9	3 - 8		10-25	
Enhanced Phosphorus Removal	-	-	-	1 - 2 mg/L	-	
Enhanced Nitrogen Removal	-	-	40 - 80% removal	-	-	
Emerging Trace Contaminant Removal	-	-	-	-	-	
Chlorine Disinfection	-	-	-	-	Reduction of 99.0-99.9%	
UV Disinfection	-	-	-	-	Reduction of 99.9%	

Table 5-3 Summary of Advantages and Disadvantages of Typical Onsite Wastewater Treatment Systems

Treatment System	Advantages	Disadvantages or Limitations
Septic Tank	<ul style="list-style-type: none"> ▪ No moving parts ▪ Easily maintained with periodic pumping 	<ul style="list-style-type: none"> ▪ Only primary treatment provided
Low water/Waterless Toilets	<ul style="list-style-type: none"> ▪ Incinerators – waste is sterile and can be thrown away like household rubbish ▪ Composting toilets – offer recycling of waste ▪ Chemical – viable temporary system 	<ul style="list-style-type: none"> ▪ Incinerators – require other utilities such as electricity or natural gas ▪ Composting – long periods of treatment ▪ Chemical – usually temporary, must be pumped often
Continuous Flow, Suspended Growth ATU	<ul style="list-style-type: none"> ▪ Habitually meets Class I effluent standards 	<ul style="list-style-type: none"> ▪ Continuous energy requirements ▪ Poor maintenance leads to degraded effluent quality ▪ Requires long startup times-not good for seasonal flows
Continuous Flow, w/ Fixed Packing	<ul style="list-style-type: none"> ▪ Habitually meets Class I effluent standards 	<ul style="list-style-type: none"> ▪ Energy consumption ▪ Requires long startup times-not good for seasonal flows
Sequenced Batch Reactor ATU	<ul style="list-style-type: none"> ▪ Habitually meets Class I effluent standards ▪ High Nitrification/Denitrification 	<ul style="list-style-type: none"> ▪ Energy consumption is costly ▪ Requires computer controls
Single Pass Sand Filter	<ul style="list-style-type: none"> ▪ High TSS removal ▪ Proven technology 	<ul style="list-style-type: none"> ▪ High cost associated with media ▪ Maintenance required to prevent biomat clogging and ponding
Recirculating Sand Filter	<ul style="list-style-type: none"> ▪ High denitrification 	<ul style="list-style-type: none"> ▪ Energy consumption with recirculating pump ▪ Cost of media ▪ Maintenance required of the bed and the pump
Enhanced Phosphorus Removal	<ul style="list-style-type: none"> ▪ Removes phosphorus in areas that have low calcium, low iron, or low aluminum soils ▪ Helps protect surface water in soils that fail to remove phosphorus 	<ul style="list-style-type: none"> ▪ For media filters, construction costs can double due to expense associated with phosphorus attenuating media
Enhanced Nitrogen Removal	<ul style="list-style-type: none"> ▪ Helps prevent groundwater contamination ▪ Prevents eutrophication of surface waters 	<ul style="list-style-type: none"> ▪ Requires aerobic and anoxic cycles or stages for biological removal of nitrogen ▪ Plumbing code does not regulate separate black- and graywater plumbing
Enhanced Emerging Contaminant Removal	<ul style="list-style-type: none"> ▪ Necessary to remove medication and hormones that are not consumed by biological treatment 	<ul style="list-style-type: none"> ▪ Added expense associated with powdered activated carbon or other chemical absorbants
Chlorine Disinfection	<ul style="list-style-type: none"> ▪ Safest and simplest with chloride tablets ▪ Cheapest means of disinfection 	<ul style="list-style-type: none"> ▪ Requires monitoring to ensure chloride tablets are always present to provide chloride ▪ Residual chlorine may harm downstream organisms
UV Disinfection	<ul style="list-style-type: none"> ▪ No residual chemicals disposed in environment 	<ul style="list-style-type: none"> ▪ Bulbs are expensive ▪ Requires power ▪ Can be ineffective in high TSS environments

A septic tank is a tank that serves as both a settling and skimming tank. Grit and other solids settle to the bottom of the tank and create a layer of sludge. Oil, grease, fat, and other floatables rise to the top creating a layer of scum. Accumulated sludge and scum must be removed on a regular basis; failure to do so will lead to carryover of these materials into downstream systems leading to their failure. Where site conditions indicate higher quality effluent is required, septic tanks are used as pretreatment for other treatment systems, including biological treatment systems.

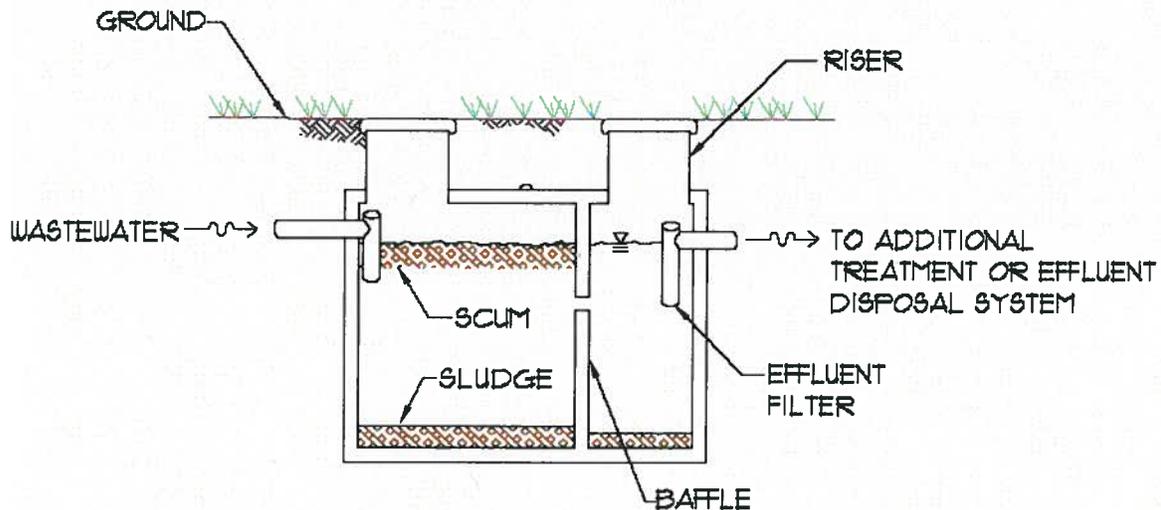


Figure 5-2 Typical Double Chambered Septic Tank

Considerations and Restrictions

A septic tank is purchased prefabricated, made of concrete or fiberglass, and it must meet the International Association of Plumbing and Mechanical Officials (IAPMO) material and property standards for prefabricated septic tanks. However, depending on site conditions, sometimes it is easier to construct a tank in-place. A constructed in-place septic tank must be designed in accordance with IAPMO specifications and stamped by a licensed structural engineer. Regardless of how a tank is constructed, it must be waterproof to prevent leakage and protected from corrosion in accordance with HAR 11-62, Subchapter 3.

The capacity of a septic tank is an important aspect in the treatment of wastewater prior to disposal. The required capacity of residential septic tanks can be referenced using HAR 11-62, Subchapter 3. The City and County of Honolulu "Design Standards of the Department of Wastewater Management" or the applicable county publication must be consulted.

A septic tank must be installed by a licensed contractor to comply with spacing and minimum distance requirements, as described in Chapter 3 of this document. Use of a septic tank requires the selection of a downstream disposal system (see Chapter 4).

Effluent Quality

In accordance with HAR 11-62, Subchapter 33, septic tank effluent must be discharged into a soil absorption system, a sand filter, a subsurface irrigation system (with director approval), or another treatment system. Septic tanks remove approximately 30% of BOD and 30% of TSS from typical domestic wastewater resulting in effluent quality of BOD ranging between 138 mg/L and 240 mg/L, and suspended solids in the range of 49 to 155 mg/L.

The DOH requires the installation of a screen on the effluent end of the septic tank to enhance solids removal and thereby prevent clogging of disposal systems. The effluent filter can be installed on the effluent tee on the inside of the septic tank, or in a separate structure outside the tank to facilitate access for required periodic cleaning, without which backups will occur.

Typical Installed Costs (2007)

A 1,000-1,250 gallon residential septic tank costs approximately \$5,000-\$12,000 installed, including material, equipment, and labor. An effluent filter is about \$200-\$700 installed. The cost of a septic tank does not include the disposal system (see Chapter 4).

Operation and Maintenance Costs

The decomposition rate of the solids that settle to the bottom of the tank and those that accumulate in the scum layer on the surface is slow, resulting in the accumulation of solids in the septic tank. Because of the accumulation of solids and scum, periodic pumping is required (every 2-3 yrs) to keep the tank functioning as designed and prevent solids from breaking and overflowing to the soil absorption system. The estimated cost for these pumping services range between \$150 and \$550 per visit. Assuming that the septic tank is pumped every 2-3 years, the equivalent cost is about \$50-\$200 per year. Pumping costs vary due to difficulty accessing the tank, haul distances, and limited pump truck capacity. Minimal use of kitchen sink grinders will help reduce the solids load, and extend the time between pumping of the septic tank and any downstream treatment units.

The effluent filter must be cleaned on a regular basis because of the growth of bacteria that will clog the filter. Frequency of cleaning is dependent on the size of the screen, environmental conditions, and type of wastewater entering the septic systems. Some manufacturers recommend cleaning every 1-3 years depending on level of use and site conditions. Cleaning consists of hosing off the filter into the septic tank and can be done by the homeowner.

Septic Tank Summary

Meets NSF 40 Standards	No
Effluent BOD:	132-217 mg/L
Effluent TSS	49-161 mg/L
Removes 50% total influent nitrogen	No
Effluent Nitrogen:	39-82 mg/L
Effluent Phosphorus:	11 -22 mg/L
Effluent Fecal Coliform:	1,000,000 /100 mL
Maintenance Level:	2-3 yrs
Power Required:	No
Typical Installed Cost:	\$5,000-\$12,000 /1,000 gal

Low water or waterless system is a broad, generic term given to a range of treatment systems that use little water or no water in collecting or treating human waste. It includes incinerating toilets, composting toilets, and chemical toilets.

Incinerating toilets use heat or combustion to degrade human waste into water, carbon dioxide, and ash. Incinerating toilets are one of a few treatment technologies that do not require a soil disposal system. However, the ash from the incineration must be disposed of, usually with municipal refuse in a landfill. Incinerating toilets may use natural gas, liquid propane, or electricity to incinerate the human waste, and are usually designed to handle only feces, urine, and paper. Ventilation for the toilet must be supplied.

Composting toilets receive human waste and stabilize it through natural degradation. The waste is mixed with starting mulch, and allowed to degrade and dehydrate for a period of up to 12 months, depending on usage. The composted material removed from composting toilets is suitable as a soil amendment, however, such use is restricted as described in HAR 11-62 in order to protect public health. The toilets come in automatic, semi-automatic, and manual versions. The automated models usually include heaters, ventilation fans, and a mechanical means to mix or aerate the compost.

Chemical toilets are toilets which have a chemical reservoir beneath them that catches the human waste. The chemicals in the toilet slightly disinfect the human waste and also provide a deodorant. Chemical toilets do not completely break down human waste and must be pumped frequently due to a very limited holding capacity. The contents of chemical toilets must be taken to a local wastewater treatment facility. The contents should not be poured into a home septic tank or aerobic treatment unit as the chemicals will have adverse effects on the biology of the treatment system.

Considerations and Restrictions

Incinerating toilets are acceptable, long-term treatment systems, but they are typically only found in temporary or seasonal housing. The by-products (ash) must be periodically removed, but because it is sterile after incineration and poses no nutrient threat to the environment, it can generally be disposed of as household garbage. Without proper ventilation, odors may be generated (both from the human waste and the process of combustion.) Additional utilities are required (natural gas, propane, or electricity).

Composting toilets are also acceptable long term treatment systems, but are also an item typically only found in seasonal housing, campsites or other locations not occupied fulltime. Composting requires long periods of time to stabilize the human waste and may create odor problems. Those systems that do not use electricity for evaporative fans or mixing require more attention from the operator to maintain function. The produced compost is suitable as a soil applied fertilizer, but cannot be used for crops meant for human consumption, and its use is restricted by HAR 11-62.

Chemical toilets are a temporary means of treatment. The limited capacity and frequent pumping lend the system for uses that are of short duration, such as a few days. As anyone who has been to a large public gathering knows, chemical toilets are also a good augmentation to existing restroom facilities during short events or festivities.

Suspended Growth Aerobic Treatment Systems Fact Sheet B-1

A suspended growth aerobic treatment system (one type of ATU) is a biological treatment system where microorganisms are kept in suspension by mixing air with wastewater influent and concentrated underflow or sludge (from a clarifier) in an aeration tank.

From the aeration tank, the mixture is passed into a settling basin (clarifier), where microorganisms settle to the bottom forming a layer of sludge. The liquid is passed to a disposal system or another process for additional treatment. Some of the sludge solids in the settling basin will undergo decomposition, while the remainder accumulates and must periodically be removed (pumped out) and properly/legally disposed of offsite.

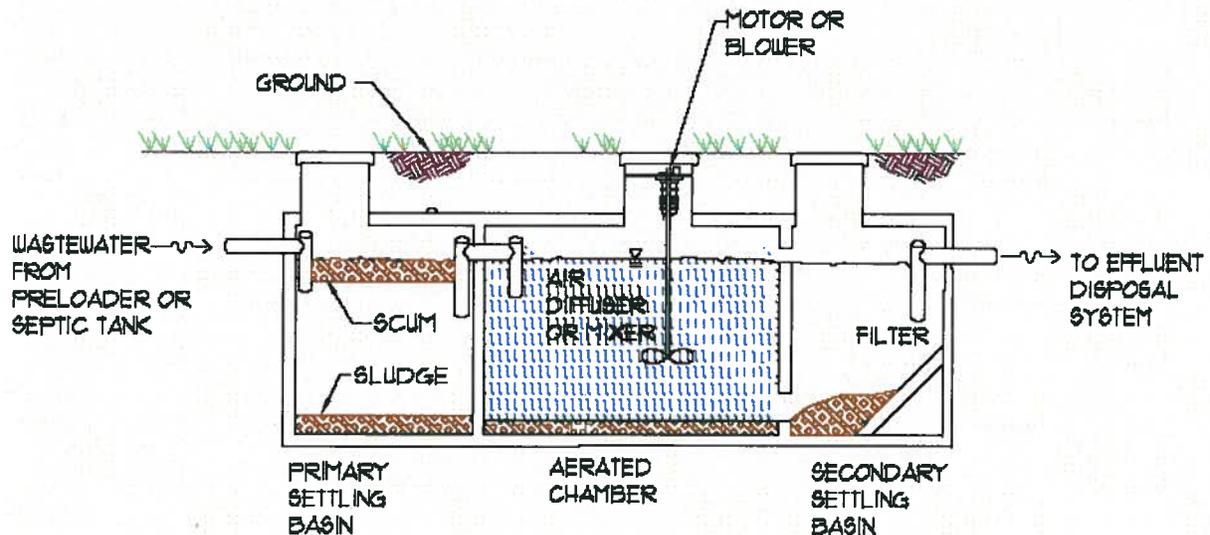


Figure 5-3 Continuous Flow, Suspended Growth Aerobic System with Settling Basins

Considerations and Restrictions

If the suspended-growth aerobic treatment system does not include an integral primary settling basin, a separate septic tank or pre-loader should be installed upstream of the aerobic treatment unit. The purpose of this additional tank is to remove readily settleable solids and floating matter that will reduce suspended solids loading and protect downstream mechanical equipment.

Consideration should be given to determine how best to use the existing grades to allow gravity flow from septic tank to aerobic treatment system to disposal system.

Power is needed to serve the blowers, pumps, controls, and monitoring and alarm systems in the ATU.

Use of a suspended-growth ATU requires the selection of a disposal system (see Chapter 4).

Effluent Quality

Suspended-growth aerobic treatment systems can treat domestic wastewater and achieve effluent quality of BOD concentrations in the range of 5-50 mg/L and TSS concentrations of 5-60 mg/L. However, it should be noted that suspended-growth ATUs are not the most optimal to reduce nitrogen or phosphorus.

Typical Installed Costs (2007)

Complete installation including materials, equipment and labor can range between \$20,000-30,000. This cost does not include the cost for a preloader/septic tank, if required, or the cost for a disposal system. See Septic Tanks (Sheet P-1) for a cost range for preloaders. See Chapter 4 for the costs of disposal systems.

Operation and Maintenance Costs

Operation and maintenance costs are dependent on labor costs and electricity but range from \$400 to \$600 a year. Trained professionals should manage the aerobic system which should be inspected every 3-4 months with sludge/scum pumping performed as needed.

These systems are sensitive to high and low temperatures, heavy loading of solids, toxic chemicals (including chemical cleansers and the like), power failures, and influent flow variability.

Suspended Growth Summary

Meets NSF 40 Standards	Yes
Effluent BOD:	5-50 mg/L
Effluent TSS	5-60 mg/L
Removes 50% total influent nitrogen	No
Effluent Nitrogen:	10-60 mg/L
Effluent Phosphorus:	4-18 mg/L
Effluent Fecal Coliform:	1,000,000 /100 mL
Maintenance Level:	Quarterly
Power Required:	Yes
Typical Installed Cost:	\$20,000-\$30,000 /1,000 gallons

Combined attached and suspended growth systems are a type of ATU in which microorganisms form a slime layer on the surface of submerged or semi-submerged media. Treatment occurs as the wastewater passes over the microorganisms.

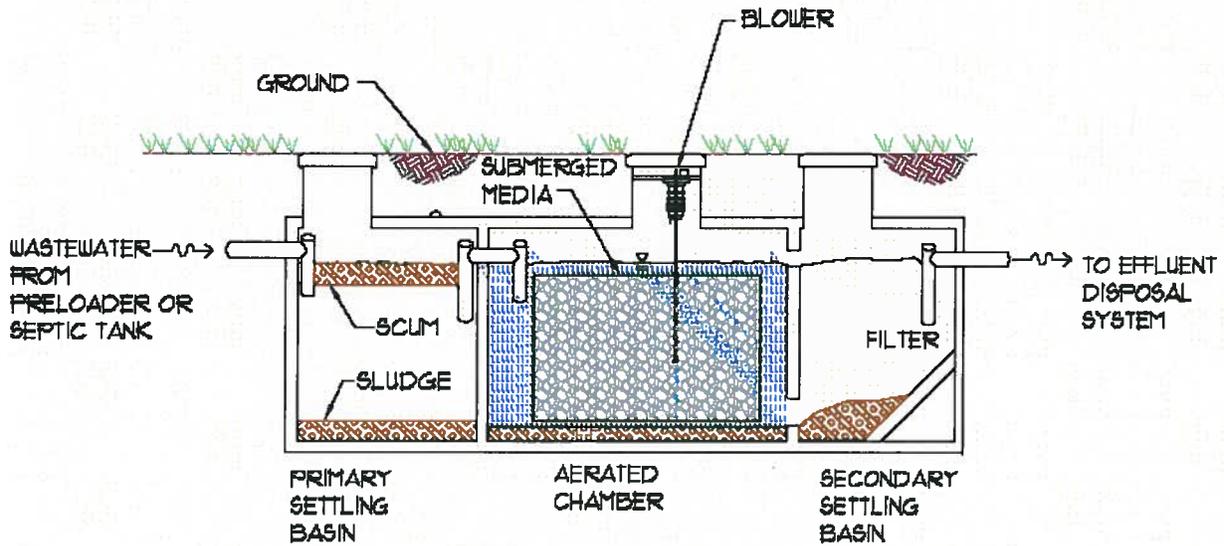


Figure 5-4 Combined Attached and Suspended Growth Reactor

Considerations and Restrictions

If the combined growth ATU does not include an integral primary settling basin, a separate septic tank or pre-loader should be installed upstream of the aerobic treatment unit. The purpose of this additional tank is to remove readily settleable solids and floating matter that will reduce suspended solids loading and protect downstream mechanical equipment.

Consideration should be given to determine how best to use the existing grades to allow gravity flow from septic tank to aerobic treatment system to disposal system. In addition, the system should be sited such that it can easily be accessed and inspected.

Use of a combined attached and suspended growth ATU system requires the selection of a disposal system (see Chapter 4).

Effluent Quality

Effluent BOD and TSS concentrations of 5-40 mg/L are expected from a combined growth system. Complete nitrification is expected (conversion of ammonia to nitrate) and phosphorus removal is expected to be between 10 and 15%.

Typical Installed Costs (2007)

Installation costs range from \$20,000 to \$30,000. This cost does not include the cost for a pre-loader, if required, or the cost for a disposal system. See Septic Tanks (Sheet P-1) for a cost range for pre-loaders. See Chapter 4 for the costs of disposal systems.

Operation and Maintenance Costs

Costs to operate combined growth ATU systems range from \$35-\$100 per year in energy, and management (pumping, inspection, and analysis) can cost \$100-\$200 per year. Energy consumption is on the order of 1-8 kW-h/day. Extended power outages will result in odorous conditions. Trained professionals should manage the ATU system which should be inspected every 3-4 months with sludge/scum pumping as needed.

These systems are sensitive to high and low temperatures, heavy loading of solids, toxic chemicals (including chemical cleansers and the like), power failures, and influent flow variability.

<u>Attached and Suspended Growth Summary</u>	
Meets NSF 40 Standards	Yes
Effluent BOD:	10-30 mg/L
Effluent TSS	15-60 mg/L
Removes 50% total influent nitrogen	Possible
Effluent Nitrogen:	7-22 mg/L
Effluent Phosphorus:	2-10 mg/L
Effluent Fecal Coliform:	1,000,000 /100 mL
Maintenance Level:	Quarterly
Power Required:	Yes
Typical Installed Cost:	\$20,000-\$30,000 /1,000 gallons

A Sequencing Batch Reactor (SBR) is a form of ATU in which all of the aerobic and clarifying processes occur within a single tank. The tank may be constructed from concrete, fiberglass, or high-density polyethylene (HDPE). A SBR is designed to operate by sequencing through at least four (4) steps as follows:

- 1) **FILL**: tank is filled with wastewater to a predetermined volume or time;
- 2) **AERATION**: aeration is started with the suspended microorganisms in the wastewater;
- 3) **SETTLE**: aeration is turned off and the microorganisms settle to the bottom of the tank; and
- 4) **DECANT**: decant the clarified portion as effluent.

After decanting, the cycle repeats with filling again. By allowing the tank water level to vary, providing influent stilling zones, and only decanting during aeration off cycles, these single-tank systems can be designed to operate continuously. Of great importance to the SBR process is the control system consisting of timers, level sensors, and microprocessors.

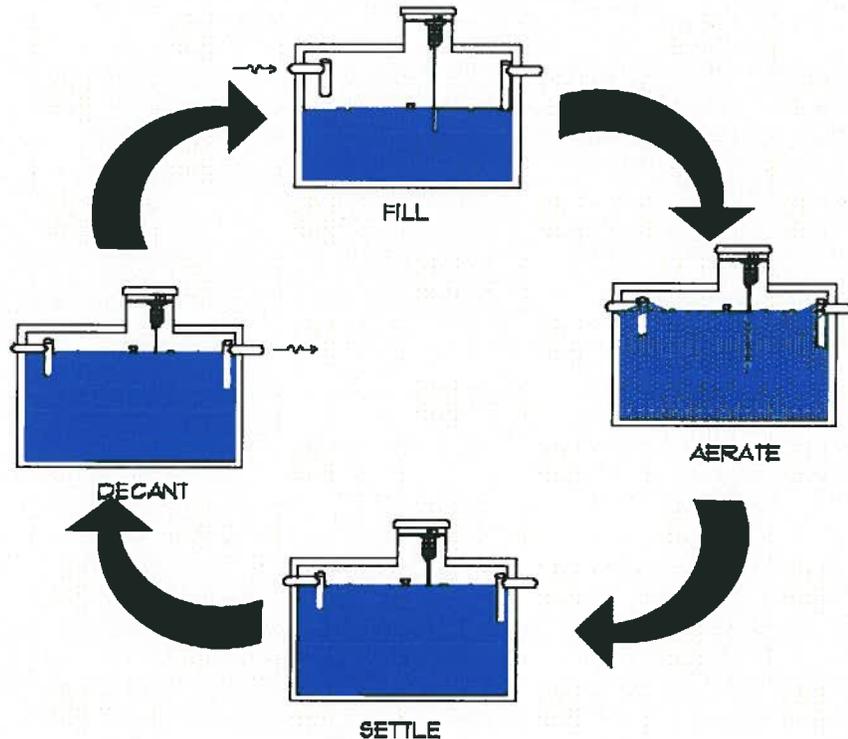


Figure 5-5 Cycles of an SBR / CBT

Considerations and Restrictions

SBRs are a type of suspended-growth ATU that can oxidize BOD and provide both nitrification and denitrification (enhanced nitrogen removal). SBRs require power, control, and monitoring and alarm systems. SBRs have mechanical equipment (pumps, blowers, decanters) which must be properly maintained to ensure optimal operation.

Use of an SBR system requires the selection of a disposal system (see Chapter 4).

Effluent Quality

Effluent from SBRs is of very good quality in terms of BOD and TSS. Typical ranges are from 5 -15 mg/L BOD and 10-30 mg/L of TSS.

SBRs will completely oxidize ammonia to nitrate via nitrification during the aeration cycle (aerobic cycle), and then facilitate nitrogen removal via denitrification during the settle and decant cycles (cycles that are anoxic). They can also provide enhanced biological phosphorus removal. The higher quality of effluent produced reduces the organic loading on the disposal system. SBRs also provide a consistent effluent, eliminating the fluctuations caused by varying influent loads.

Typical Installed Costs (2007)

Equipment costs range from \$7,000-\$9,000 with installation costs of \$1,500-\$3,000 based on Mainland costs. Current costs to install in Hawaii are in the range of \$20,000 - \$30,000. This cost does not include the cost for a preloader, if required, or the cost for a disposal system. See Septic Tanks (Sheet P-1) for a cost range for preloaders. See Chapter 4 for the costs of disposal systems.

Operation and Maintenance Costs

Annual energy costs are less than \$600 and pumping and inspection costs are greater than \$100. Trained professionals should manage the SBR system, which should be inspected every 3-4 months with sludge/scum pumping as needed. Homeowner neglect and/or interference can lead to operational malfunction. Alarms to warn of system failures are critical. Energy requirements are between 3 and 10 kW-h/day.

SBR Summary

Meets NSF 40 Standards	Yes
Effluent BOD:	5-15 mg/L
Effluent TSS	10-30 mg/L
Removes 50% total influent nitrogen	Yes
Effluent Nitrogen:	7-45 mg/L
Effluent Phosphorus:	2-10 mg/L
Effluent Fecal Coliform:	1,000,000 /100 mL
Maintenance Level:	Quarterly
Power Required:	Yes
Typical Installed Cost:	\$20,000-\$30,000 /1,000 gallons

A packed-bed reactor is an attached-growth biological treatment process that can be aerobic or anaerobic, upflow or downflow, continuous or intermittent dosing, single-media or multi-media and arranged in one or multiple stages. The most common prefabricated packed-bed reactor is an aerobic, down flow, continuous dosing, and continuous media type reactor. The packed-bed filter is a large excavation lined with an impermeable material that is filled with sand or other media placed over an underdrain. Wastewater is dosed at the top of the media bed, and allowed to percolate through the media (filter) to an underdrain. The aerobic biological treatment usually occurs in the first six inches of the filter surface, and chemical treatment, in the form of adsorption, occurs throughout the filter.

Packed bed reactors can be single pass (intermittent sand filters) or they can recirculate the effluent to treat the wastewater multiple times (recirculating sand filters or RSF). Ultimately, the effluent is discharged to a disposal system, similar to those discussed in Chapter 4.

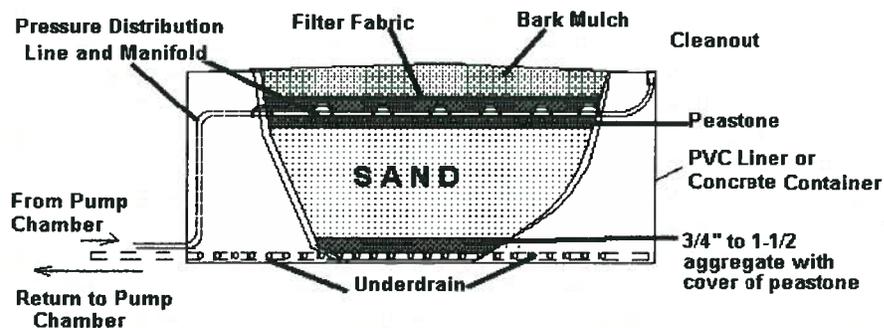


Figure 5-6 Packed Bed Filter (Adapted from USEPA)

Considerations and Restrictions

Sand filters are usually sized using hydraulic data, but consideration must also be given to the organic loading since it acts as a biofilm reactor. This type of system requires significant land area. Based on a typical application rate of 1-2 gallons per day per square foot (gpd/ft²), it will require 500-1,000 square feet for the treatment of 1,000 gpd.

Filters may need to be covered to ensure protection against accumulation of debris from the surrounding environment, algae fouling, and an increased hydraulic load from precipitation. Coverings may be as simple as a tarp canopy, which allows ample ventilation of the bed. Otherwise, the filter may be buried in the ground to provide protection and aesthetic concealment. Extra care must be given to filters buried in the ground to ensure ventilation of the bed. Mechanical aeration (blowers) may be required.

A pump station or recycle tank is required prior to the packed-bed filters to assist with equal distribution in the dosing pipelines across the media bed area.

Use of a packed bed system requires the selection of a disposal system (see Chapter 4).

Effluent Quality

Effluent BOD is typically 5 mg/L and TSS is typically about 10 mg/L. Biological nitrogen removal is approximately 18-33%. Fecal coliforms are reduced by 99 to 99.99%.

Typical Installed Costs (2007)

This cost includes the excavation, the media, the underdrain, and the dosing pump. The price range for media is \$10-\$15 per square foot of bed area. For a 250-1,000 square foot media filter, costs should range between \$15,000 and \$30,000. This cost does not include the cost for a preloader, if required, or the cost for a disposal system. See Septic Tanks for a cost range for preloaders. See Chapter 4 for the costs of disposal systems.

Operational and Maintenance Costs

Operational costs include electricity for pumping and semi-skilled labor. Electrical costs can be estimated at \$20-30 a year at 0.3-0.4 kW-h/day, and management costs at \$150-200 per year. Every 3-4 months the filter should be inspected, and the top layer (1 inch) of media should be scraped off periodically (3 months-1 year) and properly disposed. Power outages affect the performance of sand filters, and extended outages may result in odors.

Packed-bed Reactor Summary

Meets NSF 40 Standards	Yes
Effluent BOD:	2-10 mg/L
Effluent TSS	3-16 mg/L
Removes 50% total influent nitrogen	Possible
Effluent Nitrogen:	0.5-8 mg/L
Effluent Phosphorus:	3-12 mg/L
Effluent Fecal Coliform:	1,000 /100 mL
Maintenance Level:	Quarterly
Power Required:	No
Typical Installed Cost:	\$15,000-30,000 /1,000 gallons

Chlorine is the most commonly used chemical and/or method for disinfection of water and wastewater, and has a long history of use in the US. Chlorine is effective against a wide range of pathogenic organisms. Common forms of chlorine include chlorine gas, solid or liquid chlorine (calcium hypochlorite and sodium hypochlorite), and chlorine dioxide.

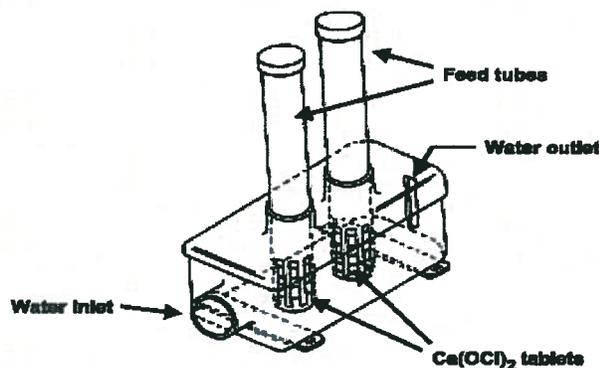


Figure 5-8 Tablet Chlorination Chamber (Adapted from USEPA)

Considerations and Restrictions

Gaseous chlorine is the most commonly used form; however, due to its highly corrosive nature and significant safety concerns, it is generally not recommended for onsite applications. Liquid hypochlorite solutions are commonly used at small treatment plants, where safety and simplicity are top priorities. Solid hypochlorite (powder or tablets) is common for onsite treatment systems (the same materials used for swimming pools and hot-tubs). All forms of chlorine are generally toxic and corrosive. They require careful handling and storage. The residual chlorine is effective as a disinfectant after the initial treatment. However, even at low concentrations, it can be toxic to aquatic life, and de-chlorination is necessary for discharges to (or impacting) surface waters.

Effluent Quality

One advantage of using chlorine as a disinfectant is its ability to exist as a residual in wastewater effluent even after initial treatment. Chlorine has been shown to reduce fecal coliforms by 99-99.99%.

Typical Installed Costs (2007)

A hypochlorite tablet feed system could cost \$800-\$1,000 for 1,000 gallons per day for the system itself. Labor and material costs vary depending on whether the tablet feeder is part of a pre-packaged system or added to an existing system. A gas chlorine system may cost \$75,000 to treat 100,000 gallons per day.

Operation and Maintenance Costs

Operational costs for a tablet system are approximately \$30-\$50 per year for tablets, \$75-\$100 per year in labor, and \$15-\$25 per year in repairs and replacements.

Estimated cost for a gaseous chlorine system is approximately \$4,500 for chemicals, \$4,000 for labor, \$4,000 for power, and \$6,000 for materials.

Operating and maintenance cost and tasks include power consumption, cleaning, chemicals and supplies, repairs, and labor.

Chlorination Summary

Meets NSF 40 Standards	NA
Effluent BOD:	- mg/L
Effluent TSS	- mg/L
Removes 50% total influent nitrogen	NA
Effluent Nitrogen:	- mg/L
Effluent Phosphorus:	- mg/L
Effluent Fecal Coliform:	1000-10000 /100 mL
Maintenance Level:	Quarterly
Power Required:	No
Typical Installed Cost:	\$800-\$1,000 /1,000 gallons

Ultraviolet (UV) light is a physical disinfection agent that takes advantage of the germicidal properties of UV in the range of 240-270 nm. This radiation penetrates the cell wall of organisms, preventing reproduction. The effectiveness of UV disinfection depends on the characteristics of wastewater (particularly clarity as measured by turbidity), UV intensity, time of exposure, and reactor configuration.

Considerations and Restrictions

UV is effective in the inactivation of most viruses, spores, and cysts. UV eliminates the handling and storage of hazardous or toxic chlorine chemicals. However, UV performance is highly dependent on the quality of the wastewater it is disinfecting. High turbidity and total suspended solids will shield bacteria, making UV treatment ineffective.

Effluent Quality

UV disinfection is lacking in field studies, but typical units treating sand filter effluents can reduce fecal coliforms by 99.9%.

Typical Installed Costs (2007)

The component cost for a UV system is between \$1,000-\$2,000 per 1,000 gpd. Labor and material costs vary depending on whether the system is a built-in component of a packaged treatment system or added as an off-the-shelf component to enhance an existing system.

Operation and Maintenance Costs

Annual power costs are \$35-\$45, labor \$50-\$100, and lamp replacement \$70-\$80 per year. Power consumption is about 35 W or 307 kW-h/y.

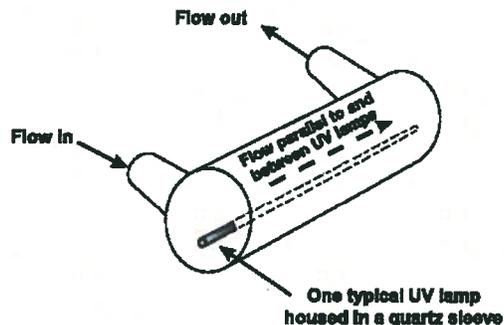


Figure 5-9 Ultraviolet Radiation Chamber (Adapted from USEPA)

UV Disinfection Summary

Meets NSF 40 Standards	NA
Effluent BOD:	- mg/L
Effluent TSS	- mg/L
Removes 50% total influent nitrogen	NA
Effluent Nitrogen:	- mg/L
Effluent Phosphorus:	- mg/L
Effluent Fecal Coliform:	~1,000 /100 mL
Maintenance Level:	Quarterly
Power Required:	Yes
Typical Installed Cost:	\$1,000-\$2,000 /1,000 gallons

Table 6-1 Typical Small Flows Wastewater Treatment System Effluent Water Quality

SYSTEM	BOD mg/L	TSS mg/L	Total Nitrogen mg/L	Total Phosphorus mg/L	Fecal Coliforms per 100 mL	COMMENTS
Cluster systems	132-217	49-161	39-82	11-22	1 – 100 million	Assuming STEP system
Lagoons	60-140	Variable	Up to 60% removal	Minimal Removal	Variable	
Oxidation Ditches	<10	<10 if settling tank is used	Total removal with designed anoxic zone	Minimal Removal	Variable	
Attached Growth Aerobic reactors	<30	<30	<30	~10	>2000	California Water Boards
Constructed Wetlands	2-7	<20	<30	Minimal removal	90-99% removal w/HRT of 3-7 days	
Membrane Bioreactors	<5	<2	3	0.5	<200	Data from manufacturers' websites

Table 6-2 Advantages and Disadvantages of Small Flows Wastewater Treatment and Disposal Systems

System	Advantages	Disadvantages or Limitations
Cluster systems	<ul style="list-style-type: none"> ▪ May be economical for small communities without sewers ▪ Transfers non-point discharges to a point discharge that may be more easily monitored and managed ▪ Requires less space than reliance on IWS 	<ul style="list-style-type: none"> ▪ Concentrates pollutants in one location for disposal ▪ Requires very structured and delineated management system to assign responsibility to designated parties
Lagoons	<ul style="list-style-type: none"> ▪ Passive system with little or no energy requirements ▪ Large volume able to buffer shock loads 	<ul style="list-style-type: none"> ▪ Vector control (mosquitoes) must be managed ▪ Nuisance odors may be caused by anaerobic conditions
Oxidation Ditches	<ul style="list-style-type: none"> ▪ High BOD removal ▪ Can be engineered to remove almost all nitrogen 	<ul style="list-style-type: none"> ▪ Aeration or mixing require power consumption
Attached Growth Aerobic Reactors	<ul style="list-style-type: none"> ▪ Can reduce energy costs per unit of organic removal 	<ul style="list-style-type: none"> ▪ Odors and poor effluent quality may result from poor design.
Constructed Wetlands	<ul style="list-style-type: none"> ▪ Natural process ▪ Good process to treat wastewater prior to discharge to surface water ▪ Nitrification and denitrification occur 	<ul style="list-style-type: none"> ▪ Demands large land area ▪ If free surface wetlands are constructed, there is a threat of mosquitoes or other insect vectors.
Membrane Bioreactors	<ul style="list-style-type: none"> ▪ Extremely high quality effluent in small space 	<ul style="list-style-type: none"> ▪ Costly to build ▪ Operating conditions may cause fouling which leads to more frequent and costly cleaning

A constructed wetland (CW) is a man-made, marsh-like area that is designed and built to provide wastewater treatment. A lined bed of washed gravel is planted with hydroponic species whose roots absorb nutrients and create areas for aerobic treatment to take place. CWs can be designed for discharge to SWIS and will require disinfection for reuse or discharge to surface or groundwater. CWs can be generally categorized into two categories: subsurface and free flowing or surface constructed wetlands. Subsurface wetlands are designed for fluid flow that is below ground level, whereas free flow wetlands allow for wastewater to approach the surface.

Considerations and Restrictions

Wastewater pretreatment is required prior to the use of CWs. These operations include settling with a septic tank and/or screening mechanisms. CWs generally require more land space than other treatment methods, require a start-up period to establish the vegetation, must be designed such that rainfall runoff will not collect in the bed, and be designed to receive ample sunlight. Currently, there are no regulations in HAR 11-62 governing CWs, so the use of such systems requires approval. Safety issues and public access should be considered when designing and constructing CWs. Vector problems, such as mosquitoes, must be considered.

Effluent Quality

The expected BOD and TSS removal can be 60-80% for BOD and 50-90% for TSS, but depends on the nature and characteristics of the influent. Removal of nitrogen can be effective. For the typical constructed wetland located at the Riveredge Nature Center, effluent quality for a system receiving 2,000-9,300 gpd of wastewater is about 3.7 mg/L of BOD, 17.2 mg/L of TSS, and fecal coliforms of 54 per 100 mL.

Typical Installed Costs (2007)

According to the USEPA, a free flow, surface wetland should cost about \$2,000-\$4,000 per 1,000 gpd treated. However, for large disposal flows, the costs could approach \$15,000 per 1,000 gpd treated.

Operation and Maintenance Costs

Operation and maintenance required for a CW is minimal and may include mosquito control. Occasional maintenance of the vegetation to promote growth of desired vegetation and maintaining hydraulic capacity is required. Proper maintenance of upstream processes is necessary to prevent clogging of the gravel bed.

Constructed Wetlands Summary

Meets NSF 40 Standards	No
Effluent BOD	<10 mg/L
Effluent TSS	<20 mg/L
Removes 50% total influent nitrogen	Possibly
Effluent Nitrogen	<20 mg/L
Effluent Phosphorus	- mg/L
Effluent Fecal Coliform	<100 /100 mL
Maintenance Level:	Medium
Power Required:	No
Typical Installed Cost:	\$2,000-\$15,000 /1,000 gallons

Table 4-1 Summary of Typical Disposal System Effluent Water Quality

DISPOSAL SYSTEM	BOD mg/L	TSS mg/L	Total Nitrogen mg/L	Total Phosphorus mg/L	Fecal Coliforms Per 100 mL	COMMENTS
Holding Tank (Septic Tank effluent in parenthesis)	100-400 (132-217)	100-400 (49-161)	14-40 (39-82)	5-20 (11-22)	1 – 100 million	
Cesspool	100-400	100-400	15-90	5-20	1-100 million	
Seepage Pit			78 mg/kg soil		~10,000	Reported by Field et al at 3 m below pit and 30 cm from edge
Absorption Trenches	<30	4	1	<2	13	
Absorption Beds	<30	4	1	<2	13	
Elevated Mounds	<30	<20	<15	<2	13	
Evapotranspiration	Varies	Varies	Varies	Varies	Varies	
Water Reuse	< 30 mg/L	< 30 mg/L	No specs.	No specs	< 23	Requirements for R-2 water

Table 4-3 Advantages and Disadvantages of Typical Disposal Systems

Disposal System	Advantages	Disadvantages or Limitations
Holding Tank	<ul style="list-style-type: none"> Zero discharge to surrounding area 	<ul style="list-style-type: none"> Generally a temporary solution to a problem Must be pumped on regular basis Possible odors
Cesspool	<ul style="list-style-type: none"> May already exist No power consumption 	<ul style="list-style-type: none"> Minimal treatment of sewage
Seepage Pit	<ul style="list-style-type: none"> Can be easily installed where a cesspool once existed Can be used in very steep terrain locations 	<ul style="list-style-type: none"> Surface area needed for percolation may make pit so deep it discharges to groundwater Large percolation area may require multiple pits, increasing price drastically
Absorption Trenches	<ul style="list-style-type: none"> Most common means of disposal Excavation does not disturb soil properties 	<ul style="list-style-type: none"> Limited by steep terrain and land area Sides of the trenches are not credited to percolation area
Absorption Beds	<ul style="list-style-type: none"> Area of the entire bed bottom is credited to percolation area 	<ul style="list-style-type: none"> Extremely limited by steep terrain
Elevated Mounds	<ul style="list-style-type: none"> A soil absorption system to overcome limitations regarding poor soil or proximity to groundwater 	<ul style="list-style-type: none"> Increased cost due to additional backfill requirements. Requires energy consumption due to pumping wastewater to above ground dispersion system
Evapotranspiration	<ul style="list-style-type: none"> Non-leaching system Can be used above UIC line with approval 	<ul style="list-style-type: none"> Works well in arid areas where the rate of evaporation is greater than the rate of precipitation Requires energy Requires additional storage capacity Requires lysimeter monitoring
Water Reuse	<ul style="list-style-type: none"> Reduces water demand for potable water for irrigation Considered zero discharge 	<ul style="list-style-type: none"> May be best suited to daily flow rates larger than the scope of this study Requires backup disposal or storage

A holding tank is a watertight concrete or plastic tank that receives either raw or treated wastewater and stores it until a pumping contractor can haul the wastewater away. Typically, holding tanks are used only as a temporary disposal system until a connection to a public system is established or an existing disposal system can be repaired or upgraded. The tank should be able to hold 2-3 days worth of storage, requiring a hauler to remove wastewater every other day before it becomes septic or overflows. Holding tanks are only allowed in public facilities.

Considerations and Restrictions

Holding tanks must be structurally sound and must remain watertight. Holding tanks are considered a temporary system until a better system can be installed. Consideration should be given to providing venting for odor control and sizing of the tank to account for any gases that may be produced due to anaerobic reactions occurring in the tank. Alarms for overflow or strict monitoring of the holding tanks is necessary to prevent overflowing wastewater.

Effluent Quality

If any treatment occurs, it is anaerobic in nature, producing odorous gases. No treatment can be assumed.

Typical Installed Costs (2007)

Assuming the excavation and cost of the tank itself are the slightly higher than septic tanks, the cost of installing a complete holding tank is \$10,000-\$25,000.

Operation and Maintenance Costs

Periodic pumping is required in order to prevent backups into the plumbing leading to the holding tank. For pumping up to 2 to 3 times per week, the cost would be \$1,600 -\$2,400 per month or \$19,200 to \$28,800 per year.

Holding Tanks Summary

Use in Steep Terrain	Any terrain
Use in High Ground Water Areas	Yes
Percolation Rate	N/A
Relative Footprint When Compared To Conventional Drainfield	Small
Maintenance Level:	High
Power Required:	No
Typical Installed Cost:	\$10,000 -\$25,000 /1,000 gallons

Cesspools are generally large, cylindrical, lined excavations used to receive untreated wastewater. Solids are retained and the liquid percolates into the surrounding soil. A cesspool is either lined with rock, or constructed with mortar-less brick or perforated concrete rings. Cesspools are not considered a treatment system because virtually no treatment occurs that would protect the surrounding environment. Therefore, cesspools are considered to be only a disposal device.

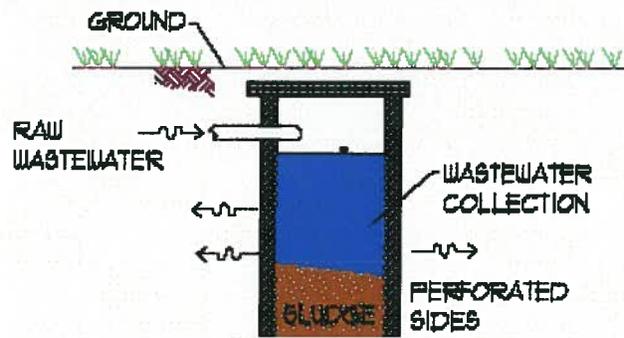


Figure 4-1 Cesspool

Considerations and Restrictions

New cesspools are severely restricted and prohibited in designated critical wastewater disposal area on all islands as defined in the HAR 11-62. New cesspools are currently still legal in specific areas of Hawaii County. Refer to the CWDA maps in Appendix C. Because of the slow decomposition rate, the solids in the wastewater will eventually clog the cesspool. The pores of the lining can be re-opened using caustic soda or a very strong acid. However, even these solvents will eventually fail to open the pores, and the cesspool will have to be closed and replaced.

Effluent Quality

Effluent quality is only slightly better than the quality of raw wastewater as only large solids are removed from the wastewater. When used following a treatment system, no treatment is assumed and the cesspool functions as a seepage pit (see D-3).

Typical Installed Costs (2007)

\$15,000 for excavation, lining and backfill.

Operation and Maintenance Costs

The organic solids that settle to the bottom of the cesspool decompose at a very slow rate, resulting in accumulation of solids. Because of this accumulation, periodic pumping is required, ranging from \$150 to \$550 per visit, depending on site conditions and volume pumped.

Cesspools Summary

Use in Steep Terrain	Yes
Use in High Ground Water Areas	No
Percolation Rate	Designated by DOH
Relative Footprint When Compared To Conventional Drainfield	Small
Maintenance Level:	Low
Power Required:	No
Typical Installed Cost:	up to \$15,000 /1,000 gallons

The construction of a seepage pit is similar to that of a cesspool. The difference between the two is that the seepage pit receives treated wastewater, whereas a cesspool receives untreated wastewater. The effective absorption area of a seepage pit is measured along the sidewalls of the pit. No allowance is made for the bottom of the pit according to HAR 11-62.

Considerations and Restrictions

Seepage pits should be considered when the land area available to dispose of effluent is insufficient for absorption beds/trenches, when the terrain is too steep for other disposal systems or when an impermeable layer overlies more suitable soil. Design criteria should be referenced in HAR 11-62.

Seepage pits are often found where cesspools once existed. The addition of a septic tank or other treatment system upstream from the cesspools enables the owner to consider converting the cesspool into a seepage pit, if the cesspool does not have any problems like spills or overflows. However, in cases where a new seepage pit is to be installed, it may be more expensive than other systems due to the greater depth of excavation. Seepage pits may also be sited such that they are below the aerobic zone in soil, resulting in little or no oxidation of organic compounds as compared to shallower systems such as absorption systems.

Effluent Quality

There have been few studies that have investigated the effluent characteristics of seepage pits. It is commonly believed that seepage pits do not provide the same level of treatment as other disposal systems. However, in a 2007 study, it was shown that seepage pits in loamy soil eliminated E. Coli, a fecal coliform, from wastewater as well as absorption trenches did. Organic loads adjacent to the absorption trenches were actually higher than they were for the seepage pits. Effluent from seepage pits was also lacking in ammonia nitrogen, indicating effective nitrification. Total nitrogen was similar to background levels within six feet of the bottom of the seepage pits.

Typical Installed Costs (2007)

Conversion of a cesspool into a seepage pit will cost approximately \$5,000. Installing a new seepage pit is much more expensive, depending on the soil conditions, but will generally cost approximately \$10,000 each. Multiple seepage pits may be required, depending upon site-specific percolation rates.

Operation and Maintenance Costs

The overwhelming issue for seepage pits is not the maintenance of the pits themselves, but the maintenance of the treatment systems preceding the pits. Proper operation and maintenance of the septic tank(s) or ATU(s), extends the life of the seepage pit and decreases the likelihood of solids clogging in the seepage pit. If upstream processes allow passage of solids to the seepage pit, periodic sludge pumping will be required.

Seepage Pits Summary

Use in Steep Terrain	Yes
Use in High Ground Water Areas	Usually no
Percolation Rate	Faster than 60 min/in
Relative Footprint When Compared To Conventional Drainfield	Small
Maintenance Level:	Low
Power Required:	No
Typical Installed Cost:	\$10,000 /1,000 gallons

Absorption beds are subsurface wastewater infiltration systems (SWIS) that have beds at least three feet wide. Absorption beds are similar to absorption trenches. For an absorption trench system, there is a distinct section of undisturbed soil between the absorption trenches. With an absorption bed, the area designated for disposal is excavated, and a layer of gravel is installed with the distribution pipe laid atop. In the case of gravelless systems, the plastic chambers are laid on the exposed soil. In essence, the wastewater will be spread over the entire area, instead of restricted to beneath the distribution pipe.

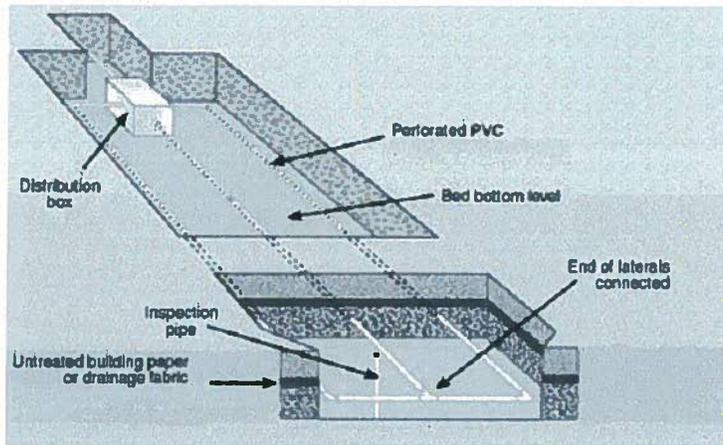


Figure 4-3 Bed disposal system (Adapted from Kent County, DE DPW)

Considerations and Restrictions

Beds are not allowed in terrain with slopes exceeding 8%. Since the entire area of the bed is considered as absorption area the total amount of land required is smaller compared to an absorption trench system. Roots from bushes and trees will damage the performance of the absorption system, therefore, root barriers should be utilized.

Effluent Quality

Effluent quality from an absorption bed will be similar to that of absorption trenches (see D-4).

Typical Installed Costs (2007)

These costs include excavation, gravel, piping, and/or plastic chambers/storage panels. Typical costs are about \$7,000-\$18,000 per 1,000 gpd of treated wastewater.

Operation and Maintenance Costs

Operational and maintenance issues are the same as for trenches. See Appendix A for tips extending the functional life of SWIS.

Absorption Beds Summary

Use in Steep Terrain	<8% slope
Use in High Ground Water Areas	No
Percolation Rate	Faster than 60 min/in
Relative Footprint When Compared To Conventional Drainfield	Medium
Maintenance Level:	Low
Power Required:	No
Typical Installed Cost:	\$7,000-\$18,000 /1,000 gallons

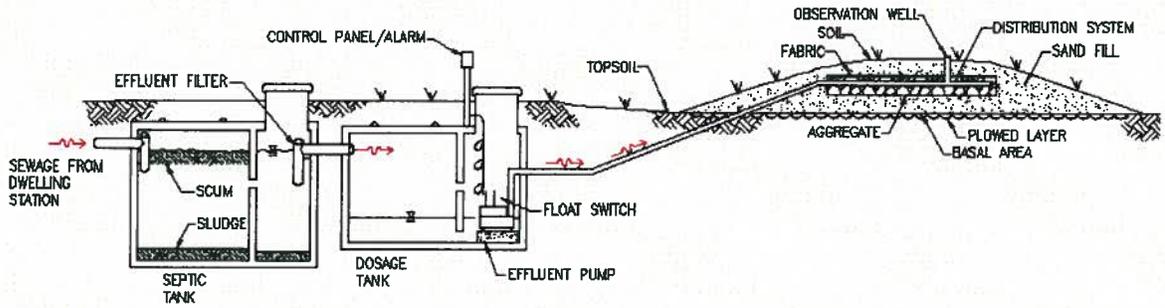


Figure 4-4 Elevated Mound System

Elevated mound systems are engineered mounds of sand/soil used to create acceptable soil conditions for effluent disposal and/or to create vertical separation from groundwater. The land on which the mound will be placed is first tilled, and a layer of sand and distribution system is placed over the tilled surface. The top of the mound is covered with surrounding soil and aesthetically landscaped.

Considerations and Restrictions

Mounds are commonly used in areas where absorption trenches and beds cannot be used, such as when the terrain is excessively steep, when there is a high groundwater table, or when the soil percolation rate is not conducive for a SWIS. Landscaping is required as the mounds could reach a height of three feet. As shown in the figure above, the disposal point is higher than the treatment system, therefore a pump system will be required.

Effluent Quality

Effluent quality for an elevated mound system is similar to that of an absorption trench or bed (see D-4).

Typical Installed Costs (2007)

Construction costs range from \$10,000 to \$15,000, but can go as high as \$25,000 per 1,000 gpd of treated wastewater in Hawaii.

Operation and Maintenance Costs

Since the elevated mound system requires a pump to lift the effluent to the specific elevation, the pump's power costs need to be budgeted. The estimated power consumption is approximately 100 – 300 kW-h per year. The same care must be provided to the mound as would be provided to trenches or beds. See Appendix A for tips on maintenance.

Elevated Mounds Summary

Use in Steep Terrain	Yes
Use in High Ground Water Areas	Yes
Percolation Rate	All
Relative Footprint When Compared To Conventional Drainfield	Large
Maintenance Level:	Medium
Power Required:	Yes
Typical Installed Cost:	up to \$25,000 /1,000 gallons

Evapotranspiration (ET) is the combined effect of wastewater disposal by direct evaporation and by plant transpiration. ET is the discharge of pretreated effluent to a porous bed containing water-tolerant plants. Wastewater effluent is discharged into the bed, and wicking or capillary action draws the water to the surface where it is either taken up by the plants and transpired or evaporated from the surface of the bed. These systems may or may not be designed with an impermeable liner. If the system is designed with a liner, the system is considered "zero-discharge", and disposal is strictly dependent on transpiration through the plants and evaporation. However, if the liner is not used, the disposal system sizing criteria can also account for absorption via the soil. This type of system is known as evapotranspiration-infiltration (ETI). ET and ETI require large surface areas for year round disposal and are most suited for very arid climates where evaporation rates are much higher than precipitation rates.

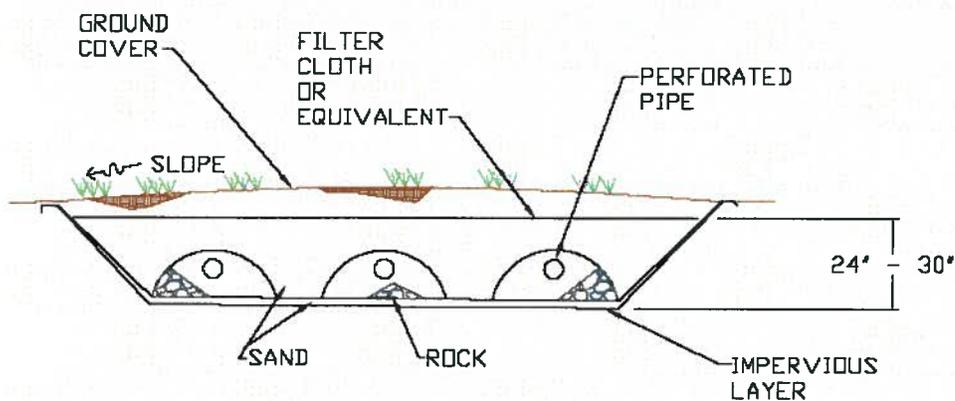


Figure 4-5 Cross Section of an ET Bed

Typical components of an ET system may include drip or distribution lines, a flushing and filtering mechanism, a controller to automate the dosing cycles, a distribution pump, and several alternating drainfields. DOH approves these systems on a case-by-case basis, and systems exist in the State of Hawaii. Record keeping of lysimeter (soil pore water sampler) data is required to ensure that this alternative system is operating effectively.

Considerations and restrictions

These systems are considered non-standard/alternative systems by DOH. Evapotranspiration is best suited for environments where the rate of evaporation significantly exceeds the rate of precipitation. Zero discharge systems, like evapotranspiration, that prevent wastewater from leaving the site (and/or reaching groundwater) can be used above the UIC line, pending approval from DOH on a case-by-case basis. Other considerations include:

- Stormwater runoff should drain away from the system. Gutters and drainpipes shall be directed away from the system.
- Use high transpiration plants suitable for the wetness at ground level.
- Consider additional ET/ETI beds as required to enable owner to deal with operating difficulties or system failures and alternate loads.

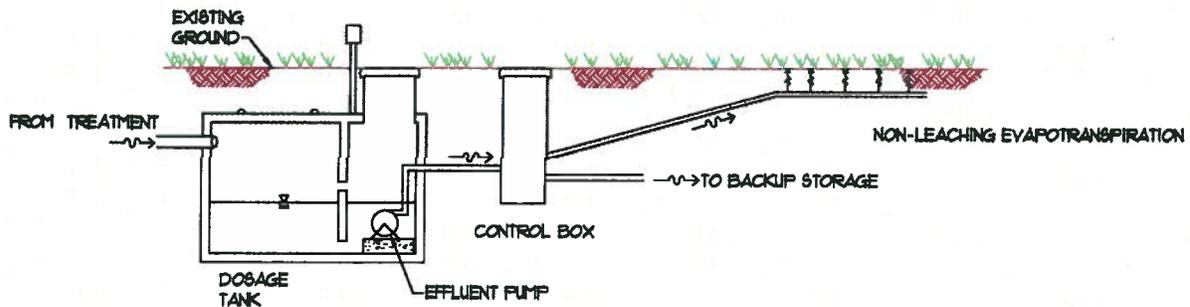


Figure 4-6 Subsurface Evapotranspiration Profile of Typical ET System

Effluent Quality

Few studies have adequately quantified the quality of the effluent from this disposal system. Trial and error has been the norm for these types of systems, so success rates are very hard to determine, as well as quality of effluent.

Typical Installed Costs (2007)

Because of the large surface area used, ET/ETI systems can be expensive. Values can range between \$15,000 and \$25,000 per 1,000 gpd of treated wastewater.

Operation and Maintenance Costs

Operational costs are on the order of \$20 a year for simple inspection of observation wells, plus electrical costs for pumping when needed. Other maintenance requirements include minor landscape work, such as trimming the vegetation. Upstream treatment operations and processes should be properly maintained and pumped as needed to avoid overflow of solids into the ET bed.

Evapotranspiration Summary

Use in Steep Terrain	No
Use in High Ground Water Areas	Yes
Percolation Rate	
Relative Footprint When Compared To Conventional Drainfield	Large
Maintenance Level:	High
Power Required:	Yes
Typical Installed Cost:	up to \$25,000 /1,000 gallons

The reuse of wastewater for non-potable needs can offset potable water use thereby reducing overall demand on the potable water supply. Therefore, water reuse or reclamation has become increasingly popular. If an effluent meets certain Department of Health water quality requirements, then the recycled water can be utilized in landscaping, agricultural irrigation, and even toilet flushing.

The highest level quality of recycled water defined by DOH is R-1, and is the only level of recycled water that may be used above the UIC line, on a case-by-case basis. The requirements for R-1 recycled water are quite strict and fairly expensive to achieve with a small flow onsite treatment system. However, the requirements for R-2 and R-3 water are less stringent making recycling of effluent less difficult.

Considerations and Restrictions

Care should be taken to ensure that there is no crossing of recycled water lines and potable water lines. Distinguishing markings (standard purple pipe) should be used to identify recycled water lines. Strict monitoring and record keeping are required. The frequencies and types of parameters to be monitored are determined by the level of effluent quality and the method of application of the recycled water. Daily, weekly, and annual records of the treatment and water reuse project may be required. The State of Hawaii Department of Health has published *Guidelines for the Treatment and Reuse of Recycled Water*, available at the DOH website <http://www.hawaii.gov/health/environmental/water/wastewater/forms.html>. These guidelines will help in the planning and design of any wastewater recycling system. The frequency of monitoring and reporting may be reduced for on-site systems by DOH on a case-by-case basis.

Effluent Quality

Recycling of water does not improve the quality of the effluent, but it does have minimum standards that must be met to be safe for human health and the environment.

Typical Installed Costs (2007)

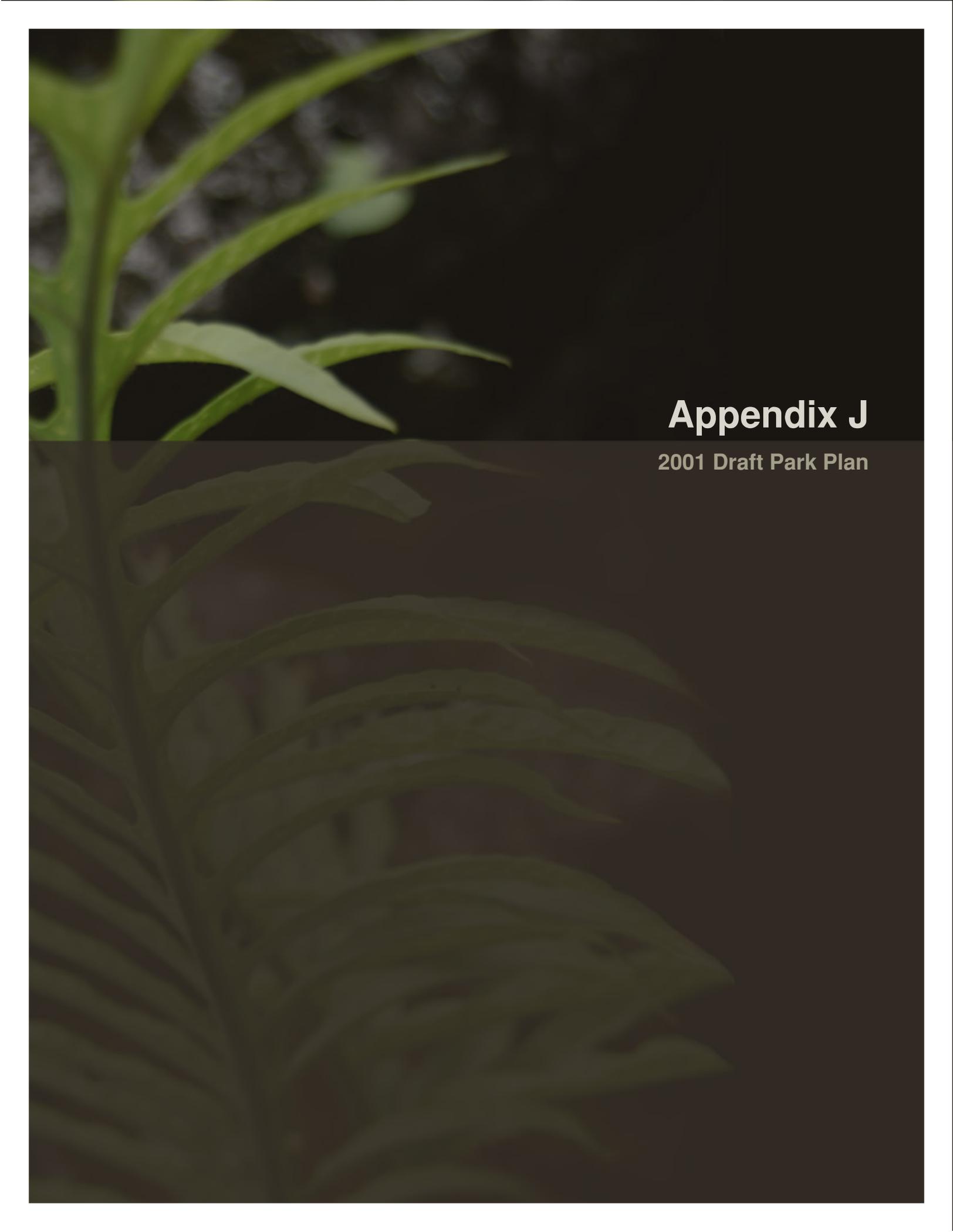
The costs associated with the specific concept of recycling water are too specific to give a general price range

Operation and Maintenance Costs

Without a definitive concept of a proposed system, operation and maintenance costs cannot be generalized.

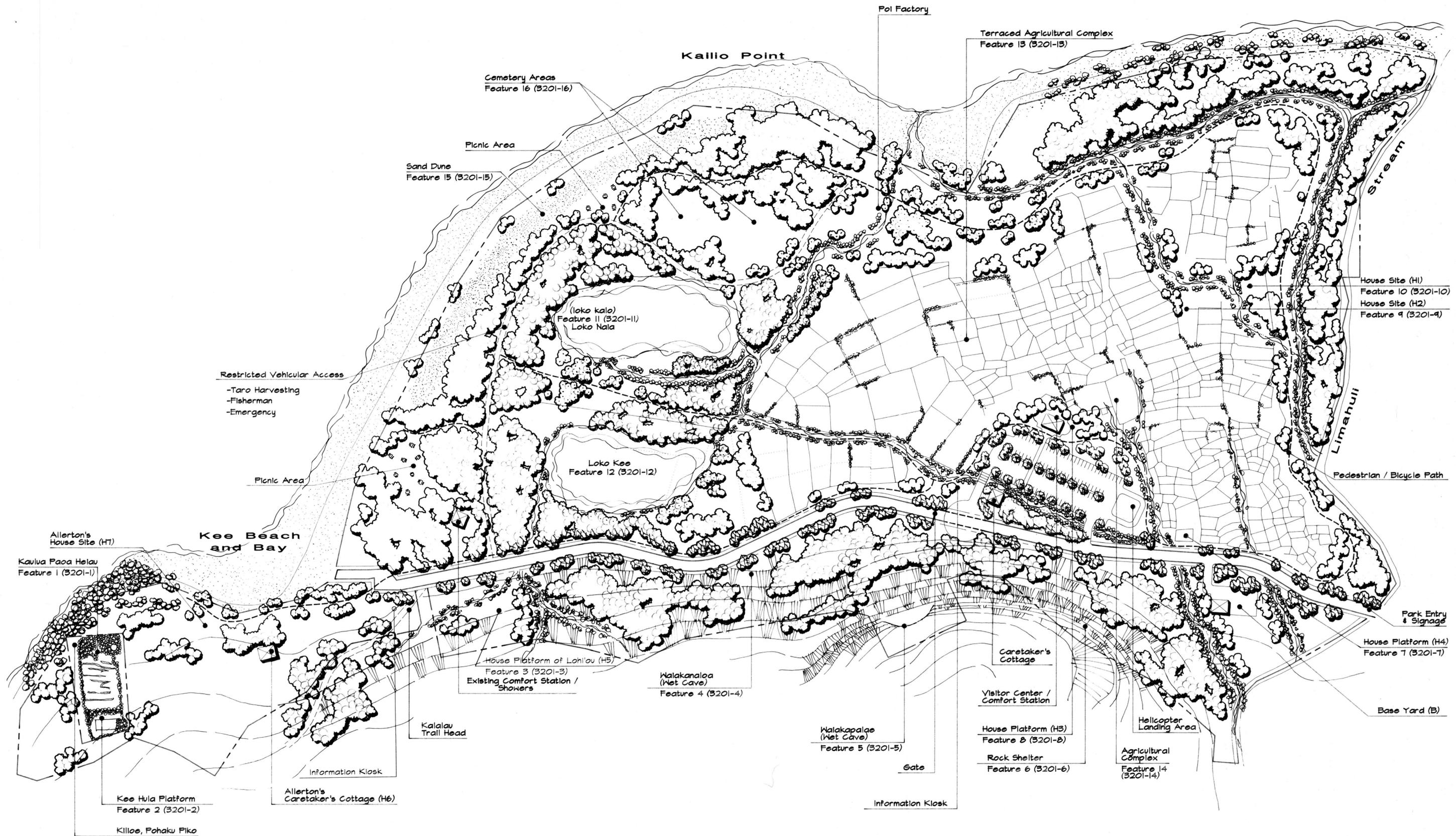
Wastewater Reuse Summary

Use in Steep Terrain	Approval needed
Use in High Ground Water Areas	Possible
Percolation Rate	All
Relative Footprint When Compared To Conventional Drainfield	Unknown
Maintenance Level:	Unknown
Power Required:	Unknown
Typical Installed Cost:	Unknown



Appendix J

2001 Draft Park Plan



COMMUNITY PREFERRED MASTER PLAN HAENA STATE PARK HAENA, KAUAI, HAWAII

