OEQC

RECEIVED
OFFICE OF THE DIRECTOR
DEPT OF HEALTH

EXECUTIVE CHAMBERS '01 AUG 22 P12:38

HONOLULU

BENJAMIN J. CAYETANO
GOVERNOR

August 15, 2001

TO: The Honorable Gilbert Agaran, Director
Department of Land and Natural Resources

SUBJECT: Acceptance of the Final Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion

With this memorandum, I accept the Final Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion, island of Hawai'i, as satisfactory fulfillment of the requirements of Chapter 343, Hawai'i Revised Statutes. The economic, social and environmental impacts, which will likely occur should this project be implemented, are adequately described in the statement. The analysis, together with the comments made by reviewers, provides useful information to policy makers and the public.

My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws but does not constitute an endorsement of the proposed action.

I find that the mitigation measures discussed in the environmental impact statement will minimize the negative impacts of the project. Therefore, if this project is implemented, the Department of Land and Natural Resources and/or its agents should perform these or alternative and at least equally effective mitigation measures at the discretion of the permitting agencies. The mitigation measures identified in the environmental impact statement are listed in the attached document.

BENJAMIN J. CAYETANO

Attachment

c: Honorable Bruce S. Anderson, Ph.D., M.P.H.
Office of Environmental Quality Control

May 2001 (FEIS)
Hapuna Beach State Recreation Area Expansion

JUN 2 3 2001

OEQC LIBRARY

Final Environmental Impact Statement

Hapuna Beach State Recreation Area Expansion

Lalamilo, South Kohala, Hawaii

Division of State Parks
Department of Land and Natural Resources
State of Hawaii

May 2001

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

DATE DUE

10/30/07

Final Environmental Impact Statement

Hapuna Beach State Recreation Area Expansion

Lalamilo, South Kohala, Hawaii

PROPOSING AGENCY:

Division of State Parks
Department of Land and Natural Resources
State of Hawaii

RESPONSIBLE OFFICIAL:

This environmental impact statement and all ancillary documents were prepared under my direction or supervision and the information submitted, to the best of my knowledge, fully addresses document content requirements as set forth in Section 11-200-17 and Section 11-200-18, Hawaii Administrative Rules.

GILBERT COLOMA-AGARAN
Chairperson
Board of Land and Natural Resources

May 22, 2001
Date

Prepared by:
Harrison Associates
In Association With:
Belt Collins Hawaii
and
Pedersen Planning Consultants

PREFACE

On June 23, 1996, a notice of availability for the Hapuna Beach State Recreation Area Expansion Draft Environmental Impact Statement was published in the Office of Environmental Quality Control's The Environmental Notice. During the public comment period, many letters were received commenting on and raising concern over the State Board of Land and Natural Resources' (BLNR) plan to acquire privately-held properties at Wailea Bay for the expansion of the State park.

Previously, on November 20, 1987, the BLNR ordered the Department of Land and Natural Resources (DLNR) to acquire the privately-held properties for park purposes. In 1994, the DLNR initially acquired two parcels adjacent to an existing public beach access easement near the center of Wailea Bay.

Between 1994 and 1997, the State made no further acquisitions and, as such, the Wailea Bay property owners expressed concern over the sequence of property acquisition and the lack of action to do so. In 1998, the private property owners requested the BLNR's 1987 Order be rescinded on the basis that the State has no funds to acquire their properties and that the Order clouds the title to their properties which in turn adversely affects their property values.

On June 5, 1998, in response to a property owners' petition for declaratory ruling and after hearing all arguments on the matter, the BLNR rescinded its 1987 Order, subject to the following conditions:

1. Rescission of BLNR's Order of November 20, 1987 does not invalidate the transfer of properties that have already been acquired by the State.

2. Rescission of BLNR's Order of November 20, 1987 shall not prohibit BLNR from taking action in the future to condemn Wailea properties, when funds become available for acquisition of these properties, and provided that any such action comply with Chapter 343, Hawaii Revised Statutes, addressing Environmental Impact Statements.

3. Rescission of BLNR's Order of November 20, 1987 shall be contingent upon recordation of the Unilateral Agreement and Declaration for each affected privately-owned property requiring the landowner to: A) restrict any development to conform to what is currently allowed today, and B) not seek zoning changes for a period of 15 years, with the 15-year term to commence on the date of the last such property covenant document is recorded.

4. Recordation of the Unilateral Agreement and Declaration shall be completed within one hundred and eighty (180) days of the date of BLNR's decision to rescind its November 1987 Order or 30 days from the acceptance of the Final Environmental Impact Statement (FEIS), whichever is later.

5. BLNR's rescission shall be null and void should the private property owners fail to complete recordation of the Unilateral Agreement and Declaration within one (1) year of the date of BLNR's decision to rescind its November 20, 1987 Order.

6. Property owners agree to not seek zoning changes prohibited by the Unilateral Agreement and Declaration during the period that the Unilateral Agreement and Declaration is being recorded.

7. The FEIS for expansion of Hapuna Beach State Recreation Area shall be amended to delete references to condemnation and/or to explain the resolution of the private property owners' concern regarding condemnation.

On June 5, 1998, the BLNR also accepted the Hapuna Beach State Recreation Area Master Plan and the FEIS (amended pre-final document), subject to the following conditions:

A. All references to the acquisition of private properties at Wailea shall be deleted from the FEIS and/or clarification added, and drawings modified to show the presence of privately-owned inholdings.

B. In the future, when specific areas of the park are actually slated for any undertaking that would impact historic sites, the archaeological inventory survey will be upgraded for the relevant impact area to address the Historic Preservation Division's comments.

C. The development of the Lalamilo Well shall not occur if it is unfeasible to carry out the park expansion development and unless the economic use of the brackish water system has been maximized.

D. No state funds shall be used for the development of the golf course proposed in the Draft EIS.

REVISIONS IN THE FINAL EIS

The Draft EIS was published in 1996 and during the public comment period a number of responses were received from public agencies, community organizations, and individuals. The comments ranged primarily from concerns over impacts on the use of the area by more people to costs of the proposed improvements. The most predominant concern related to the State's plan to acquire the remaining private properties at Wailea Bay. As provided in the preface of this document, the owners of the private properties at Wailea Bay came to an agreement with the State over the planned acquisition of the private lots.

The Final EIS incorporates the provisions of this agreement. It also includes other changes reflecting the comments received from the community during the public comment period. Below is a summary of the major changes in the Final EIS.

Revisions to document organization and format:

On the inside title page, a revision was made to the identification of the Chairperson for the State Board of Land and Natural Resources and an addition was made to describe the responsibility of the responsible official for the Final EIS.

Revisions to specific words:

All references to "handicapped persons" were revised to "persons with disabilities."

Revisions to the document text:

On page 1-3, Section 1.1.3 entitled, "Need for the Project," three paragraphs describing the DEIS/FEIS review process were deleted. The information in the deleted paragraphs is apparent in the current assessment procedures.

On page 2-34, Section 2.4.5 entitled, "Alternative to Wailea Lots Acquisition," the following two paragraphs were added:

> *Two private lots were acquired by the State in 1994, thereby adding 400 linear feet of beach frontage to an existing 30-foot-wide public access road reserve leading to the beach. A 40-foot-wide road reserve also runs the length of the beach fronting the private properties. Acquisition of the*

remaining private lots behind Wailea Bay would be required to provide the maximum amount of open space, beach frontage and picnic area for park users.

If the private properties were not acquired, the park would have only limited direct physical and visual access to the shoreline that is important for establishing a costal recreation environment. Although the 40-foot-wide road reserve lot provides open space over the length of the beach, shaded picnic amenities in this section of the park would be limited to 1.8 acres (the area of the two parcels that have been acquired) and the State Parks Division will only partially meet its development objectives for the area.

On page 3-46, Section 3.11.1.3 entitled "Potential Impacts - Project Cost," modifications were made and are shown in the following two paragraphs:

The acquisition of private Wailea properties is not being considered at this time, and to date, no specific land acquisition cost has been determined for the properties. Should the Department of Land and Natural Resources consider purchase of the private properties in the future, an estimate of property value would be more appropriate at that time.

As a general indication of land cost, research was conducted on property values at the County Real Property Tax Office. The total value for the 19 properties behind Wailea amounted to about $14 to $16 million. Property improvement costs varied considerably but totaled approximately $3.0 to $3.5 million. These figures were based on assessments made in early 1996.

On page 5-4, Section 5.4 entitled, "Condemnation of Residential Lots at Wailea Bay," the statement "Development of the park expansion will require the condemnation of 19 privately owned lots behind Wailea Bay." was replaced by "Optimum development of the park expansion may require condemnation of 19 privately owned lots."

Update on facility conditions and status of events:

On page 2-10, Section 2.2.2 entitled, "Golf Course," the number of golf courses in West Hawaii was updated from 12 to 13.

On page 2-29, Table 2-1, revisions were made to update the preliminary schedule. Construction start-up for the park expansion is scheduled to begin in 2003 or 2004. Completion of the first two phases involving the expansion area's basic infrastructure and initial ground and park improvements is scheduled for 2009.

On page 3-42, Section 3.11.1 entitled, "Economic Assessment," the amount of short tons of cargo handled at Kawaihae Harbor was updated from 730,000 in 1989 to 655,000 in 1993.

On page 3-80, Section 3.13.1.1 entitled, "Health Care - Existing Conditions," the completion date of the North Hawaii Community Hospital was updated.

On pages 3-83, 3-85 and on Figure 3-17, the name of the Kona Coast State Park was updated to Kekaha Kai State Park.

Revisions relating to the agreement between the Wailea private property owners and State of Hawaii

The Final EIS incorporates the agreement between the private property owners at Wailea and the State of Hawaii regarding the acquisition plan for the area. The preface of this document reviews the background of the agreement and provides a summary of the agreement (see attached Preface).

On page 1-1, Section 1.1.1 entitled "Purpose of Document," the following statement was added: "The proposed action does not include acquisition of privately owned parcels at Wailea Bay and this EIS does not address the proposed impacts of possible acquisition of these private lands."

On page 1-1, Section 1.1.2 entitled "General Project Description," the statement ". . . are 19 privately-owned lots which are proposed for acquisition . . . ." was revised to state ". . . are 19 privately-owned lots which had previously been considered for acquisition . . . ."

On page 1-3, Section 1.1.2 entitled "General Project Description," the phrase "not part of the proposed action and hence" was inserted in the following statement, "Acquisition of the private lots behind Wailea Bay is not included in the construction cost."

On page 1-7, Section 1.3 entitled, "Social Environment - Potential Impacts," a statement referring to the acquisition of private lots at Wailea Bay by the State was replaced by, "Also, as part of the expansion program, the State had considered purchasing the Wailea Bay lots. This action would displace a number of residents who are presently residing on the property, but possible acquisition is not part of the proposed action addressed in this FEIS."

On page 1-8, Section 1.3 entitled, "Social Environment - Proposed Mitigation Measures," the following statement was added: "The schedule for Wailea Bay

lot purchases is uncertain and this remains an unresolved issue and is a source of grave concern for the potentially affected residents."

On page 1-11, Section 1.5 entitled, "Summary of Unresolved Issues," the issue of condemnation of residential lots at Wailea Bay was removed.

On page 2-11, Section 2.3.1 entitled, "General Development Proposal," the statement, "acquisition of beach lots at Wailea Bay," was removed from the list of development elements in the park expansion plan.

On page 2-22, Section 2.3.10 entitled, "Wailea Bay Lots Acquisition," was revised to reflect the agreement between the private property owners and the State.

On page 2-30, Section 2.4.3 entitled, "Alternative B: Expansion of the Park to Encompass 526 Acres (No Golf Course)," revisions were made to clearly indicate that this alternative does not include acquisition of the privately-owned parcels.

On page 2-39, Section 2.4.6.2 entitled, "Summary of Comparative Evaluation," revisions were made to the evaluation of impacts from the proposed alternatives considering the acquisition of the privately-owned lots is not part of the current master plan. Table 2-2 which summarizes the evaluation was also revised to reflect the change.

On page 3-53, Section 3.11.2.2 entitled, "Community Attitudes and Concerns – Potential Impacts," three paragraphs were added:

The uncertainty concerning the State's acquisition of private properties proved stressful to some community residents, and, consequently, community members filed a petition for deletion of BLNR's Order of November 1987. The petitioners based their request for a declaratory ruling on the grounds that: 1) the 1987 Order was nearly ten years old and the State had not acted on the Order, 2) the 1987 Order was in furtherance of appropriations which had lapsed, and no new funds had been appropriated, 3) BLNR had completed neither the planning nor the EIS and, as such, the 1987 Order was premature, 4) the 1987 Order was inconsistent with the State Recreation Functional Plan which calls for acquisition of undeveloped lands, and 5) the existence of the 1987 Order damages the petitioners by clouding title to and blighting the value of their properties.

The uncertainty was alleviated by the BLNR on June 5, 1998, when BLNR chose to rescind its November 1987 Order. At the time the Order was rescinded, an understanding was reached between BLNR and the landowners. The landowners understood that BLNR's rescission did not preclude a future condemnation if funds become available, and that any future action to acquire by condemnation would

include the preparation and processing of an EIS to fully describe the impacts of condemnation. In addition, the landowners requested, and BLNR agreed to, the removal of all references to, and/or clarification of, the acquisition of private property in the pending Final EIS for expansion of the Hapuna Beach State Recreation Area.

In addition, BLNR desired to maintain the status quo of private property land use at Wailea Bay, meaning that landowners should not be allowed to upzone their property so as to increase its value. To guarantee that this would not occur, BLNR asked for, and the landowners agreed to, the imposition of a 15-year covenant on their parcels that: 1) restricts development to conform to what is currently allowed today, and 2) prohibits zoning change for a period of 15 years. A Unilateral Agreement and Declaration was prepared and executed and recorded as a property covenant document.

On page 3-54, Section 3.11.2.2 entitled, "Community Attitudes and Concerns - Proposed Mitigation," the following paragraph was added:

The uncertainty of the acquisition of the Wailea Bay private properties was alleviated by BLNR's action to rescind its 1987 Order. In the future, however, should funds for acquisition become available, BLNR will prepare and process an EIS to address the impact of acquisition of the private properties. Thus, the community will be apprised of any pending State action to acquire the properties.

<u>Revisions clarifying the development of the golf course by a private interest:</u>

On page 1-3, Section 1.1.2 entitled, "General Project Description," revisions were made to clarify that approximately $23.2 million of the approximately $40 million park expansion cost (in 1993 dollars) will be used for the golf course development and financed by a private investor-developer or other private interest.

On page 1-7, Section 1.3 entitled, "Summary of Potential Impacts and Mitigation Measures - Economic Environment," and on page 2-29, Section 2.4.2.4 entitled, Public Resource Commitments," revisions were made to clarify that the golf course construction represented approximately 40 percent of the project construction budget and that it will be financed by a private interest.

On page 3-44, Table 3-9, revisions were made to indicate that the golf course management and maintenance staff may be filled by a private contractor under an agreement with the State.

On page 3-46 and 3-47 (Table 3-12), Section 3.11 entitled, "Project Cost," revisions were made to indicate that the operations/maintenance cost for the golf course would be financed by a private operator.

Revisions to Figures in the EIS:

Figure 2-2: Revisions were made to show that the privately-owned properties are not part of the park expansion area.

Figures 2-4, 2-11, 2-12, 2-13, 3-5, 3-6, 3-13, 3-15, and 3-16: Revisions were made to show that the privately owned-properties a separate area and not part of the park expansion plan.

Figure 3-8: A revision was made to show that the two private properties that were acquired by the State in 1994 are now part of the State land.

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION AND SUMMARY

1.1 BACKGROUND 1-1
1.1.1 Purpose of Document 1-1
1.1.2 General Project Description 1-1
1.1.3 Need for the Project 1-3

1.2 STATEMENT OF OBJECTIVES 1-3

1.3 SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES ... 1-4

1.4 SUMMARY OF ALTERNATIVES 1-11

1.5 SUMMARY OF UNRESOLVED ISSUES 1-11

1.6 SUMMARY OF COMPATIBILITY WITH LAND USE POLICIES AND PLANS 1-12

1.7 NECESSARY APPROVALS AND PERMITS 1-12

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES CONSIDERED

2.1 PROJECT OBJECTIVES 2-1

2.2 PROJECT NEED 2-4
2.2.1 Existing Recreation in the Hapuna-Puako Area 2-4
2.2.2 Future Demand 2-9

2.3 DESCRIPTION OF THE PROPOSED ACTION 2-11
2.3.1 General Development Proposal 2-11
2.3.2 Beach and Water Activity Areas 2-11
2.3.3 Picnic Areas 2-11
2.3.4 Campgrounds 2-12
2.3.5 Hiking Trails 2-12
2.3.6 Golf Course 2-20
2.3.7 Park Headquarters 2-20
2.3.8 Maintenance Baseyard 2-20
2.3.9 Site Access and Infrastructure 2-20
2.3.10 Wailea Bay Lots Acquisition 2-22

2.4 PROJECT ALTERNATIVES 2-24
2.4.1 Introduction 2-24
2.4.2 Alternative A: Expansion of the Park to Encompass 846 Acres 2-24
2.4.2.1 General Concept 2-24
2.4.2.2 Project Benefits 2-27
2.4.2.3 Potential Adverse Impacts 2-28
2.4.2.4 Public Resource Commitments 2-29
2.4.3 Alternative B: Expansion of the Park to Encompass 526 Acres (No Golf Course) 2-30
2.4.3.1 General Concept 2-30
2.4.3.2 Project Benefits 2-30
2.4.3.3 Potential Adverse Impacts 2-30
2.4.3.4 Public Resource Commitments 2-30
2.4.4 Alternative C: Continued Use of the Existing Park (No Action) 2-33
2.4.4.1 General Concept 2-33
2.4.4.2 Project Benefits 2-33
2.4.4.3 Adverse Impacts 2-33
2.4.4.4 Public Resource Commitments 2-33
2.4.5 Alternative to Wailea Lots Acquisition 2-34
2.4.6 Comparison of Project Alternatives 2-37
2.4.6.1 Criteria for Evaluation of Project Alternatives 2-37
2.4.6.2 Summary of Comparative Evaluation 2-39

CHAPTER 3
EXISTING CONDITIONS, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

3.1 OVERVIEW OF THE ENVIRONMENTAL SETTING 3-1

3.2 EXISTING RECREATIONAL AREAS AND FACILITIES 3-6
3.2.1 Hapuna Beach 3-6
3.2.2 Beach 68 3-10
3.2.3 Wailea Beach 3-10
3.2.4 Puako Boat Ramp 3-10

3.3 TOPOGRAPHY, GEOLOGY, AND SOILS 3-11
3.3.1 Existing Conditions 3-11
3.3.1.1 Physiography 3-11
3.3.1.2 Geology 3-11
3.3.1.3 Geologic Hazards 3-12
3.3.1.4 Soil 3-12
3.3.2 Potential Impacts and Proposed Mitigation 3-13

3.4 CLIMATE 3-14
3.4.1 Existing Conditions 3-14
3.4.2 Potential Impacts and Proposed Mitigation 3-14

3.5 DRAINAGE 3-15
3.5.1 Existing Conditions 3-15
3.5.2 Potential Impacts and Proposed Mitigation 3-15

3.6 HYDROLOGY AND WATER RESOURCES 3-22
3.6.1 Existing Conditions 3-22
3.6.2 Potential Impacts and Proposed Mitigation 3-22

3.7 COASTAL AND MARINE ENVIRONMENT 3-24
3.7.1 Existing Conditions 3-24
3.7.1.1 Physical Characteristics 3-24
3.7.1.2 Water Chemistry Analyses 3-25
3.7.1.3 Biological Characteristics 3-26
3.7.2 Potential Impacts and Proposed Mitigation 3-26
3.7.2.1 Shoreline Modification and Surface Runoff 3-26
3.7.2.2 Ciguatera 3-27
3.7.2.3 Fertilizer and Pesticides 3-27
3.7.3 Natural Marine Hazards/Water Safety 3-30
3.7.3.1 Existing Conditions 3-30
3.7.3.1.1 Rocky Shoreline 3-30
3.7.3.1.2 Rip Currents 3-30
3.7.3.1.3 High Surf/Storm Swells 3-30
3.7.3.1.4 Tsunamis 3-31
3.7.3.2 Potential Impacts and Proposed Mitigation 3-32

3.8 BIRDS AND WILDLIFE 3-33
3.8.1 Existing Conditions 3-33
3.8.2 Potential Impacts and Proposed Mitigation 3-33

3.9 TERRESTRIAL FLORA 3-34
3.9.1 Existing Conditions 3-34
3.9.2 Potential Impacts and Proposed Mitigation 3-35

3.10 CULTURAL RESOURCES 3-35
3.10.1 Existing Conditions 3-35
3.10.2 Study Findings and Recommendations 3-39

3.11 SOCIOECONOMIC ENVIRONMENT 3-41
3.11.1 Economic Assessment 3-41
3.11.1.1 Overview 3-41
3.11.1.2 Existing Conditions 3-42
3.11.1.3 Potential Impacts 3-43
3.11.2 Community Attitudes and Concerns 3-48
3.11.2.1 Existing Conditions 3-48
3.11.2.2 Potential Impacts and Proposed Mitigation 3-50

3.12 INFRASTRUCTURE AND PUBLIC SERVICES/FACILITIES 3-55
3.12.1 Roads and Traffic 3-55
3.12.1.1 Existing Conditions 3-55
3.12.1.2 Existing Traffic 3-56
3.12.1.3 Projected Traffic Without the Proposed Project 3-56
3.12.1.4 Projected Traffic With Project 3-59
3.12.1.5 Traffic Analysis 3-59
3.12.1.6 Study Conclusions 3-62
3.12.1.7 Summary 3-65
3.12.2 Utilities 3-67
3.12.2.1 Water 3-67
3.12.2.2 Sewer 3-73
3.12.2.3 Solid Waste Collection 3-73
3.12.2.4 Electrical Service 3-74
3.12.2.5 Telephone 3-79

3.13 PUBLIC SERVICES AND FACILITIES 3-80
3.13.1 Health Care 3-80
3.13.1.1 Existing Conditions 3-80
3.13.1.2 Potential Impacts and Proposed Mitigation 3-80
3.13.2 Police Protection 3-81
3.13.2.1 Existing Conditions 3-81
3.13.2.2 Potential Impacts and Proposed Mitigation 3-81
3.13.3 Fire Protection and Emergency Services 3-81
3.13.3.1 Existing Conditions 3-81
3.13.3.2 Potential Impacts and Proposed Mitigation 3-82
3.13.4 Harbors and Boat Ramps 3-82
3.13.4.1 Existing Conditions 3-82
3.13.4.2 Potential Impacts and Proposed Mitigation 3-83
3.13.5 Parks and Recreation 3-83
3.13.5.1 Existing Conditions 3-85
3.13.5.2 Potential Impacts and Proposed Mitigation 3-85

3.14 AIR QUALITY 3-85
3.14.1 Existing Conditions 3-86
3.14.2 Potential Impacts and Proposed Mitigation 3-87

3.15 NOISE 3-87
3.15.1 Overview 3-87
3.15.2 Existing Conditions 3-88
3.15.3 Potential Impacts and Proposed Mitigation 3-90

3.16 VIEWS 3-90
3.16.1 Existing Conditions 3-90
3.16.2 Potential Impacts and Proposed Mitigation 3-90

CHAPTER 4
CONSISTENCY WITH LAND USE PLANS, POLICIES, AND CONTROLS

4.1 HAWAII STATE PLAN 4-1
4.1.1 Overall Themes, Goals, Objectives, and Policies 4-1

4.2 STATE FUNCTIONAL PLANS 4-6
4.2.1 State Agriculture Functional Plan 4-6
4.2.2 State Conservation Lands Functional Plan 4-6
4.2.3 State Education Functional Plan 4-8
4.2.4 State Employment Functional Plan 4-8
4.2.5 State Energy Functional Plan 4-8
4.2.6 State Higher Education Functional Plan 4-8
4.2.7 State Health Functional Plan 4-8
4.2.8 State Historic Preservation Functional Plan 4-9
4.2.9 State Housing Functional Plan 4-9
4.2.10 State Human Services Functional Plan 4-9
4.2.11 State Recreation Functional Plan 4-9
4.2.12 State *Tourism Functional* Plan 4-12
4.2.13 State Transportation Functional Plan 4-12
4.2.14 State Water Resources Development Functional Plan 4-12

4.3 STATE LAND USE LAW 4-12

4.4 WEST HAWAII REGIONAL PLAN 4-14

4.5 HAWAII COUNTY GENERAL PLAN 4-15

4.6 HAWAII COUNTY ZONING 4-16

4.7 HAWAII COASTAL ZONE MANAGEMENT PROGRAM 4-16
4.7.1 Recreational Resources 4-16
4.7.2 Historic Resources 4-16
4.7.3 Scenic and Open Space Resources 4-17
4.7.4 Coastal Ecosystems 4-17
4.7.5 Economic Uses 4-17
4.7.6 Coastal Hazards 4-17
4.7.7 Managing Development 4-17
4.7.8 Public Participation 4-17
4.7.9 Beach Protection 4-18
4.7.10 Marine Resources 4-18

4.8 COUNTY SPECIAL MANAGEMENT AREA GUIDELINES 4-18

CHAPTER 5

TOPICAL ISSUES

5.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY 5-1

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES .. 5-1

5.3 PROBABLE ADVERSE EFFECTS THAT CANNOT BE AVOIDED AND OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES 5-1

5.4 UNRESOLVED ISSUES 5-2

CHAPTER 6

CONSULTED PARTIES AND COMMENTS ON THE EIS PREPARATION NOTICE

CHAPTER 7

CONSULTED PARTIES AND THOSE WHO PARTICIPATED IN THE PREPARATION OF THE FINAL EIS

CHAPTER 8

PUBLIC INPUT FROM COMMUNITY INFORMATIONAL MEETINGS

CHAPTER 9

ORGANIZATIONS AND INDIVIDUALS WHO ASSISTED IN THE PREPARATION OF THIS EIS

CHAPTER 10

REFERENCES

APPENDICES

Appendix A Economic and Financial Analysis, Hapuna Beach State Recreation Area Expansion, prepared by Pedersen Planning Consultants, April 1995.

Appendix B Recreational Demand and Capacity Analysis Hapuna Beach Recreation Area, prepared by Pedersen Planning Consultants, April 1993.

Appendix C Geotechnical Consultation, Hapuna Beach Recreation Area Expansion, South Kohala, Island of Hawaii, prepared by Harding Lawson Associates, June 1991.

Appendix D Baseline Assessment of the Marine Environment in the Vicinity of The Hapuna Beach Recreational Area, South Kohala, Hawaii, prepared by Marine Research Consultants, 1991.

Appendix E Assessment of the Environmental Impact of Fertilizers and Pesticides on the Proposed Golf Course of the Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii, prepared by Charles L. Murdoch, Ph.D. and Richard E. Green, Ph.D., May 1991.

Appendix F Botanical Survey, Hapuna Beach State Recreation Area Expansion, South Kohala District, Island of Hawaii, prepared by Char & Associates, February 1994.

Appendix G Phased Archaeological Inventory Survey, Hapuna Beach State Recreation Area Expansion Project, Phase III - Data Analyses and Final Report, prepared by Paul H. Rosendahl, Ph.D., Inc., February 1994.

Appendix H 2010 Traffic Impact Assessment Report for Hapuna Beach State Recreation Area Expansion, prepared by Pacific Planning & Engineering, Inc., February 1995.

LIST OF FIGURES

Figure 1-1	Location Map	1-2
Figure 2-1	Regional Location Map	2-2
Figure 2-2	Project Location Map	2-3
Figure 2-3	Existing Recreation Area	2-5
Figure 2-4	Master Plan	2-13
Figure 2-5	Typical Organized Group Camp Site	2-15
Figure 2-6	Typical Organized Group Dining Pavilion at Group Camp Sites	2-16
Figure 2-7	Large Organized Group Events Pavilion	2-17
Figure 2-8	Typical Family Camp Site Cluster	2-18
Figure 2-9	Central Cooking and Eating Area at Family Camp Sites	2-19
Figure 2-10	Park Headquarters Conceptual Floor Plan	2-21
Figure 2-11	Proposed Project – Alternative A	2-25
Figure 2-12	Proposed Project – Alternative B	2-31
Figure 2-13	Proposed Project – Alternative C	2-35
Figure 3-1	North & South Kohala Region	3-2
Figure 3-2	Project Vicinity	3-3
Figure 3-3	Existing Recreation Area	3-7
Figure 3-4	Existing Hapuna Beach State Recreation Area	3-9
Figure 3-5	Existing Drainage	3-17
Figure 3-6	Drainage Improvement Plan	3-19
Figure 3-7	Archaeological Sites	3-37
Figure 3-8	Beach Lot Acquisition	3-51
Figure 3-9	Existing Roadway Intersection Laneage	3-57
Figure 3-10	Existing Peak Hour Traffic Volumes (1994)	3-58
Figure 3-11	Year 2010 without Project—Peak Hour Traffic Volumes	3-60
Figure 3-12	Year 2010 with Project—Peak Hour Traffic Volumes	3-61
Figure 3-13	Existing Water System	3-69
Figure 3-14	Planned Off-site Water System	3-71
Figure 3-15	Planned Wastewater Disposal System	3-75
Figure 3-16	Existing & Planned Electrical Power Distribution System	3-77
Figure 3-17	Coastal Recreational Opportunities, County of Hawaii	3-84
Figure 4-1	State Land Use District Map	4-13

LIST OF TABLES

Table 2-1	Preliminary Schedule	2-29
Table 2-2	Evaluation Scores of Alternative Proposed Actions	2-38
Table 3-1	TR55 Runoff Quantities for the Basins (Mauka of Queen Ka'ahumanu Highway)	3-15
Table 3-2	Net Flow Over Project Area	3-16
Table 3-3	Culvert Size and Design Flow for Old Kawaihae-Puako Road Realignment	3-21
Table 3-4	Selected Water Well Data in the Vicinity of the Hapuna Beach State Recreation Area Expansion	3-23
Table 3-5	Approximate Fertilizer Use for an 18-Hole Golf Course in Hawaii	3-28
Table 3-6	Approximate Pesticide Use for an 18-Hole Golf Course in Hawaii	3-29
Table 3-7	Summary of Storm Wave Heights and Frequencies of Occurrence – West Hawaii	3-31
Table 3-8	Summary of General Significance Assessments and Recommended General Treatments for Eight (8) Significant Sites	3-40
Table 3-9	Recommended Employment at Hapuna Beach State Recreation Area	3-44
Table 3-10	Annual Income of Expansion Park Employees by Year 2015	3-45
Table 3-11	Summary of Direct and Indirect Economic Benefits to the Big Island by Year 2015	3-45
Table 3-12	Estimated Capital and Operations/Maintenance Costs Hapuna Beach Park Expansion 1993-2015	3-47
Table 3-13	Net Present Value Analysis Hapuna Beach Park Expansion 1993-2015	3-49
Table 3-14	Descriptions of Levels of Service (LOS) for Unsignalized Intersections	3-63
Table 3-15	Unsignalized Intersection Analysis of Two Intersections	3-63
Table 3-16	Unsignalized Intersection Analysis with 4-Lane Queen Ka'ahumanu Highway	3-64
Table 3-17	Signalized Intersection Analysis	3-65

ACRONYMS

AAQS	Ambient Air Quality Standards
ALISH	Agricultural Lands of Importance to the State of Hawaii
AUY	Animal Unit Year
BLNR	Board of Land and Natural Resources
BMP	Best Management Practice
cfs	cubic feet per second
CZM	Coastal Zone Management
DEIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources
DOCARE	Division of Conservation and Resource Enhancement
DOH	Department of Health
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highways Administration
gpd	gallons per day
HELCO	Hawaii Electric Light Company
KV	kilovolt
LSB	Land Study Bureau
LUPAG	Land Use Pattern Allocation Guide
mgd	million gallons per day
msl	mean sea level
OSP	Office of State Planning
OTEC	Ocean Thermal Energy Conversion
SCORP	State Comprehensive Outdoor Recreation Plan
SHPD	State Historic Preservation Division
SIHP	State Inventory of Historic Places
SMA	Special Management Plan
SRFP	State Recreation Functional Plan
TMK	Tax Map Key
USGS	U.S. Geological Survey
vpd	vehicles per day
vph	vehicles per hour
WWTF	wastewater treatment facility

CHAPTER 1
INTRODUCTION AND SUMMARY

1.1 BACKGROUND

1.1.1 Purpose of Document

This Final Environmental Impact Statement (FEIS) has been prepared for the Division of State Parks (hereafter referred to as State Parks) in conjunction with the Land Division of the Department of Land and Natural Resources (DLNR), State of Hawaii for the expansion of an existing beach park at Hapuna Bay in South Kohala, Hawaii. The proposed action calls for the use of State land and funds which subjects the proposed action to Chapter 343, Hawaii Revised Statutes, and its administrative rules. The DLNR has determined that the proposed action will result in potential impacts which should be addressed in an EIS. The proposed action does not include acquisition of privately owned parcels at Wailea Bay and this FEIS does not address the potential impacts of the possible acquisition of these private lands.

The Governor of the State of Hawaii is the accepting authority for the FEIS. The Office of Environmental Quality Control (OEQC) will provide a recommendation to the Governor regarding the acceptability of the FEIS.

1.1.2 General Project Description

State Parks is proposing to expand its existing Hapuna Beach State Recreation Area (previously known as Hapuna Beach State Park) from 62 acres to approximately 846 acres. This expansion will include the area between Hapuna Bay and Puako Bay from the shoreline to a distance of approximately 5,080 feet inland. Traversing the mauka section of this area is the Queen Ka'ahumanu Highway, a State right-of-way serving the South Kohala coastal region. To the north of the property is the Mauna Kea Resort and to the south are the Puako Beach Lots community and Mauna Lani Resort (Figure 1-1). Behind Wailea[1] Bay are 19 privately-owned lots which had previously been considered for acquisition by the State and inclusion within the park expansion area.

The existing park is located at Hapuna Bay and includes 62 acres of open land above the beach. Existing facilities include a concession, three picnic pavilions, three comfort stations, parking, and a mauka area containing six A-frame cabins, multi-purpose pavilion and two small comfort stations.

State Parks has identified long-term recreational needs for West Hawaii and opportunities to use and manage recreation resources at Hapuna. A master plan for expansion of the park has been prepared and calls for improvements to the year 2010. The expansion will consist of 784 additional acres of recreational facilities including picnic areas with comfort

[1] The spelling of "Wailea" also occurs as "Waialea." The spelling of Wailea in this document is consistent with the spelling provided in the 1990 State Comprehensive Outdoor Recreation Plan prepared by the Department of Land and Natural Resources, State of Hawaii.

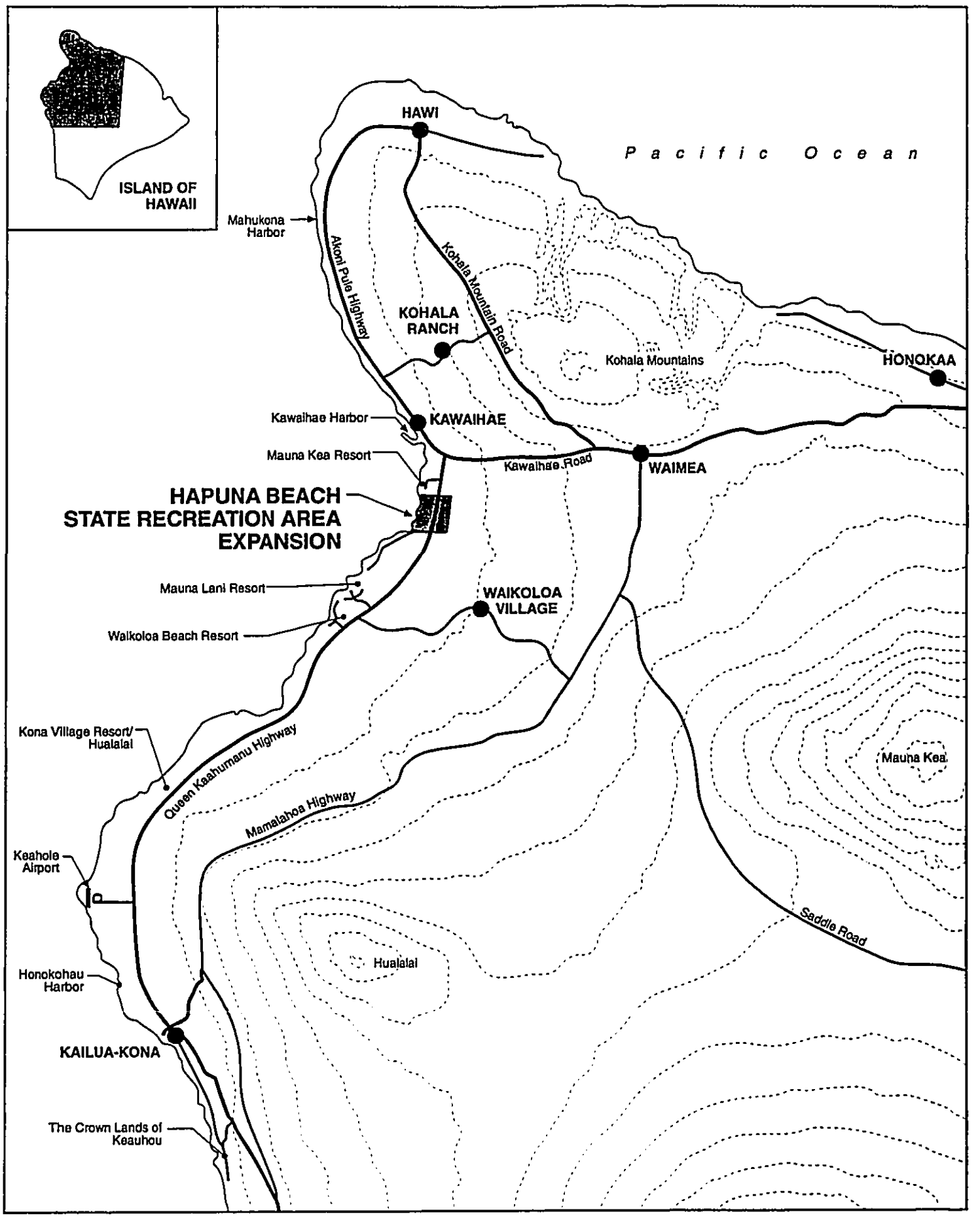


Figure 1-1
Hapuna Beach State Recreation Area Expansion
LOCATION MAP

stations, family and group camping areas, hiking trails and shoreline paths, parking areas, improved access to Wailea Bay, and an 18-hole public golf course. Construction of the park expansion is expected to cost approximately $40 million (1993 dollars) over the planning period. The portion of the park that is to be developed makai of the highway will cost approximately $23.2 million and will be financed by the State's general obligation bond funds. The balance of the $40 million will be used to develop the golf course and is planned to be financed by private interests. The golf course may be constructed by a private investor-developer and operated by an independent contractor. The land would be leased to the golf course developer to provide additional government revenues.

Annual operations and maintenance costs of the park are expected to be $4.3 million by the year 2010 and $5.1 million by the year 2015. Approximately 53 percent of the cost would be for the golf course operations and maintenance which may be financed by a private operator.

1.1.3 Need for the Project

In 1990, on behalf of the State Parks, the Division of Water and Land Development (which has been reclassified to a branch of the Land Division) commissioned Harrison Associates to prepare a master plan for the expansion of the Hapuna Beach State Recreation Area. This plan was undertaken to update a 1970 master plan prepared by Charles Yoon & Associates, Inc. The earlier plan covered approximately 525 acres of State-owned land makai of the old Kawaihae-Puako Road. The updated plan is intended to recognize the rapid urbanization of West Hawaii since 1970 and to re-examine potential recreational opportunities at Hapuna.

Included also in the scope of work for the current plan is the task of demonstrating need for the park expansion. Pedersen Planning Consultants of the Big Island was retained to assess recreational needs with particular focus on West Hawaii (Appendix A).

In summary, the Pedersen study notes the shortage of sand beaches, camping sites, picnic areas, hiking trails, and affordable golf on the island. The available capacities, particularly at existing camping sites, hiking trails and golf courses with affordable green fees, are currently exceeded by demand. This demand is generated by a growing population of residents and visitors alike. According to the Pedersen study, expansion of the park will help meet the projected demand from facility shortages on the island as well as at the Hapuna site. The land use master plan for the Hapuna Beach State Recreation Area is described in Chapter 2 and provides the "proposed action" for this FEIS.

1.2 STATEMENT OF OBJECTIVES

South Kohala and North Kona Districts combine to form the fastest-growing region on the Island of Hawaii, and this growth is generating an increased demand for recreational amenities. Responsibility for meeting this demand is shared by the state and county governments. The county focuses on serving the island's local communities, typically with beach parks, neighborhood parks, playgrounds, and botanical gardens. State Parks provides resource-oriented recreational opportunities and considers regional and islandwide outdoor recreational needs that are not offered by the county. In particular,

State Parks focuses on managing and conserving natural, cultural, scenic, coastal, and wildland resources while providing for the recreational needs of the public.

The concept of sustainability is incorporated in the project's planning process, particularly in the selection of suitable activities and uses for the proposed park expansion. A major consideration in the selection process is the harmonizing of the selected uses with the site's natural resources while being cognizant of any environmentally sensitive areas. Development will involve best management practices and water quality monitoring programs to assure that there are no detrimental effects to the environment. Planning and site selection will include assessment of development alternatives and compliance with State objectives that preserve and protect the region's natural resources.

During the operational stage of this project, efforts will be taken to promote public awareness and protection of the park's natural resources through informational and educational programs.

1.3 SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Impacts to the environment are expected to result from construction and operation of the Hapuna Beach State Recreation Area. Adverse impacts will be mitigated where possible and/or offset by benefits resulting from the project. The following identifies the expected short-term and long-term adverse impacts and recommended mitigation. Each of the mitigation measures summarized below is discussed in detail in Chapter 3.

PHYSICAL ENVIRONMENT

Potential Impacts

In the short-term during the project's construction phase, site clearing, grading, and landscaping will result in alterations to the existing landform and drainage patterns. New topsoil will be imported to provide a finish grade for the golf course.

In the long-term, when construction is completed, the arid, open, and sparsely vegetated setting of the project site will be transformed into a landscaped environment with green, dense pockets of vegetation. The new landscape will require fertilizer and pesticides for maintenance operations. The use of these applications could impact groundwater and result in coastal waters infiltration.

Proposed Mitigation Measures

Much of the golf course area will remain in its natural state; essentially only the tees, greens, and fairways will require site modification. This will eliminate the need for mass site grading and allow the developer to integrate the golf course design with the existing terrain.

Development of the park expansion will also involve selective clearing and grading for the most suitable picnic and camp sites within the park. They will be selected to take advantage of existing land forms, vegetation, and view vantage points.

The project contractor will employ dust control measures, noise suppressant devices on construction equipment, and best management practices on site preparation work to control erosion and sedimentation wherever necessary. The new drainage system for the property will be designed to accommodate net increase in surface runoff, and the new landscaping will include native or indigenous plants and an irrigation system to maintain green, healthy plants. These improved areas will reduce the flow of surface runoff and improve ground percolation and soil drainage.

No importation or exportation of soil, except topsoil for the golf course, will be required. The new topsoil will come from an approved source and will be contaminant-free.

NEARSHORE AND MARINE ENVIRONMENT

Potential Impacts

The proposed project will not involve any shoreline alteration. Thus, no impacts will result from direct modifications of the shoreline ecosystem.

There may be short-term impacts associated with project construction such as dust, erosion and sedimentation which may affect the nearshore areas. In the long-term, the park expansion will generate heavier use of the shoreline area.

Concerns have been raised regarding contamination of groundwater and/or offshore waters by fertilizers, herbicides, and pesticides applied on the golf course and park landscaping. With current low rainfall conditions and high evapotranspiration from turf in the area, groundwater recharge under normal conditions does not occur. Moreover, the groundwater in the area is brackish and will not be used for human consumption.

The inland location of the park landscaping and especially the mauka golf course site provides a large coastal buffer area for dilution and dispersion of lawn chemical applications in surface runoff to the marine waters.

Proposed Mitigation Measures

During construction, dust, erosion, and sedimentation control measures will be employed by the contractor. A Best Management Practice (BMP) plan will be implemented to insure that the contractor takes necessary precautions to protect environmentally sensitive areas. A water quality monitoring program, if necessary, could be implemented to verify the quality of the off-shoreline waters during construction.

Expansion of the park will include improved park management. Park managers, security personnel, caretakers and beach lifeguards will provide improved monitoring of park and beach activities and educational programs to enhance the enjoyment and preservation of park amenities and resources.

Areas that become too overburdened by park users will be subject to temporary or permanent park rules that restrict the area's access and use.

Although adverse impacts to groundwater and coastal waters are not anticipated from fertilizer and pesticide use, the use of adequate topsoil depths, appropriate amounts of lawn treatment applications, and well-managed irrigation procedures will provide added safeguards to reducing potential groundwater impacts and coastal water infiltration.

FLORA AND FAUNA

Potential Impacts

Existing vegetation will be selectively cleared in the proposed golf course site and park expansion area. Wildlife habitats will be impacted and will result in a change in fauna. No rare or endangered plant or wildlife species, however, are expected to be impacted.

Proposed Mitigation Measures

The development of the park expansion will involve the practice of selective clearing and grading. This is in line with the design objective of the park to integrate park improvements with the natural environment. The proposed golf course will also be designed to adapt to the terrain and minimize land alteration.

Existing vegetation will be replaced with new vegetation comprising, as much as possible, of native or indigenous plants. Chapter 103-24.6, HRS, mandates that any new or renovated landscaping for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants, wherever and whenever possible.

The new vegetation, which will include an irrigation system, should draw back a large variety of the original fauna, especially in the bird species, once construction is completed. With vegetation in a more abundant and healthier state in the expansion area, fauna will be more abundant and may include new species. The remaining species should readily adapt to the vast lands that are located adjacent to the project area.

HISTORIC SITES

Potential Impacts

An archaeological survey was conducted on and immediately adjacent to the project area. A total of 164 sites were specifically identified within the existing park and expansion area. The proposed project will affect a number of these sites while the remainder would be left intact in the open undeveloped portions of the property.

Proposed Mitigation Measures

The archaeology consultant for the project has recommended various mitigation measures that would reduce or eliminate impacts to archaeological sites. These measures range from further data collection/recovery work to preservation and interpretative development. The recommendations of the archaeology consultant will be reviewed with the State Historic Preservation Division and implemented prior to construction so no significant archaeological features are adversely impacted.

ECONOMIC ENVIRONMENT

Potential Impacts

The proposed project will generate various beneficial effects including new jobs, increased personal income, and additional government revenues from user fees. Secondary impacts would include increased demand in supplies and materials that are used for operating and maintaining the park. The cost of these benefits are the project's short-term construction costs and long-term operating and maintenance costs. In the future, substantial funds may also be required to acquire private properties that occupy the oceanfront land at Wailea Bay.

Proposed Mitigation Measures

The construction of the proposed golf course, which represents approximately 40 percent of the project construction budget, is planned to be financed by the participation of a private developer with the State. This public-private sector arrangement would make the entire project more feasible.

Other means of keeping the cost of construction under control is scheduling. The project could be developed in phases and payment of project expenses could be done over an extended period to make the annual cost of the project more manageable.

In the future, land acquisition costs also could be spread over an extended period to reduce annual public expenses, and options, such as a lease back program, could be employed to help recover some of the land purchase cost.

SOCIAL ENVIRONMENT

Potential Impacts

Expansion of the existing park will open more land to recreation, benefitting Big Island residents. Bringing more people to the area could increase undesirable activities such as loitering, littering, trespassing, vandalism, and use of alcohol and drugs. These activities are of deep concern to area residents.

Also, as part of the expansion program, the State had considered purchasing the Wailea Bay lots. This action would displace a number of residents who are presently residing on the property, but possible acquisition is not part of the proposed action addressed in this EIS.

The proposed project will not involve the need to construct employee housing.

Proposed Mitigation Measures

The park expansion will bring an improvement in park management. An enlarged staff of park managers, security personnel, lifeguards and caretakers will monitor activities,

enforce park rules and regulations, and provide improved maintenance. Special programs on resource awareness will also be provided.

The schedule for the Wailea Bay lot purchases is uncertain and remains an unresolved issue as well as a source of grave concern for the potentially affected residents.

PUBLIC FACILITIES

Potential Impacts

The proposed park expansion will not directly result in a resident population increase that would burden public facilities such as schools, libraries, hospitals and playgrounds. Its benefits would be the expansion of the park's existing capacity and, to some extent, the relief in pressure on the demand on other existing recreational facilities. The park expansion may require expanded services in police and fire protection.

Proposed Mitigation Measures

Security and fire protection services are being programmed as part of the park management plan. The plan calls for a staff of park managers, security personnel, and caretakers to provide improved public safety within the park grounds. Park personnel will offer information on park rules and regulations and park amenities and provide assistance in minor emergencies. If a major emergency occurs, the County police and fire departments will be summoned for assistance. New driveways within the park will improve access for law enforcement personnel and emergency vehicles. Landscaped areas that contain large lawns will act as fire breaks within the park expansion. Medical facilities in the region have undergone expansion and improvements to accommodate increased demand for health and medical care services.

ROAD AND TRAFFIC

Potential Impacts

Traffic will increase to substantial levels on Queen Ka'ahumanu Highway in the South Kohala District, but this is expected to be a function of regional growth and not the proposed action. A large number of projects have contributed to this growth, including new residential settlements in and around Kailua-Kona, development of public facilities including a landfill in Puuanahulu and a State park near Mahailua Bay, resort expansions on the South Kohala coast, additions to the Honokohau Small Boat Harbor, development of industrial uses in Kailua and near the Keahole Airport, and growth of Waimea town, the Kawaihae industrial/business district, and Waikoloa Village.

The impact that will be evident in the project area will be on Queen Ka'ahumanu Highway at the intersections of Hapuna Beach Road, Puako Spur Road and new golf course access drive. The turning movements at these intersections will experience longer delays.

Proposed Mitigation Measures

Although the project's impact on the area traffic will be relatively small, mitigation measures would be necessary and may include signalization of the Hapuna Beach Road and Puako Spur Road intersections with Queen Ka'ahumanu Highway and channelization of Queen Ka'ahumanu Highway intersection with the proposed golf course access road. The timing and phasing of these improvements will depend on a number of factors relating to regional traffic growth, government highway design objectives, construction cost, and priority of other public improvement projects.

UTILITIES

Potential Impacts

The proposed park expansion will require the development of a potable well for domestic use and the rehabilitation of an existing brackish well in conjunction with development of two new brackish wells for golf course irrigation. The sustainable yield in the region is substantial and should be adequate for the projected usage.

Since no County sewage collection system is located in the project area, on-site individual wastewater disposal units will be required for the park and golf course facilities. Existing electricity and telephone services will be adequate to accommodate park expansion.

Proposed Mitigation Measures

A new well to supply water for the project will be developed in a proven well field on State-owned land above Hapuna. Test drilling will be initiated once property entitlements are obtained and construction funding is appropriated.

The use of seashore paspalum (thick grass turf) in the golf course fairways will minimize the need to use potable water and maximize the opportunity to use brackish water for irrigation. Seashore paspalum is a salt-tolerant species that has been successfully used on other golf courses in Hawaii.

A well-managed irrigation procedure will assure proper use of irrigation water and reduce potential salt accumulation on landscaped grounds.

An agreement with Mauna Kea Resort would allow the park to discharge some of its wastewater into the resort's wastewater treatment facility. The results of this action may help reduce the demand and cost of wastewater disposal in the park's individual disposal units.

The individual units will be located away from the shoreline and makai of any source of potable water.

NOISE

Potential Impacts

Construction and park-related activities will not generate significant noise effects on adjacent residential areas. Noise levels on Queen Ka'ahumanu Highway will increase, in part, due to the proposed park expansion, but primarily as a result of regional growth in West Hawaii.

Long-term noise would be generated during the operational phase from sources that are primarily passive recreational activities in the mauka land and active recreational activities in the coastal and nearshore areas.

Proposed Mitigation Measures

No mitigation measures will be required. Park activities will be located at far distances from Queen Ka'ahumanu Highway where noise levels will meet federally accepted noise levels for recreational use; residential populations located alongside the highway and adjacent to the park will not be exposed to traffic and recreational activity noise greater than the federally accepted level for residential dwelling exterior areas.

Construction noise will be mitigated by noise suppressant devices on heavy equipment and vehicles, and operations will be limited to daylight hours. Site preparation work will not involve blasting.

AIR QUALITY

Potential Impacts

The overall effect of fugitive dust and vehicular engine exhausts during construction is expected to be temporary and minimal. Once completed, the park expansion will have little direct impact on ambient air quality.

Carbon monoxide levels may increase as a result of the project, but would be due to primarily natural traffic growth in the West Hawaii region. Since it is anticipated that there will be infrequent overlapping of stagnant atmospheric conditions, minor vehicular queuing on the access roads, and dispersed peak traffic conditions in parking lots, pollutant concentrations greater than the State and national ambient air quality standards are unlikely.

Proposed Mitigation Measures

Fugitive dust associated with construction will be controlled, as needed, with water sprinkling or dust screens. Replanting, as soon as possible after site clearing and grading, will provide a more permanent protection. Construction equipment should be maintained in proper condition so fuel is efficiently burned and excessive emissions are minimized. No other mitigation measures will be necessary.

VISUAL CHARACTER

Potential Impacts

The visual character of the site will be transformed from an arid, sparsely vegetated setting to a developed, landscaped environment with greener, heartier vegetation. This is expected to be evident in the picnic and camping areas and in the golf course. Park structures will be low-profile and will not obstruct view plains toward the mountains and shoreline.

Proposed Mitigation Measures

The character of the expansion area will remain open and unobstructed by buildings or structures. Views from the highway to the shoreline and across the South Kohala plain will continue to be preserved. The color schemes of proposed park improvements will be compatible with the natural environment. Planned landscaping will include indigenous plant species that integrate with existing vegetation. Accordingly, no mitigation measures will be necessary.

1.4 SUMMARY OF ALTERNATIVES

Three expansion alternatives were considered for the Hapuna Beach State Recreation Area: (1) expansion of the park from 62 acres to 846 acres to include expansion of facilities at Wailea Bay (acquisition of private lands not included) and development of an 18-hole public golf course; (2) expansion of the park from 62 acres to 526 acres including expansion of facilities at Wailea Bay, but not development mauka of the Queen Ka'ahumanu Highway and no acquisition of private lands at Wailea Bay; and (3) no expansion, i.e., no improvements beyond the boundaries of the existing park.

After an evaluation of the alternatives in terms of State Parks objectives and anticipated environmental impacts, the first alternative to expand the park to 846 acres was selected as the proposed action of this FEIS.

1.5 SUMMARY OF UNRESOLVED ISSUES

The primary unresolved issues involving the proposed action are as follows:

- Required improvements for Queen Ka'ahumanu Highway and schedule for implementation.
- Availability and use of public funds for the park expansion.
- Availability of private developer to participate in construction and operation of the public golf course.
- Use of ceded land for the golf course.
- Availability of water from a proven source.

1.6 SUMMARY OF COMPATIBILITY WITH LAND USE POLICIES AND PLANS

Development of the Hapuna Beach State Recreation Area is consistent with the State of Hawaii and County of Hawaii land use policies and plans. Chapter 4 reviews these policies and plans and their relationship with the proposed action.

1.7 NECESSARY APPROVALS AND PERMITS

The major land use approvals and permits required for the proposed action are listed below along with the status of each. Additionally, a number of other permits are required from the State and County in order for development to proceed. These permits are associated with construction and are usually obtained after the land use approvals are secured and when design is in its more advanced stage. These include: grading permit; building permit; outdoor lighting permit; sign permit; groundwater use approval; well construction/operation permit; and individual wastewater system approval.

Required Approval and Permit	*Approving Agency*	*Status*
Conservation District Use Permit	Board of Land and Natural Resources	To be filed
Special Management Area Use Permit	County Planning Commission	To be filed
Use Permit for Golf Course and for Park Improvements in Urban Classified Lands	County Planning Commission	To be filed

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES CONSIDERED

2.1 PROJECT OBJECTIVES

The primary goal of the Division of State Parks, Department of Land and Natural Resources (DLNR), is to provide resource-oriented recreational opportunities within the State of Hawaii. At the same time, it seeks to manage and conserve natural, cultural, scenic, coastal, and wildlife resources. Secondarily, the State agency strives to address regional outdoor recreation needs that are demanded by the general public but not offered by County agencies. The Department of Parks and Recreation, County of Hawaii, notably, has limited financial resources that do not permit it to develop larger regional facilities.

Considerable future demand from Big Island residents as well as from visitors is anticipated for various types of shoreline recreation in West Hawaii. The Hapuna Beach State Recreation Area Expansion is designed to partially meet those needs (Figures 2-1 and 2-2). It will encompass an area that currently contains significant natural, scenic, and cultural resources, including:

- White sand beaches at Hapuna and Wailea Bays,
- Swimming, bodysurfing, bodyboarding, snorkeling, diving, and surfing areas,
- Abundant marine life at Wailea Bay,
- Archaeological features and historic trails,
- Spectacular views of Wailea and Hapuna Bays, and panoramic views of the South Kohala coastline,
- Potential overnight camping and picnicking areas, and
- An existing shoreline pathway.

State Parks also recognizes the shortage of affordable golf in West Hawaii. As described in Section 2.2.2, a public golf course would help fill a need in a highly recreation-oriented region.

Park management is also an important part of any park improvement program. Without such an operation, the park would quickly become unusable, and jeopardize the users' enjoyment, safe use, and appreciation of the park's amenities and resources.

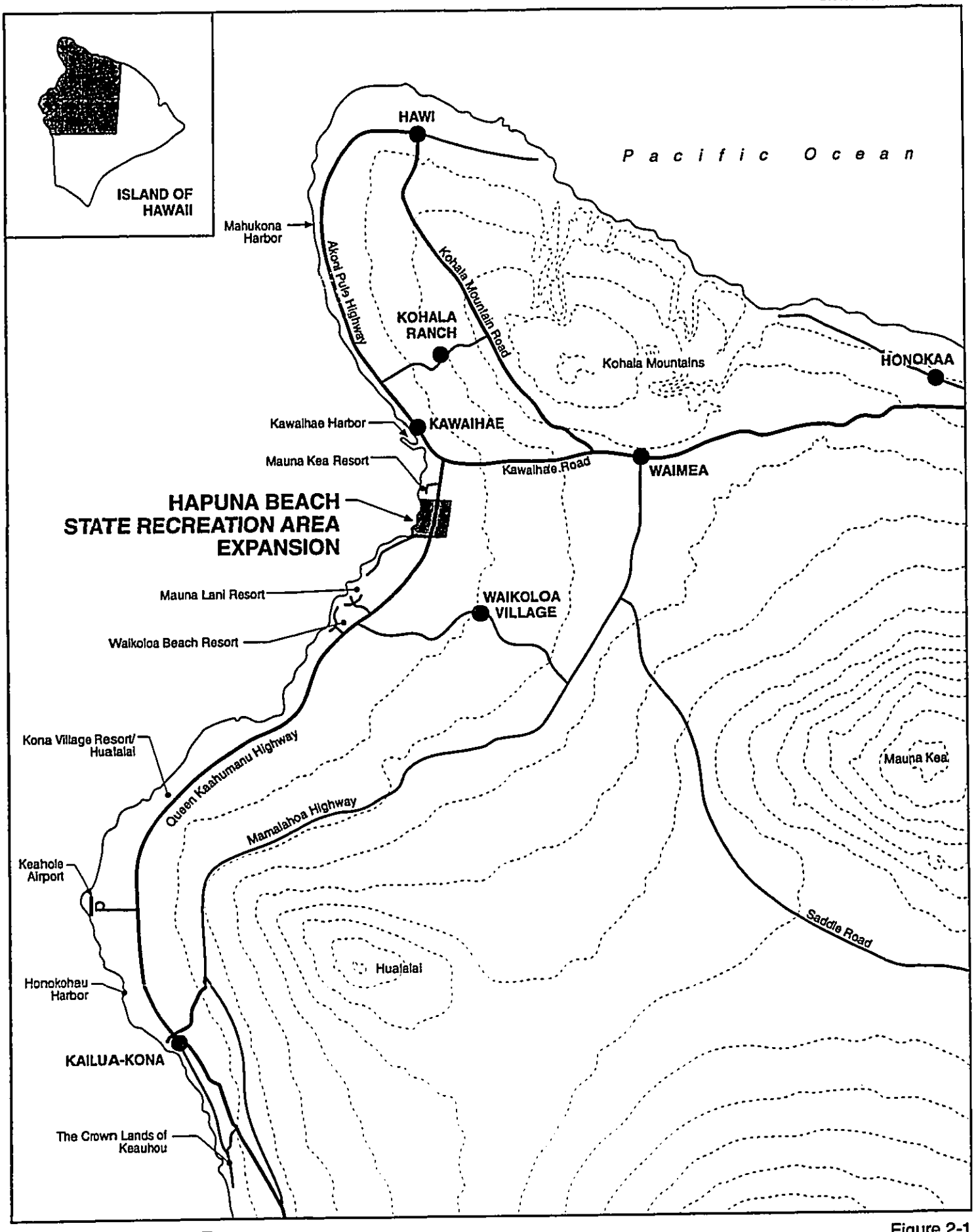


Figure 2-1
Hapuna Beach State Recreation Area Expansion
REGIONAL LOCATION MAP

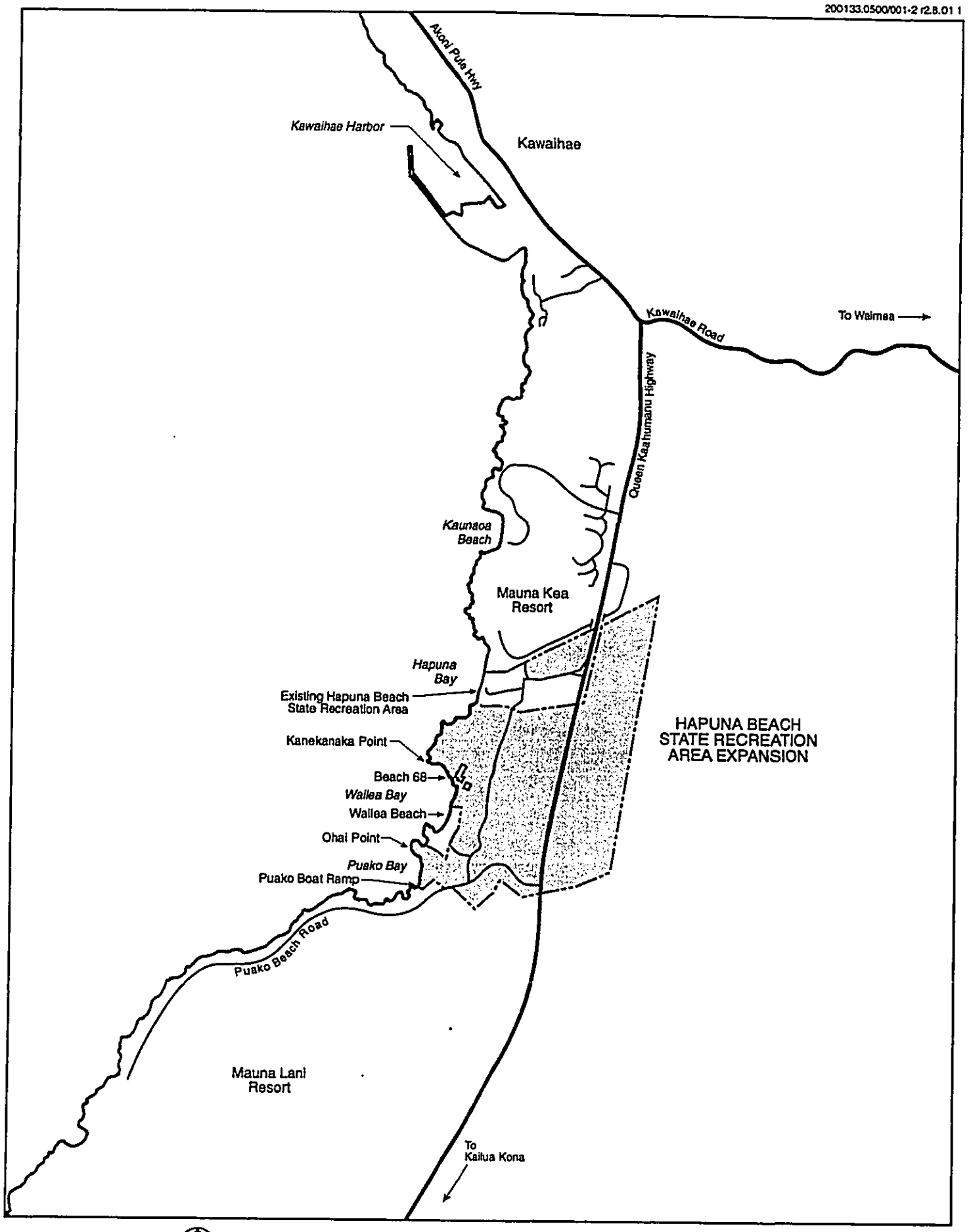


Figure 2-2
Hapuna Beach State Recreation Area Expansion
PROJECT LOCATION MAP

2.2 PROJECT NEED

2.2.1 Existing Recreation in the Hapuna-Puako Area

A two-week survey of recreational activities along the Hapuna-Puako shoreline was conducted by Pedersen Planning Consultants in June 1992. The purpose was to inventory the activities in terms of type, location, and extent.

Results of the survey showed that roughly 70 percent of all recreation occurs along existing beaches and adjacent nearshore waters. Roughly three-fourths of these activities occurred at Hapuna Beach; the remainder took place at "Beach 68" and Wailea Beach. The following is a summary of the various activities observed at the different sections of the project area (see Figure 2-3).

Hapuna Beach

Sunbathing, swimming, and picnicking represent the more popular activities at Hapuna Beach, the largest sand beach in the Hapuna-Puako area. With the appearance of nearshore wave breaks, however, bodysurfing frequently becomes the primary activity.

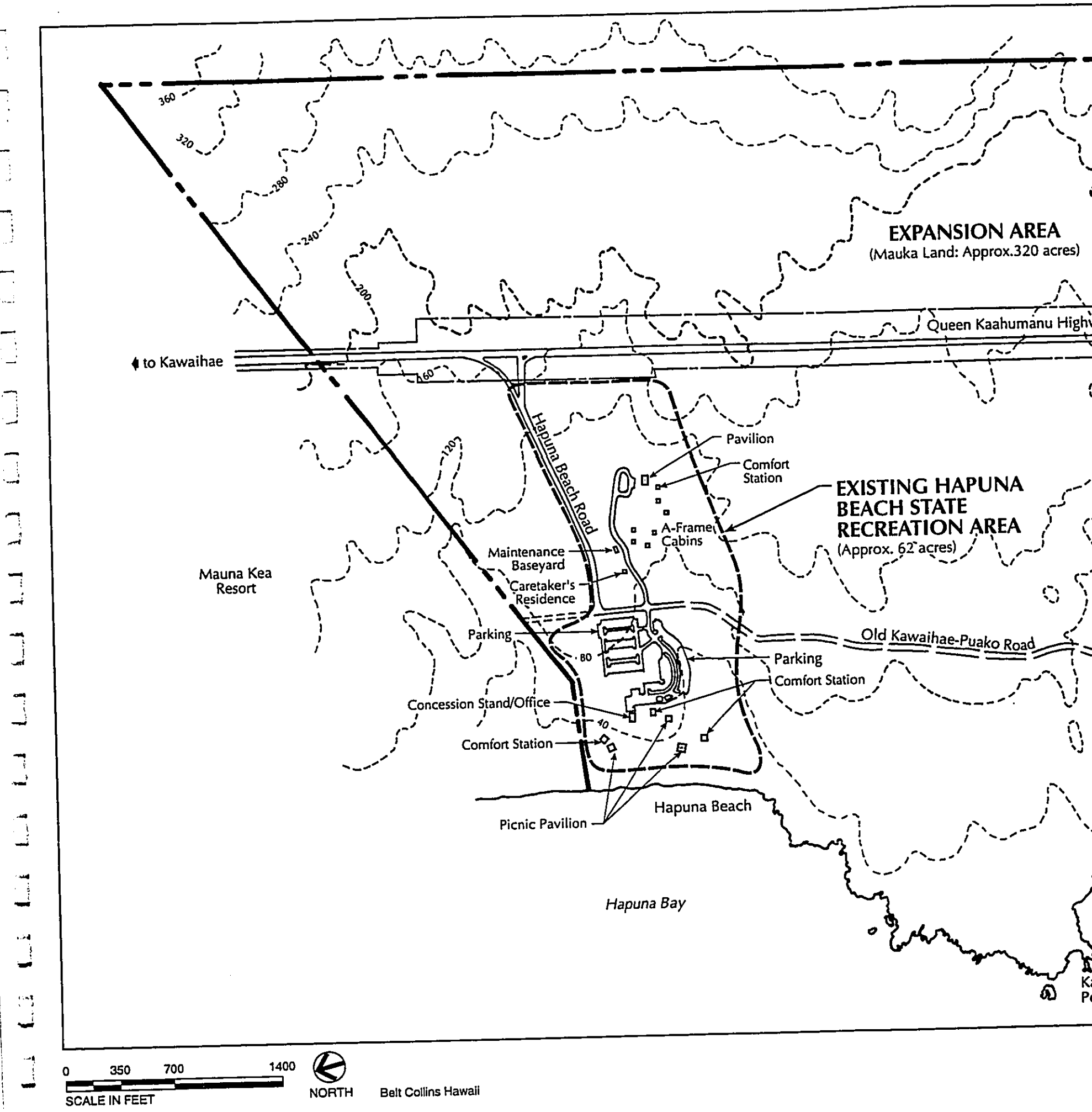
Approximately 40 percent of all Hapuna Bay beachgoers are in the nearshore waters at any given time; the remaining 60 percent are on the sandy beach and other areas of the park. During the 1992 survey, an average of 66 persons were on the beach on a typical weekday; the average weekend day use was about 93 persons.

Secondary activities include volleyball, skimboarding, snorkeling/ diving, and shore fishing. Shore fishing occurs most often along the north end of the beach. Volleyball is played either in the south or central beach sections, depending on the placement of the net by the concessionaire's lifeguards.

Boating rules and other user restrictions, based on the Statewide Ocean Recreation Management Plan, affect the types of activities in Hapuna Bay. An ingress/egress marine craft corridor, 50 yards in width, is located in the south section of the bay. In the nearshore waters of the bay, swimming and diving only are designated (Hawaii Administrative Rules, Title 13, Subtitle 11, Part 3, Chapter 256, Ocean Recreation Management Rules).

Recreational conflicts at Hapuna Beach are virtually non-existent. As a practice, concession lifeguards do not permit the use of surfboards, jet skis, or windsurfing equipment in the nearshore waters.

Mauka of the beach are landscaped picnic areas, picnic shelters, picnic tables, barbecue pits, pavilions, restrooms and showers, and a food concession. Picnicking is the primary activity in the landscaped portion of the park. Sunbathing is also very popular in the partially-shaded grassy areas. Persons using this area spend considerably less time, if any, in the water compared to individuals on the beach. Visitors tend to explore the park on the paved walkways for less than 30 minutes, return to their rental cars, and leave.


360
320
280
240
200
120
80
60
40
EXPANSION AREA
(Mauka Land: Approx.320 acres)
Queen Kaahumanu Highw
to Kawaihae
Hapuna Beach Road
Pavilion
Comfort Station
EXISTING HAPUNA BEACH STATE RECREATION AREA
(Approx. 62 acres)
A-Frame Cabins
Maintenance Baseyard
Caretaker's Residence
Mauna Kea Resort
Parking
Old Kawaihae-Puako Road
Parking
Comfort Station
Concession Stand/Office
Comfort Station
Hapuna Beach
Picnic Pavilion
Hapuna Bay
0 350 700 1400
SCALE IN FEET
NORTH
Belt Collins Hawaii

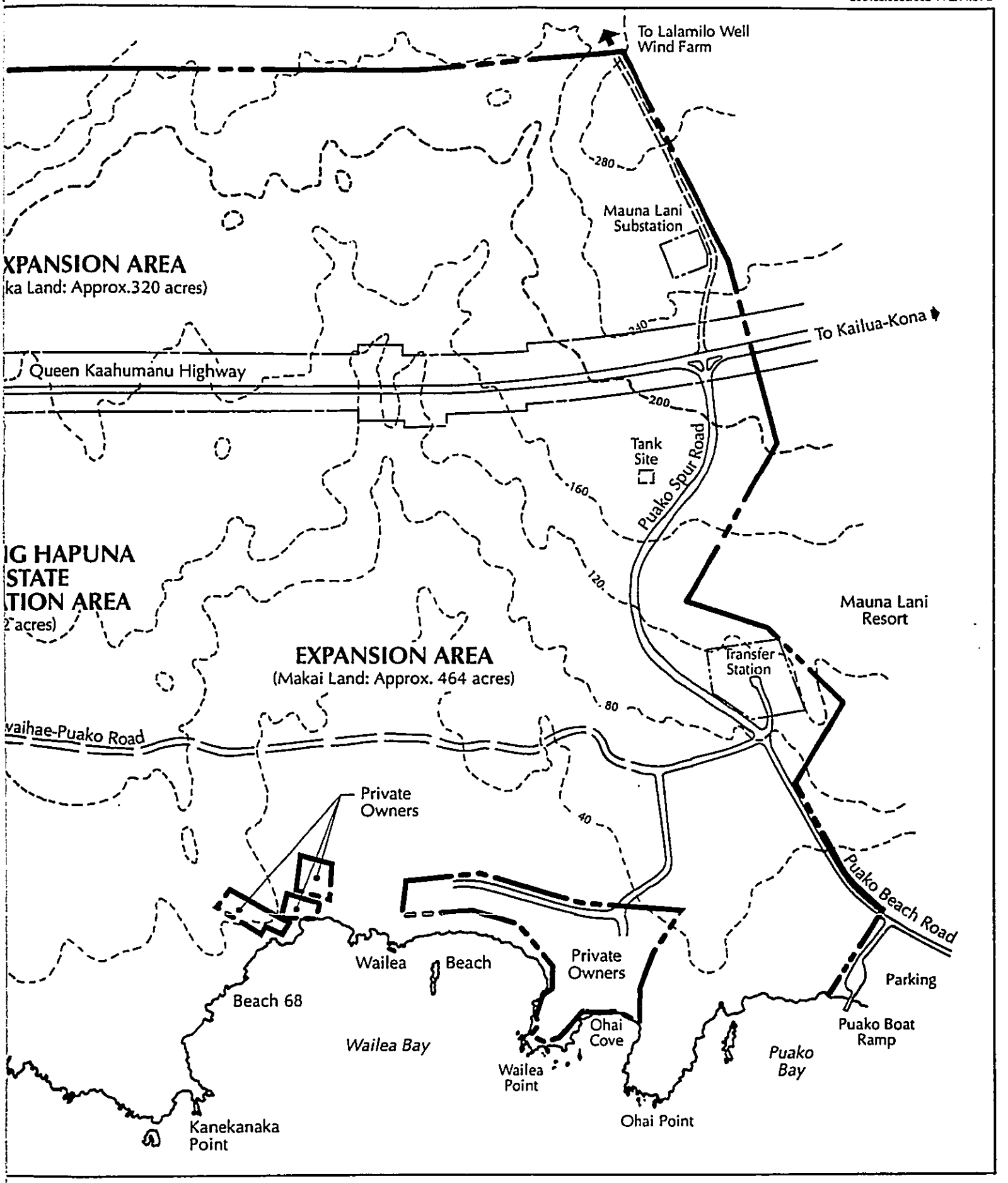


Figure 2-3
Hapuna Beach State Recreation Area Expansion
EXISTING RECREATION AREA

During the 1992 survey, an average of 48 persons per day used the picnic area during weekdays. On the weekends, participation in non-beach activities increased to 56 persons per day. The greatest amount of activity occurred between 12 noon and 3:00 pm; 78 persons were observed during this peak period.

Beach 68

This small beach is located between Hapuna Beach and Wailea Beach (see Figure 2-3). Use of the area is probably constrained by the regular presence of nude sunbathers and long-term campers. A small cove northwest of Beach 68 is good for swimming, particularly for families with younger children. The cove has a sandy bottom, is protected by reefs, and water depth near the shoreline does not exceed eight feet. Only one family was observed using the cove during the entire two-week survey period.

Wailea Beach

Wailea Beach is the second largest beach in the project area and is located between Hapuna Beach and Puako Boat Ramp. It is used for sunbathing, camping, picnicking, swimming, bodyboarding, bodysurfing, snorkeling/diving, and shore fishing. During the 1992 survey, the average use of the entire Wailea Beach was approximately 21 persons per day.

South Wailea Beach is enjoyed by both visitors and residents; swimming and snorkeling are popular activities. Overall, this beach receives considerably less use than Hapuna Beach, which is very likely the result of more difficult vehicular access, lack of restrooms, and limited parking. Peak use of South Wailea Beach occurs during the winter months when the bay is more frequently exposed to westerly and northwesterly swells. Such conditions generate favorable winter surf at several sites, including "67s Shorebreak," "68s," "Pitchers," and "69s". These are local names of surfing sites offshore from Wailea Bay. Excellent surf conditions in January and February 1991 attracted up to 30 to 40 surfers and bodyboarders during the weekend days (Clark, 1991).

In the northern half of Wailea Beach, activities include sunbathing (including nude sunbathing), swimming, and snorkeling. During the 1992 survey, a small number of people were tent camping on a long-term basis behind the northern half of the beach. Considerable alcoholic beverage consumption and possible illegal drug use occurred in the unimproved parking area. Users on the south half of the beach may have felt threatened or intimidated by these activities.

South Hapuna Bay to Kanekanaka Point

The shoreline and nearshore waters from Hapuna Beach to Kanekanaka Point provide sites for recreational fishing, hiking, camping, and cliff jumping.

Only limited fishing activity was observed during the June 1992 survey, which was conducted only during daytime hours. No more than 10 to 12 shore fishermen are expected to be found here during daytime or nighttime hours.

Cliff jumping occurs about 200 feet south of Hapuna Beach. Lifeguards caution swimmers who climb the high cliffs of the potential dangers. In general, the lifeguards permit local residents to participate in this activity but discourage visitors who are not familiar with ocean bottom and nearshore wave conditions.

Mauka of the shoreline are various jeep trails which are evidently used for off-road touring. Few users were observed during the daytime 1992 survey. Considerable trash and broken alcoholic beverage bottles suggest significant nighttime use. However, discussions with local fishermen confirm that such use is not related to fishing activities, but rather younger persons "hanging out," relaxing, and frequently drinking along the shoreline.

Overnight camping is limited to a small number of light trucks and vans owned by "homeless persons" who park their vehicles at scenic points makai of the old Kawaihae-Puako Road. During the survey, it was observed that these overnight campers are, for the most part, transient and do not park their vehicles in the same location for more than three or four days. Several small campfire activities were observed at the more preferred camp sites.

Kanekanaka Point to South Wailea Bay

Evidence of shore fishing was observed along existing trails. Only one fisherman was observed during the entire two-week survey period. This limited use can be attributed to the Marine Life Conservation District designation which extends south from Kanekanaka Point to Wailea Point. Under this designation, only fishing for finfish with hook and line is permitted. Netting finfish is allowed with a permit over the sandy bottom areas. Otherwise, no other type of fishing or taking of marine life (e.g., corals) is allowed (Hawaii Administrative Rules, Title 13, Subtitle 4, Part I, Chapter 35, Wailea Bay Marine Life Conservation District, Hawaii).

One surfing site, known as Hapuna Point or "H-Point," is located offshore from the north end of Kanekanaka Point. It is used by more experienced surfers from November through April when the offshore area is more frequently exposed to both westerly and northwesterly swells. Because of the distance to both Hapuna Beach and Wailea Beach, surfers typically enter and exit this surfing area over the rocks near Kanekanaka Point. Maneuvering in and out of this point during high surf conditions requires a higher level of skill and ocean awareness. A second surfing site called "67s" is situated at the north end of Wailea Bay.

Approximately three to four windsurfers regularly use the offshore waters of Wailea Bay, which is afforded considerable protection and provides good conditions for beginning windsurfers. Due to limited vehicular access, most windsurfers go to nearby Anaeho'omalu Bay.

Ohai Cove

This small cove, situated between Wailea Bay and Puako Bay and adjacent to Ohai Point, apparently receives little to no use by the general public. A private beach home is located immediately behind the cove and adjoining shoreline. During the 1992 survey, only one

temporarily moored recreational boat was observed in the cove during a weekend afternoon.

Puako Bay

A small boat launching facility is located at the northern end of Puako Bay. During the 1992 survey, an average of one launched and/or retrieved boat per day was observed during weekdays. On the weekend, the average number of launched and/or retrieved boats increased to two boats per day.

During other times of the year, usage is expected to vary and could be much more than the count taken during the Pedersen survey. According to the Boating and Ocean Recreation Division of the Department of Land and Natural Resources, on some weekends, the boating facility is in full use.

2.2.2 Future Demand

Park Facilities

A statewide survey of residents conducted for the 1990 State Comprehensive Outdoor Recreation Plan (SCORP) showed that going to the beach for swimming and sunbathing is the most popular weekend recreational activity and is number two overall, considering the weekdays. On the Big Island, this activity is the most popular on any day. According to the SCORP survey, most of the beachgoing occurs at developed beach parks that contain comfort stations. The survey revealed that the most popular beach and ocean recreation areas in the state are in Kohala and Kona of the Big Island.

Kohala and Kona, together, is one of the fastest population growing regions in the state and the demand for recreation has increased along with this growth. The West Hawaii area has a number of beautiful white sand beaches but the number is relatively limited compared to the neighbor islands. SCORP states that "with Hawaii County's rapidly growing resident and visitor population and limited number of beaches, congestion at certain beach parks is becoming a problem. The capacity analysis approach . . . needs to be considered for areas such as Hapuna Beach Park . . . ", which is located on the Kohala coast.

As part of the master plan update for the Hapuna Beach State Recreation Area, a capacity analysis was conducted by Pedersen Planning Consultants (see Appendix B). The analysis concluded that Hapuna's existing recreational demand does not exceed the current space available. The projected demand, however, is anticipated to increase by the year 2010 and that it would place heavy pressure on existing facilities. Forecasts were calculated by multiplying projected resident and visitor populations with the 1989 rates of both weekday and weekend participation (SCORP, 1990).

The SCORP states that "facilities on the neighbor islands may not be used as heavily at the present time, but the projections indicate a significantly higher rate of growth in both resident populations and visitor counts for the neighbor islands, when compared to Oahu. Hence, neighbor island parks will experience similar pressures. The problem is apt to be

magnified on the Big Island, which has few sandy beaches and is expected to have the highest percentage increases in the number of residents and visitors."

The strategy that SCORP has developed to address the saturation problem of existing beach park capacities is: (1) to keep up with existing beach park maintenance, especially those that receive the heaviest usage; and (2) acquire additional beach park land and rights-of-way to remaining undeveloped shoreline areas.

Due to the current shortage of camping facilities, demand already exceeds availability. The current demand for camping is 30 persons per day during the weekday and 190 per day during the weekend. By the year 2010, availability of camping facilities is estimated to be 60 percent for group camping and 78 percent for family camping. Expansion of the park will accommodate current and projected year 2010 demands.

The demand for hiking in West Hawaii exceeds current availability—primarily because of visitor needs. Although the development of a shoreline trail would attract hikers and increase demand, new trails that are proposed in the expansion would be of sufficient size to accommodate the additional demand. An available capacity of 39 percent is projected for the year 2010.

Golf Course

Golf is always a high demand activity in resort concentrated areas. In West Hawaii, which extends from North Kohala to Ka Lae (South Point), there are 13 golf courses. These popular facilities, however, are all privately operated and have green fees that range from approximately $35 to $80 for island residents. Municipal or publicly operated golf courses with lower green fees, such as Hilo Municipal Golf Course, are unavailable in West Hawaii.

According to SCORP's survey of Big Island residents, about 20 percent of the respondents identified "barriers" to golf, tennis, and beach activities. These so-called barriers refer to anything that would prevent or discourage a person from engaging in a recreational activity. Such barriers would include lack of facilities, crowded facilities, high participation fee, poor conditions of facilities, etc.

A new public golf course would clearly meet a portion of the West Hawaii residents and visitor demand for affordable golf. Residents are expected to be the primary users. Assuming a continuation of 1989 residential recreational trends, a public course in Kohala has a potential market of 400 golfers on weekdays and 300 golfers on weekends. If, as expected, local residents use primarily this course rather than the privately-owned courses in Kohala, little remaining capacity would be available. (Private golf courses that offer special rates to resident golfers will not significantly compete with the public golf course unless special rates for resident golfers are available during all tee times. The amount of remaining capacity on the public course will be influenced, however, by the marketability of the course to local residents.)

2.3 DESCRIPTION OF THE PROPOSED ACTION

2.3.1 General Development Proposal

The Division of State Parks plans to incrementally expand its Hapuna Beach State Recreation Area from 62-acre to approximately 846 acres (Figure 2-4). Expansion is designed to meet the future recreational needs of the Big Island residents and West Hawaii visitor population. The following improvements would be developed to the year 2010:

- Improved access to beach and water activity areas;
- Family picnic areas and group picnic rental grounds;
- Family and group campgrounds;
- Coastal and inland hiking trails and footpaths between Hapuna Beach and Puako Bay;
- Park headquarters and maintenance baseyard;
- 18-hole public golf course;
- Vehicular access road and parking lots; and
- Water, wastewater, electrical and drainage systems.

Figure 2-4 illustrates the concept and location of these planned improvements.

2.3.2 Beach and Water Activity Areas

Hapuna Beach will continue to be the primary destination in the expanded park for activities such as swimming, snorkeling, nearshore scuba diving, ocean jumping, diving and body surfing. Wailea Beach is currently used for sunbathing, swimming, snorkeling, diving, bodyboarding, bodysurfing, and occasional surfing. It is expected to accommodate about 15 percent of future beach and water activity demand. The adjoining Beach 68 (see Figure 2-4) will be limited to sunbathing because it has only a small sand area.

2.3.3 Picnic Areas

Facilities for family or small group picnicking will be established behind Wailea Beach and Puako Bay and on Ohai Point. Picnic tables, barbecue facilities, comfort stations, and potable water fixtures will be provided. Comfort stations will be designed to meet Americans with Disabilities Act (ADA) standards. (During the project design stage, the State Commission on Persons with Disabilities will be consulted in regard to these standards.)

A group picnic rental area with three pavilions and a comfort station will be constructed makai of the old Kawaihae–Puako Road on a site overlooking Wailea Bay. Two of the pavilions will each accommodate about 50 persons; a third pavilion will handle up to 100 persons (see Figure 2-4). Each pavilion will contain kitchen facilities, lavatories, storage area and a stage.

2.3.4 Campgrounds

Twenty clusters of tent/recreational vehicle campsites will be developed mauka of the old Kawaihae–Puako Road to serve family-size groups (see Figure 2-4). Each cluster will accommodate up to 40 people and will consist of tent/recreational vehicle campsites, comfort stations, and shared cooking and eating facilities. Camping banks will also be designated to reserve selected sites for future expansion because tent camping is a popular activity among Big Island residents.

The development of three clustered cabin sites will serve large groups of various sizes (Figure 2-5). Each clustered site will contain five to eight cabins and accommodate a total of 80 to 128 people. Each cabin, which will meet ADA standards, will have a capacity to serve 16 persons. In total, clustered cabin sites will be able to accommodate about 380 persons.

The cabin sites will be situated around a large open play area, group dining pavilion, and events pavilion (Figures 2-6 and 2-7). The pavilions will support cooking and eating activities, daytime educational programs, and night-time events.

A family campground will be provided makai of the old Kawaihae–Puako Road between Hapuna Bay and Wailea Bay. It will consist of campsite clusters, each containing tent sites and a central cooking and eating area. Vehicular access and parking will be provided to each cluster and a meandering walkway will be provided for pedestrian access. Figures 2-8 and 2-9 illustrate the type of facilities to be provided.

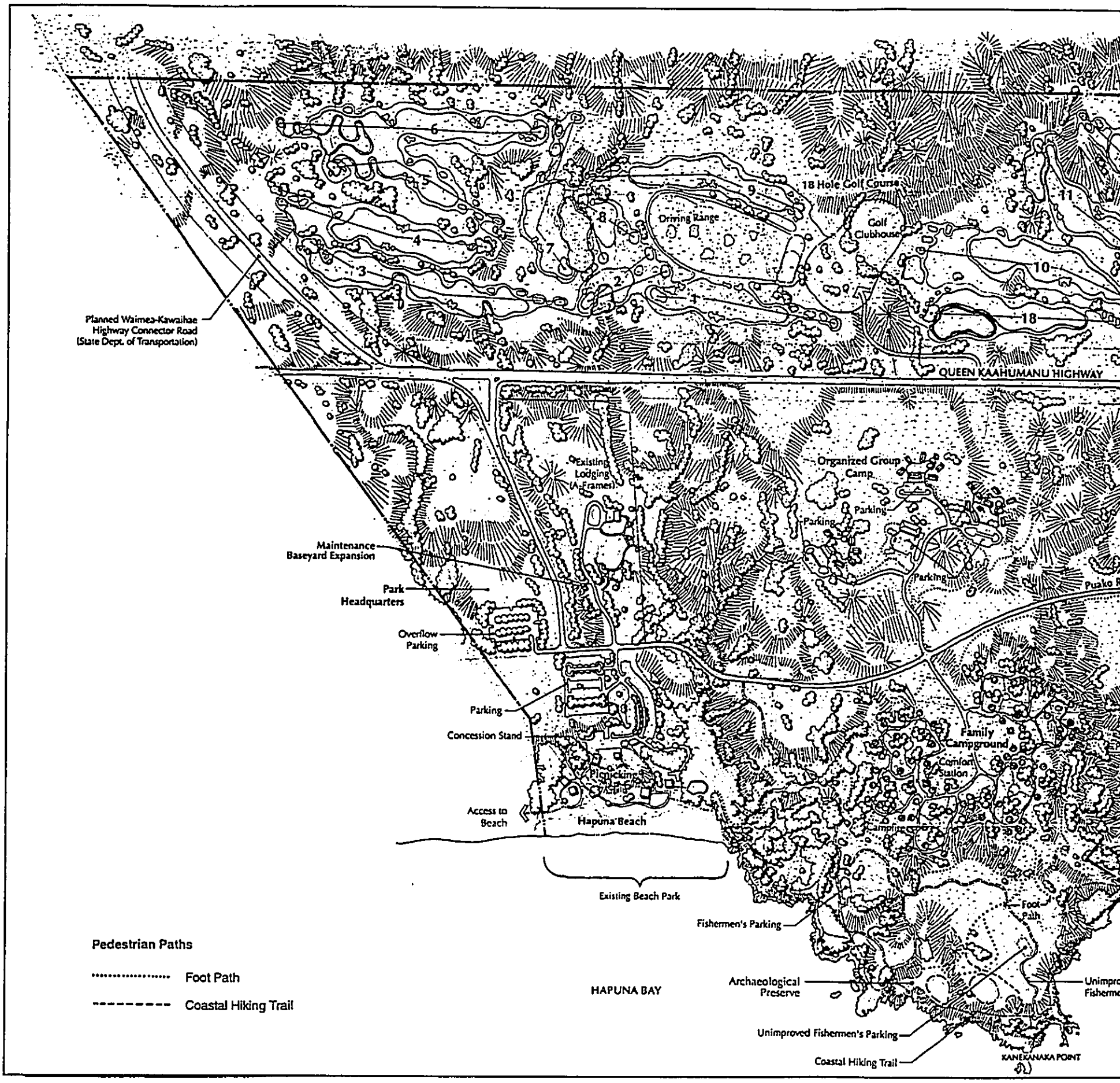
2.3.5 Hiking Trails

Almost two miles of hiking trails will be developed along or near the shoreline, as well as along mauka-makai routes, to form a series of loop trails (see Figure 2-4). The coastal route will help implement a portion of the Ala Kahakai trail system. This system consists of about 50 miles of trails along approximately 35 miles of shoreline that extends from the Pu'ukohola Heiau National Historic Site in Kawaihae to the old Kona Airport Park in Kailua-Kona. It is part of the State's Na Ala Hele program, which seeks to preserve and maintain established trails and accesses and define mechanisms to add new ones.

The Ala Kahakai has been nominated as a national trail and, as a result, the National Parks Service is conducting a feasibility study to determine whether it qualifies. If the trail is designated a national status, the State Parks agency may be asked to cooperate with the federal agency to install uniform signages.

The proposed coastal trail in the Hapuna Beach State Recreation Area will generally follow existing routes. Portions of the trail may be rerouted to allow interpretation of early historic uses of the area. A 40' wide public road reserve behind Wailea Beach is available and will be incorporated in the shoreline trail. Mauka-makai routes will take advantage of scenic views and, when possible, follow existing trails and drainageways. These routes will also connect camping and picnicking activities to the shoreline.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

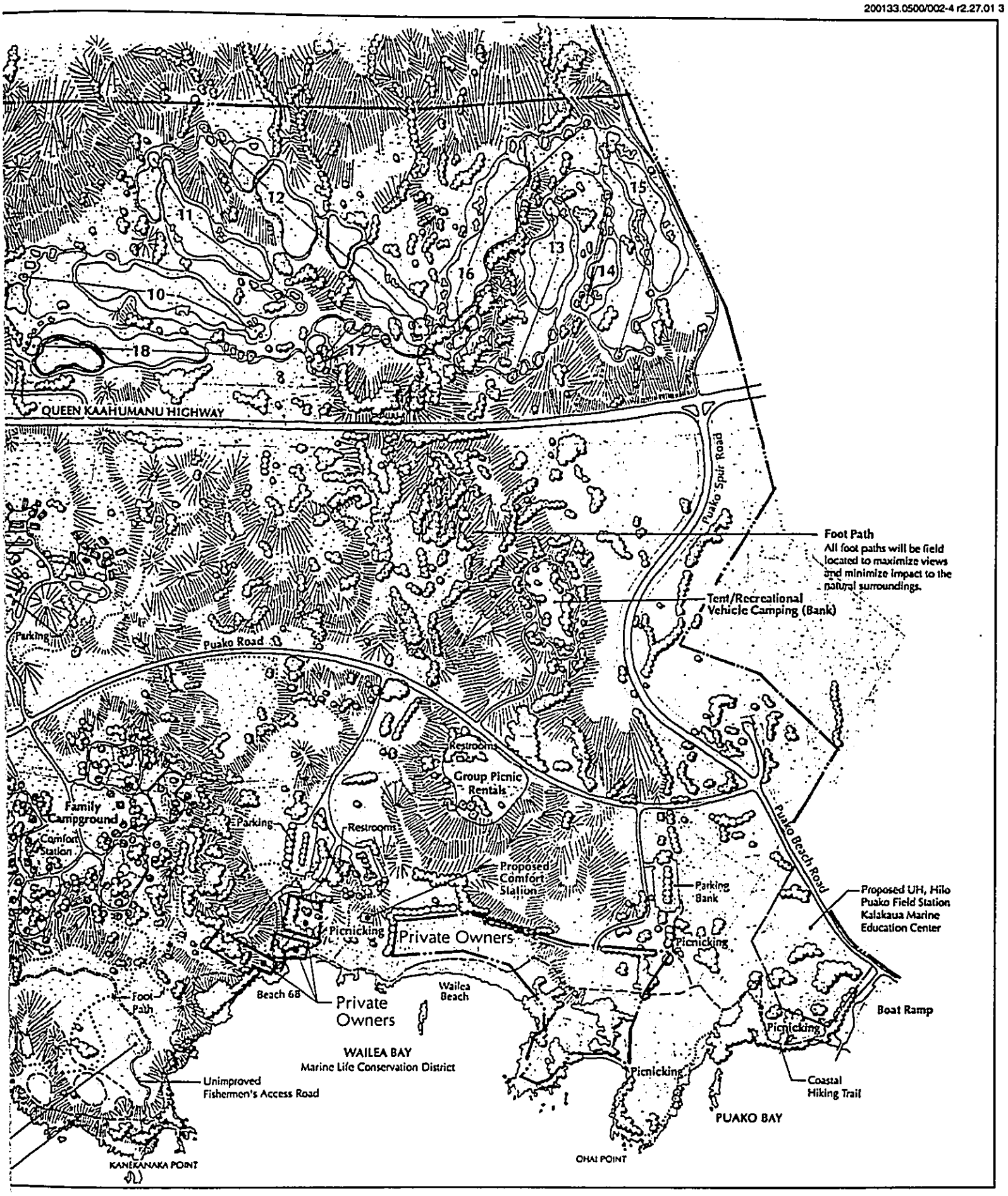
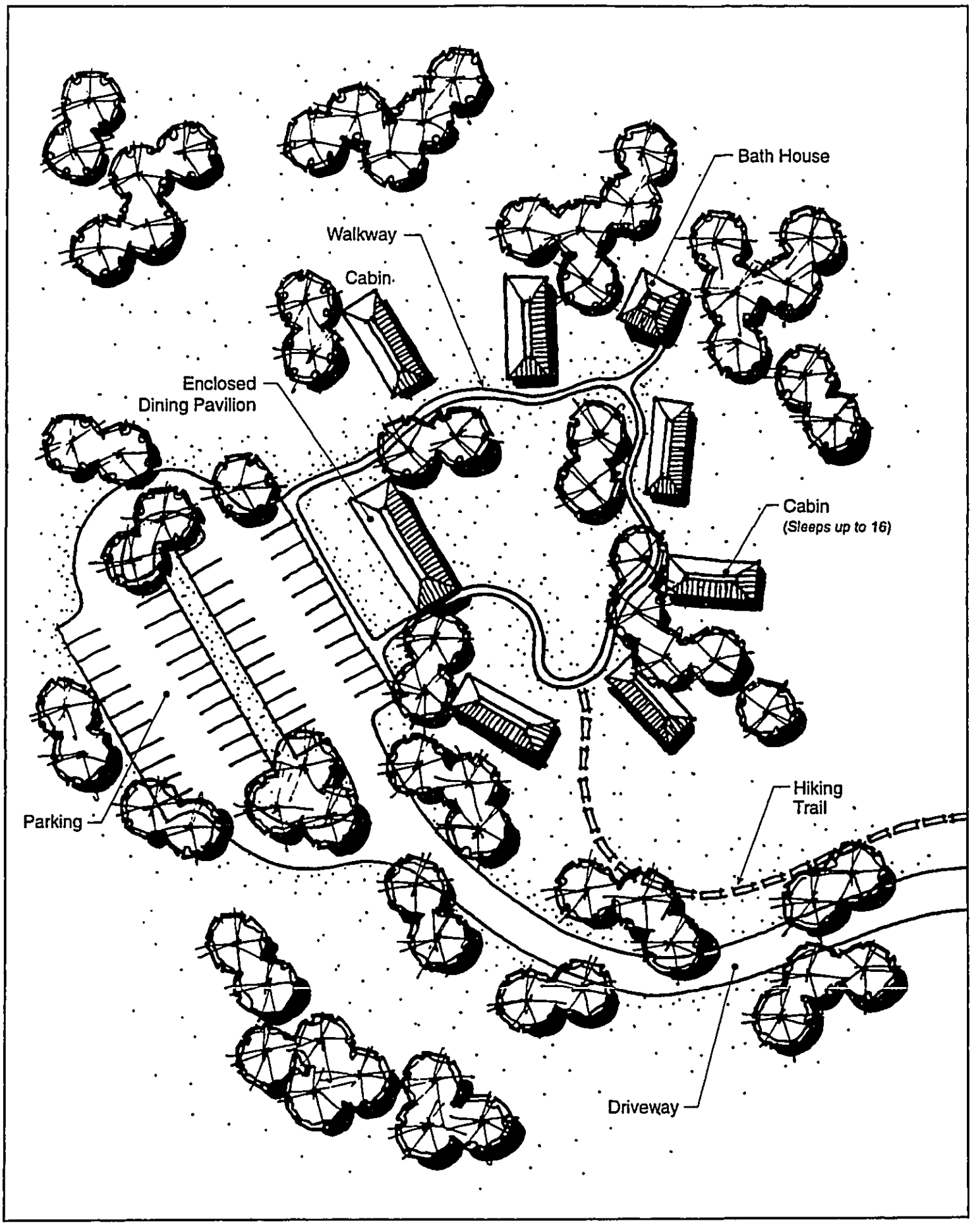


Figure 2-4
Hapuna Beach State Recreation Area Expansion
MASTER PLAN

DOCUMENT CAPTURED AS RECEIVED

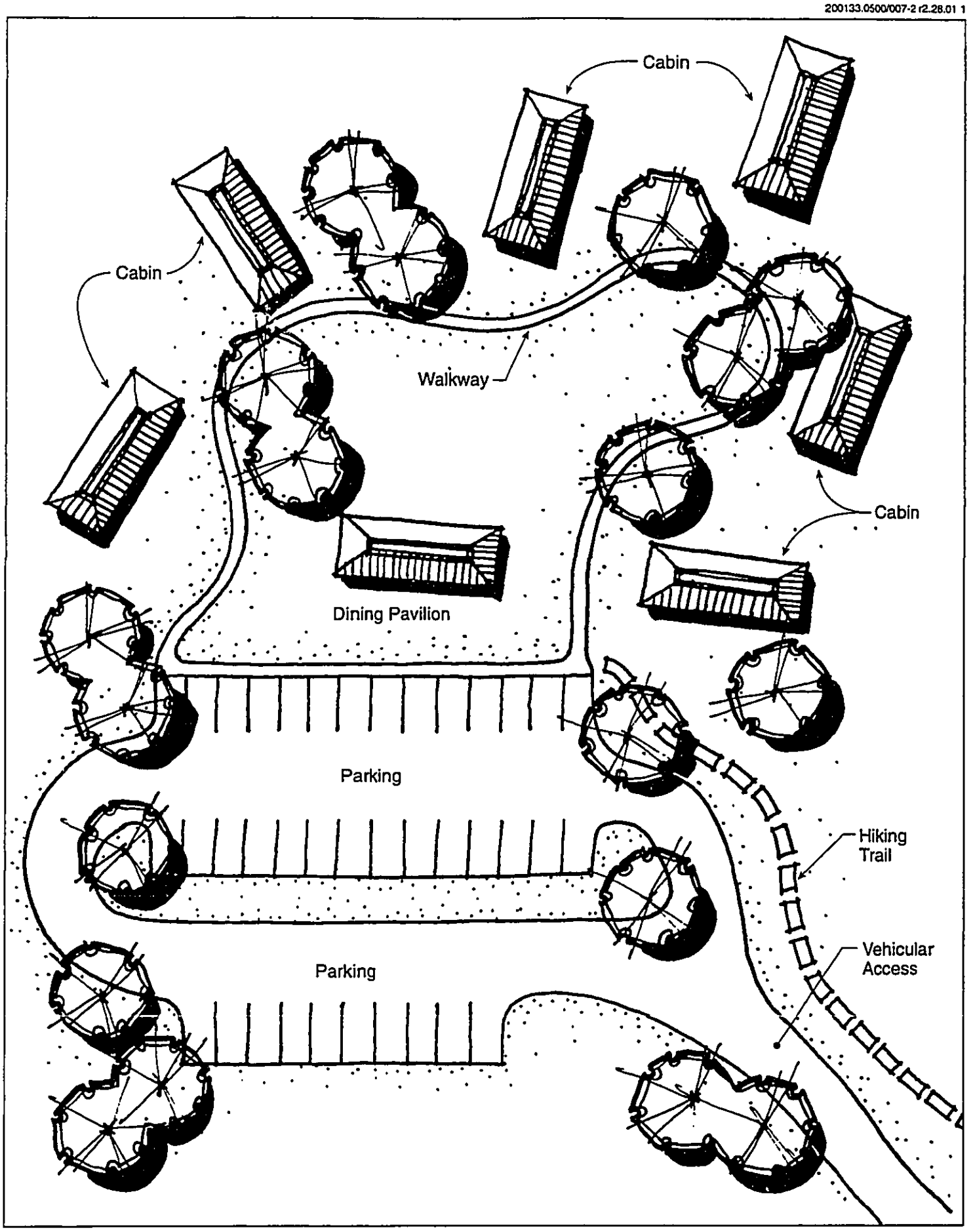


0 35 70
SCALE IN FEET

Belt Collins Hawaii

Figure 2-5
Hapuna Beach State Recreation Area Expansion
TYPICAL ORGANIZED GROUP CAMP SITE

DOCUMENT CAPTURED AS RECEIVED



0 20 40
SCALE IN FEET

Belt Collins Hawaii

Figure 2-6
Hapuna Beach State Recreation Area Expansion
TYPICAL ORGANIZED GROUP DINING PAVILION AT GROUP CAMP SITES

DOCUMENT CAPTURED AS RECEIVED

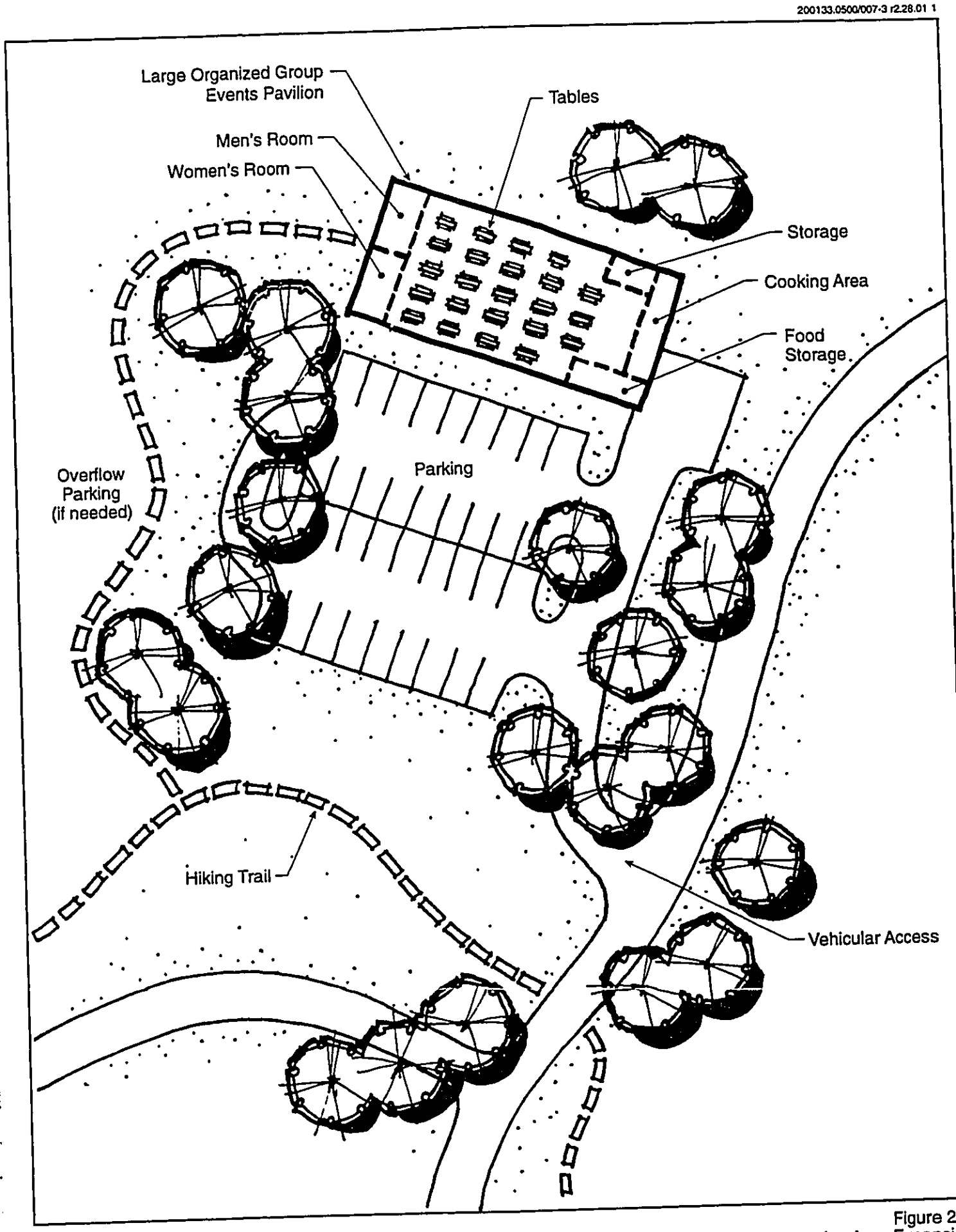
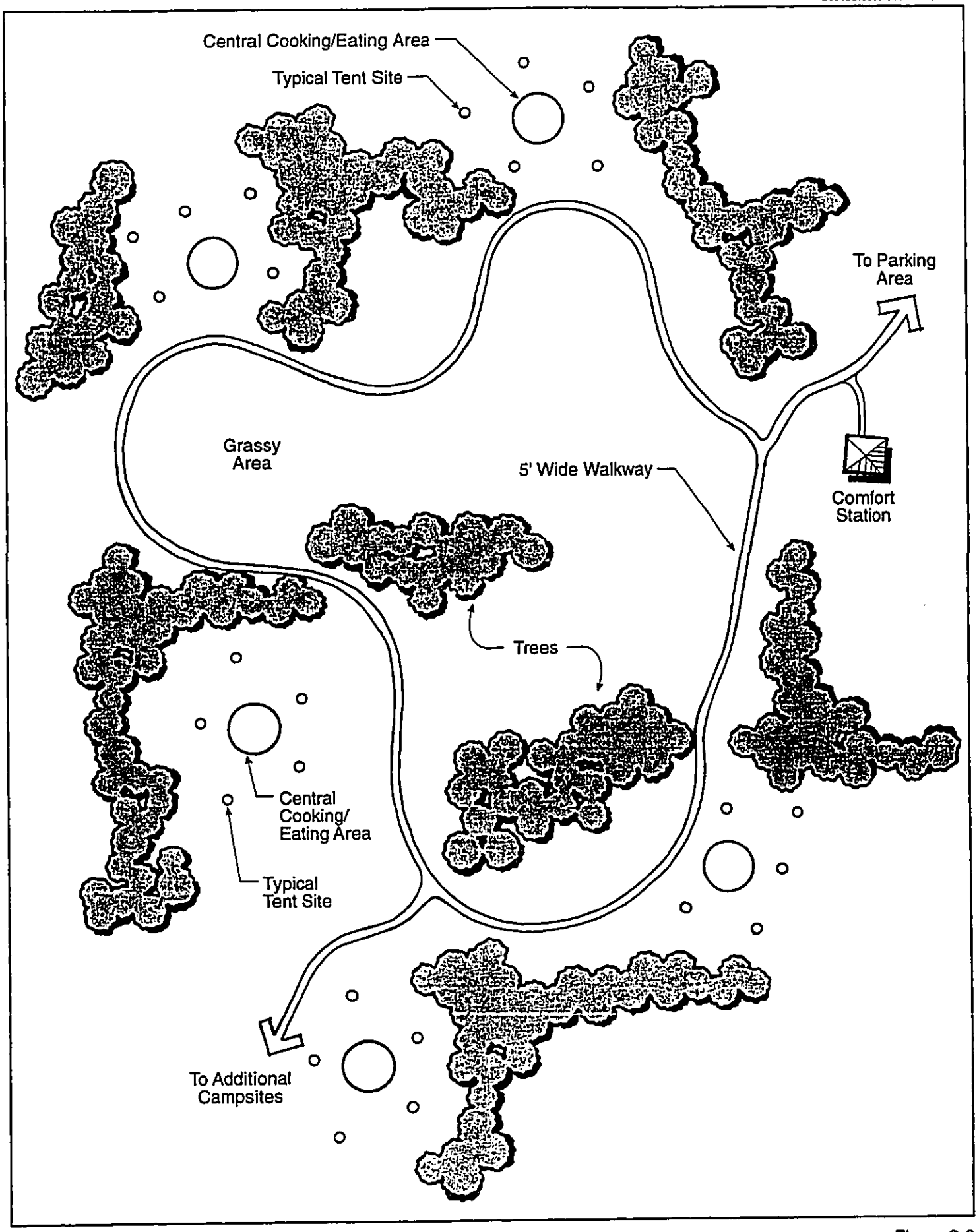


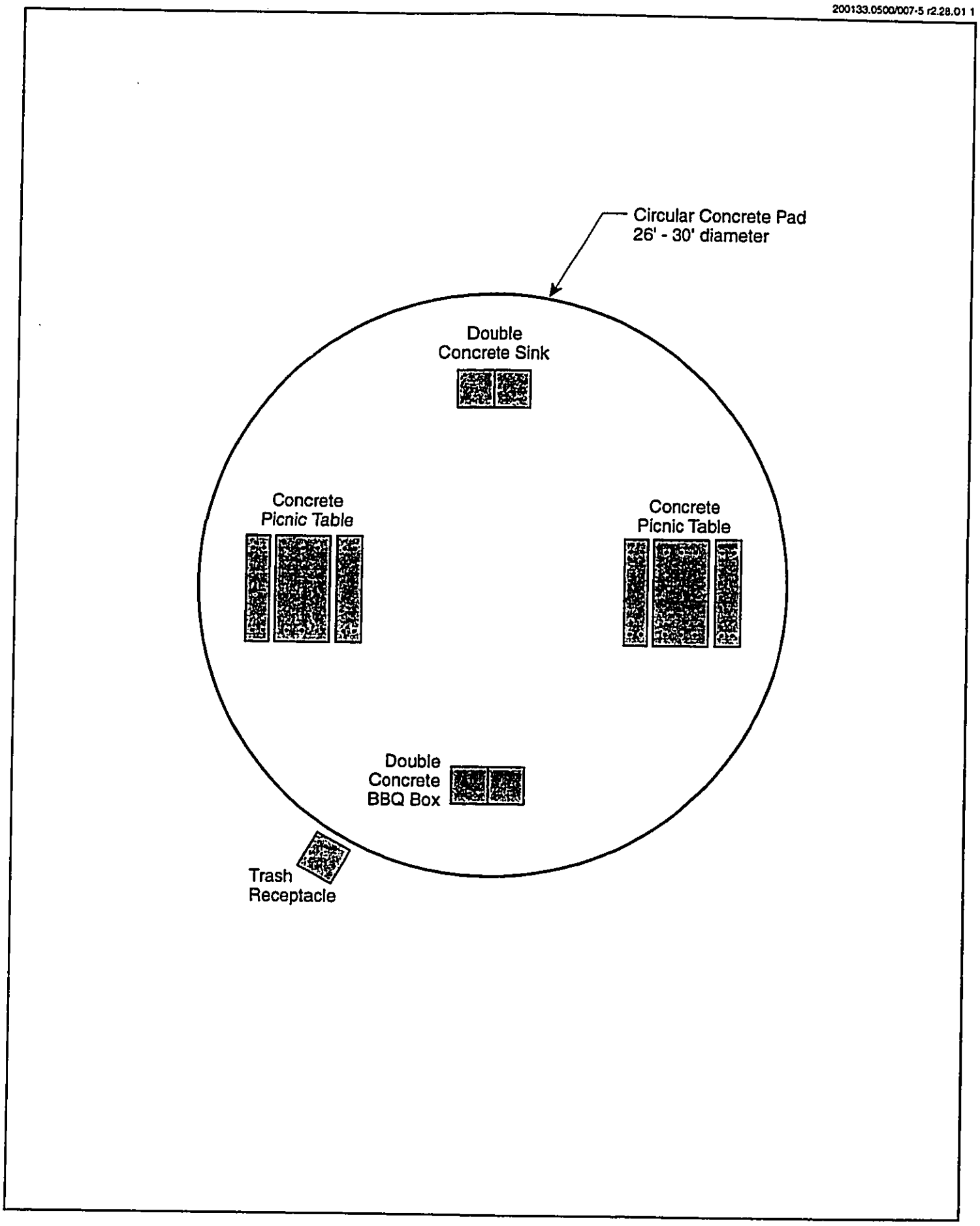
Figure 2-7
Hapuna Beach State Recreation Area Expansion
LARGE ORGANIZED GROUP EVENTS PAVILION



0 40 80
SCALE IN FEET

Belt Collins Hawaii

Figure 2-8
Hapuna Beach State Recreation Area Expansion
TYPICAL FAMILY CAMPSITE CLUSTER



0 3.5 7
SCALE IN FEET

Belt Collins Hawaii

Figure 2-9
Hapuna Beach State Recreation Area Expansion
CENTRAL COOKING AND EATING AREA AT FAMILY CAMP SITES

Selected portions of the coastal and upland trails will be accessible to persons in wheelchairs. Shorter loop trails, which may be hampered by rough terrain, will be provided for persons who do not desire a long walk.

2.3.6 Golf Course

An 18-hole public golf course will be developed mauka of the Queen Ka'ahumanu Highway on an approximately 320-acre site (see Figure 2-4). The course, which will include a clubhouse, will be a par 72 that measures approximately 6,955 yards from the back tees. The overall configuration of the course will be a north-south orientation with two returning nines of golf holes.

In order to encourage local participation in golf and junior golf programs, the facility will feature a full-size driving range and training area. The training area, which will accommodate up to 50 players at a time, will include a full-service teaching facility. Both grass and all-weather tees will be provided. Other practice features will include target greens that simulate actual golf greens, practice bunkers, and chipping and putting greens.

2.3.7 Park Headquarters

A 3,000-square-foot headquarters building will be developed to house selected on-site park management personnel and serve as a check-in station for overnight campers. This facility will include an information counter, exhibition area, office space, storage space, conference room, and toilet facilities (Figure 2-10).

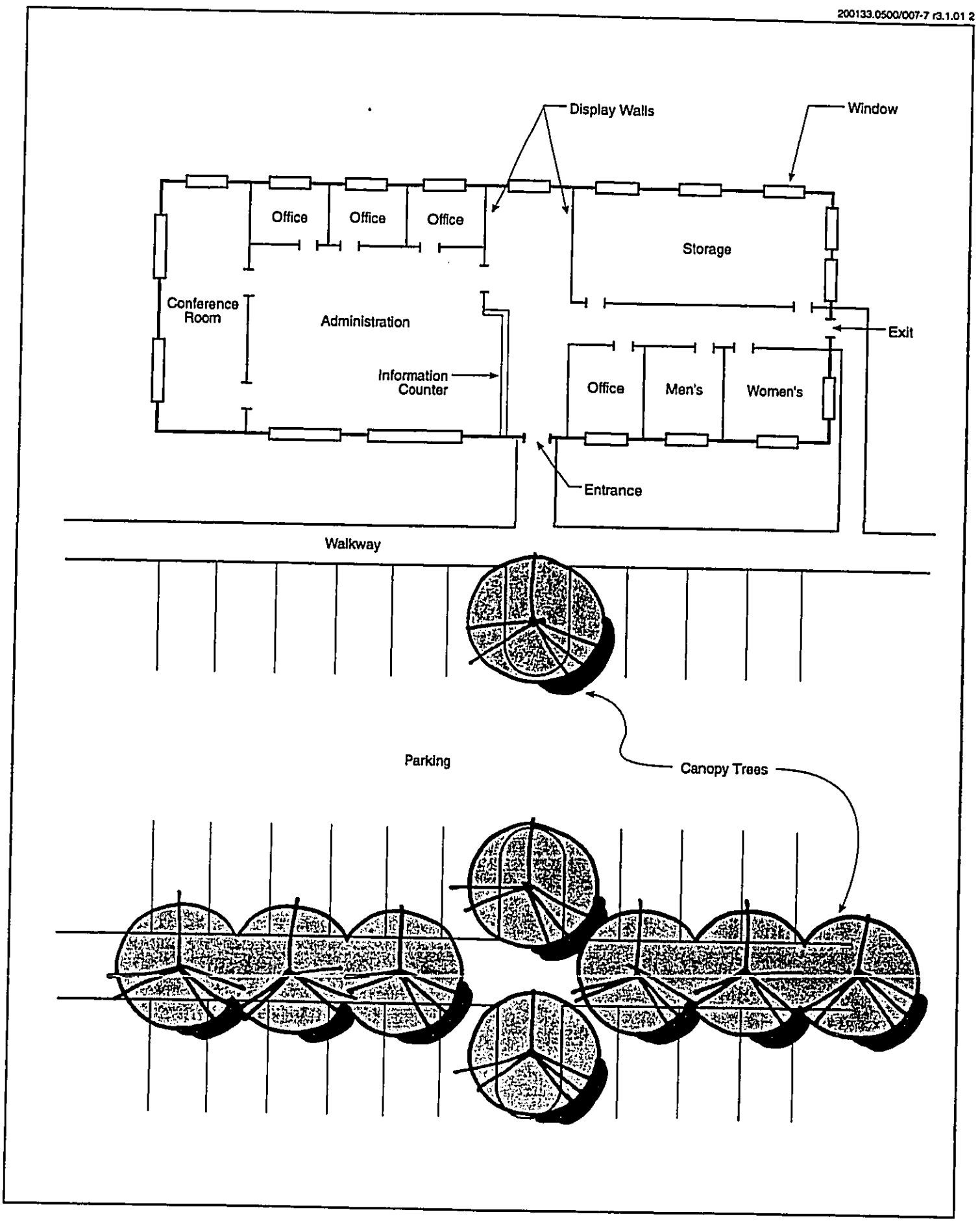
2.3.8 Maintenance Baseyard

The expanded park will contain a regional baseyard at the existing maintenance facility. It will include a new covered garage area for up to six maintenance vehicles and an adjacent paved area for equipment storage. The site will be expanded from 5,000 square feet to approximately one or two acres.

2.3.9 Site Access and Infrastructure

The existing park entrance (Hapuna Beach Road) and Puako Spur Road will provide two vehicular access points from the Queen Ka'ahumanu Highway to the expanded park. The old Kawaihae–Puako Road will be the primary corridor for vehicular traffic through the park site. It will be realigned and fully reconstructed to provide better access to the various areas of the park including the beaches, camping facilities, picnicking sites, and walking trails.

Additional parking will be provided throughout the area, including overflow parking at the existing Hapuna Beach site. The specific number of stalls will be determined during the project design stage. Some of the parking will be paved, especially where permanent facilities, such as organized group camps and picnic areas, are proposed. The parking at Wailea Bay will be located more than 300 feet from the shoreline to maintain the natural serenity of the area and to keep with the idea of a "walk-in" beach, however a drop-off point will be provided near the shoreline to accommodate individuals with physical



0 10 20
SCALE IN FEET

Belt Collins Hawaii

Figure 2-10
Hapuna Beach State Recreation Area Expansion
PARK HEADQUARTERS CONCEPTUAL FLOOR PLAN

disabilities. The size of the parking will be commensurate with the capacity of the beach. A paved parking will also be provided at the south end of the park to provide access to the proposed picnic area at Ohai Point as well as to the south section of Wailea Bay. Other parking areas will be unimproved, especially where they serve informal access points, such as fishermen's walking paths.

Infrastructure will be required to service the expansion of the Hapuna Beach State Recreation Area. New wells and service lines will be developed for both domestic (potable) and irrigation (non-potable) uses, and new septic tanks will be provided for sewage disposal. Electrical and telephone facilities within the park and golf course sites will be connected to existing lines along Queen Ka'ahumanu Highway.

2.3.10 Wailea Bay Lots Acquisition

Expansion of the Hapuna Beach State Recreation Area may require the acquisition of 19 privately-owned parcels at Wailea Bay. Almost all of the parcels are occupied by residences. Access to these parcels is via a paved driveway within a 20' wide easement from the old Kawaihae-Puako Road and over dirt roads. Within the beachfront community, the driveway transverses private parcels via designated roadway easements.

These parcels, which are located immediately behind Wailea Bay and in the middle of the park expansion area along the Hapuna-Puako coastline, may serve the public best if the area were developed for public park use. The land behind the Wailea Bay residential lots, when fully developed for park use, will have a better connection to the beach property and its ocean resources. Moreover, access to the beach will become less restrictive.

The State objective at Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea involving a mixture of land-based coastal recreation activities, such as picnicking, camping and relaxation, along with beach and near shore recreation activities.

As provided in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreational use." The policy's implementing action further provides that the State shall "acquire beaches in the following areas: (for Hawaii Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay".

On November 20, 1987, the BLNR authorized the DLNR to acquire the Wailea Beach Lots. Pursuant to this authorization, the DLNR initiated a condemnation action and eventually acquired two parcels of land at Wailea Bay (TMK: (3) 6-6-2: 6 and 7, totaling 1.8 acres at a cost of $3.8 million). Thereafter, DLNR, lacking funds, made no further effort to acquire private properties at Wailea Bay. The Wailea Bay landowners filed a Petition for Deletion of Order with the DLNR seeking a determination that the November 20, 1987 Order was invalid.

On June 5, 1998, in response to the landowners' concern and petition, the BLNR rescinded its Order of November 20, 1987 subject to the following conditions:

1. Rescission of BLNR's Order of November 20, 1987 does not invalidate the transfer of properties that have already been acquired by the State.

2. Rescission of BLNR's Order of November 20, 1987 shall not prohibit BLNR from taking action in the future to condemn Wailea properties, when funds become available for acquisition of these properties, and provided that any such action comply with Chapter 343, Hawaii Revised Statutes, addressing EISs.

3. Rescission of BLNR's Order of November 20, 1987 shall be contingent upon recordation of the Unilateral Agreement and Declaration for each affected privately owned property requiring the landowner to: A) restrict any development to conform to what is currently allowed today, and B) not seek zoning changes for a period of 15 years, with the 15 year term to commence on the date of the last such property covenant document is recorded.

4. Recordation of the Unilateral Agreement and Declaration shall be completed within one hundred and eighty (180) days of the date of BLNR's decision to rescind its November 1987 Order or 30 days from the acceptance of the Final EIS which ever is later.

5. BLNR's rescission shall be null and void, should the landowners fail to complete recordation of the Unilateral Agreement and Declaration within one (1) year of the date of BLNR's decision to rescind its November 20, 1987 Order.

6. Property owners agree to not seek zoning changes prohibited by the Unilateral Agreement and Declaration during the period that the Unilateral Agreement and Declaration is being recorded.

7. The Final EIS for expansion of Hapuna Beach State Recreation Area shall be amended to delete references to condemnation and/or to explain the resolution of the private landowners' concern regarding condemnation.

Since funding for the acquisition will require a separate legislative action for the Hapuna Beach State Recreation Area Expansion improvements, budget estimates are not included with the project construction costs, and the acquisition of the private properties is not part of the proposed action at this time.

In the future, the State could explore alternatives to reducing the cost of acquisition. One possibility is to spread the cost over an extended period to transform a lump sum expense into an annual cost at a manageable level. Another option worth considering is a lease-back program whereby the State would lease the acquired properties back to the previous owners while awaiting development. The State could recover some of the acquisition cost during this period, and Wailea lot owners could continue to live on the properties until development plans are finalized. This option was suggested at a public information meeting and in a comment letter on the DEIS.

2.4 PROJECT ALTERNATIVES

2.4.1 Introduction

This section examines how the proposed action was selected among three alternatives. Public comments resulting from two presentations of a draft master plan to the community and from a preparation notice and draft of this EIS provided insights and experiences from Big Island residents, special interest groups, and various governmental agencies. This collection of information was used to identify the following alternatives.

- Alternative A: Expansion of the park at Hapuna and Wailea Bays and development of an 18-hole public golf course, a total of 846 acres (preferred alternative).
- Alternative B: Expansion of the park at Hapuna and Wailea Bays but no development of a golf course, a total of 526 acres.
- Alternative C: Continued use of existing 62-acre park at Hapuna Bay (no expansion).

These alternatives could be evaluated as a basis for additional alternatives and provide options for further plan refinement. For example, they could be target plans that are implemented in different degrees depending on financing and development priorities. In Alternative A, the golf course would be developed but only a portion of the makai park land below Queen Ka'ahumanu Highway would be constructed. In Alternative B, the lower area makai of the new Puako Road would be developed while the upper area (between Queen Ka'ahumanu Highway and Puako Road) would be reserved for future long-term development. The idea behind these alternatives is that it grasps the major portions of the potential development range at Hapuna and Wailea. None of the above alternatives include the acquisition of private property at Wailea Bay.

A description of the three alternatives' general concepts, anticipated impacts, and associated public resource commitments is provided in the following sections.

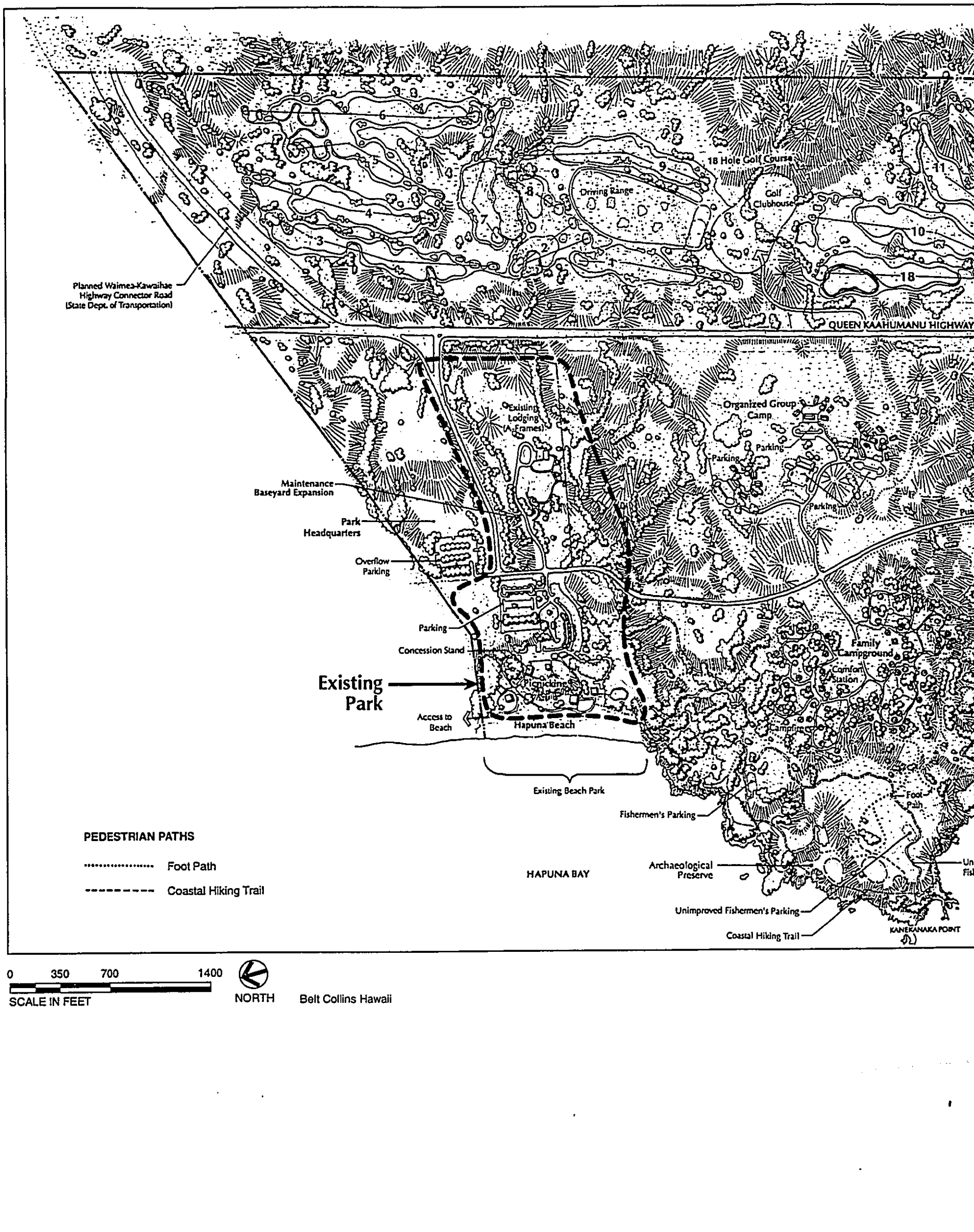
2.4.2 Alternative A: Expansion of the Park to Encompass 846 Acres

2.4.2.1 General Concept

Alternative A entails the expansion of the existing park within undeveloped State lands from Hapuna Bay to Puako Bay and mauka of the Queen Ka'ahumanu Highway (Figure 2-11).

Expansion of the park to the south would, in part, incorporate Wailea Bay to offer additional beach and near shore water area for activities such as snorkeling and diving. These activities, including seasonal winter surfing, already occur at Wailea Bay. Under Alternative A, Wailea Beach would become more accessible, and activities could be monitored and managed. Primary beach access would be provided through State land.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

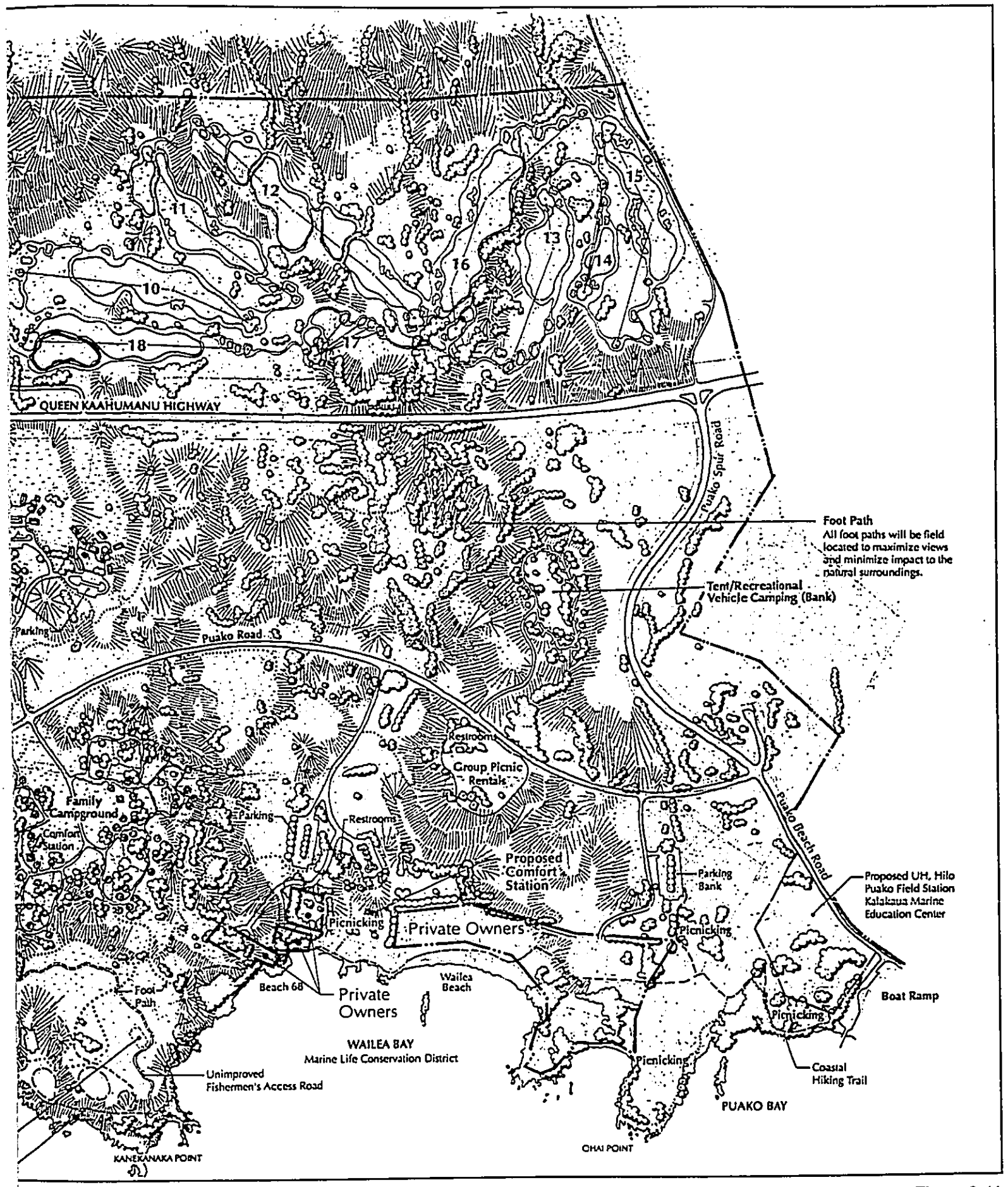


Figure 2-11
Hapuna Beach State Recreation Area Expansion
PROPOSED PROJECT - ALTERNATIVE A

The area between Hapuna and Wailea Bays would be developed for camping, picnicking, and hiking. An 18-hole public golf course would be constructed on approximately 320 acres mauka of Queen Ka'ahumanu Highway.

2.4.2.2 Project Benefits

Paved roads would improve access to the shoreline at Wailea Bay, where such activities as snorkeling, diving, shoreline fishing, surfing, and bodyboarding occur or could occur. Park improvements would disperse activities throughout the expansion area and help relieve pressure on Hapuna Beach.

An expanded recreation area would provide more facilities for picnicking, overnight camping, shoreline fishing, and hiking for Hawaii island residents. With existing camp sites in short supply, the proposed project would be particularly beneficial. The development will also increase public shoreline access and permit greater opportunities in recreational exploration of coastal areas.

Despite the influx of increased public use, the provision of park management through development of this alternative would better provide conservation measures on existing vegetation with regular maintenance and irrigation of selected areas. In addition, on-site park managers, lifeguards, and maintenance personnel would keep the park in good condition, safe, and accessible to the public. Safety measures, security provisions, and educational programs would assure an enjoyable recreational experience. The proposed park headquarters would be the staging area for these operations. On-site park management would also discourage vandalism and other illegal activities within the park and in the Wailea houselots area, as well as improve routine operations such as fire protection and trash collection.

Today, there are 13 golf courses in West Hawaii. All of the courses are privately constructed and operated. Nine are associated with resorts, two are stand-alone facilities, and two are part of a residential community. Of the 13 golf courses, 12 allow public play. A market study/financial analysis of golf course demand and feasibility was conducted by Pedersen Planning Consultants in 1995 and is included in Appendix A of this EIS.

In October 1996, a survey of West Hawaii golf course green fees was conducted. Green fees for resort golf courses vary depending on the player's residence. Guests of accommodations at the resort golf courses pay in the $80 to $90 range. Guests from other resorts playing at the resort course pay a higher rate in the $90 to $170 range. Rates for neighbor island residents are lower with fees in the $40 to $80 range, and Big Island residents pay the lowest—about $35 to $80. The Kona Country Club has a reduced rate of $28 for kamaainas on its "mountain" course.

Non-resort golf courses have regular and kamaaina rates; the regular rates are in the $40 to $70 range, while kamaaina rates are about $35 to $55. The Waimea Country Club has a reduced rate of $24 for kamaainas on weekdays. The green fees for all of the resort and non-resort golf courses include the use of a golf cart which is mandatory.

A number of golf courses are planned in West Hawaii. The one nearest to Hapuna is the Nansay project across Queen Ka'ahumanu Highway from the Mauna Lani Resort. It is designed to be a residential community containing six golf courses. Implementation of the project has stalled, however, and it is not known whether development will proceed at all.

Plans for a resort golf course near the Kona International Airport, a stand-alone golf course in South Kona, and a public golf course in Kealakehe have also been delayed.

Aside from the Kealakehe golf course, these planned facilities would be privately owned or sponsored. The Hapuna Beach State Recreation Area golf course will be a public facility and have green fees comparable to municipal rates. It will also offer players the option to walk rather than to use a golf cart.

The State is planning to be pro-active because it sees a need for a public golf course in West Hawaii where none currently exists. Although other planned golf courses in the region will offer public playing privileges, none will be comparable to the project's anticipated low green fee rates. Furthermore, many of the planned golf courses may not be built at all.

The green fee schedule for the Hapuna golf course would be in the $25 to $35 range. If carts are not used, the fee would be about $10 to $15 less. This fee range and the option of playing without a golf cart would represent a substantial savings for frequent players on fixed or limited income.

From revenues generated by the above fee rates, a private developer could run a viable public golf course operation through an arrangement with the State if State land was used under a lease. If anticipated levels of play and operational expenditures are realized, a self-sustaining investment with good growth potential can be realized within about four or five years of operation. A prospective golf course developer would also appreciate greater flexibility in its investment if the investor could maintain greater control over the initial golf course design and construction.

Expanded park opportunities makai of Queen Ka'ahumanu Highway will generate direct economic benefits of $4.3 million annually by the year 2005 (see Section 3.11.1). These benefits will be diminished by annual park maintenance costs of about $1.0 million. However, the secondary economic benefits of camping and beach activities will generate roughly $13.5 million per year.

2.4.2.3 Potential Adverse Impacts

The proposed expansion of Hapuna Beach State Recreation Area would lead to increased traffic along Queen Ka'ahumanu Highway. Greater traffic congestion would occur at the two park entrances and golf course entrance, primarily during weekend and holiday peak periods.

Increased vehicular traffic and park use would increase noise levels in the vicinity. These elevated noise levels would probably be most noticed by Wailea Bay homeowners. Correspondence and informal discussions with Wailea Bay residents indicate a concern

about the consequences of increased public use at Wailea Bay, e.g., uncontrolled public behavior and loss of privacy in the secluded residential enclave.

The development of picnicking and camping sites would eliminate habitat for some exotic birds that inhabit the grasslands between Hapuna and Wailea Bays. However, the loss in bird habitat would be offset by maintained grassed areas that provide more water and new habitat for other species. The migratory Pacific Golden Plover is one species attracted to such habitat.

2.4.2.4 Public Resource Commitments

Construction

The expansion of the park would require the expenditure of approximately $40 million over its plan implementation period. Roughly 60 percent of this would be for park improvements and the remainder would be for the golf course development. Funds for the golf course construction is expected to come from private interest or sponsorship in the project.

The DLNR proposes to construct the park expansion in four phases. The preliminary schedule as provided in the 1996 DEIS called for the first phase beginning in 1998 or 1999. Completion of the fourth and final phase was projected to occur in 2010. The current schedule (Table 2-1) shows construction of the first phase beginning in 2003 or 2004. Completion date for the first phase is expected in 2005. Completion of the entire project is scheduled for sometime after 2009.

Table 2-1 Preliminary Schedule

MILESTONE	YEAR
EIS Acceptance and Land Use Permit Approvals	2001-02
Construction Design (Phase I)	2003
Construction Start-up	2003-04
Phase I Completion Water development and distribution system for domestic and irrigation use. Wailea roadway and utilities.	2005
Phase II Completion Realignment of old Kawaihae-Puako roadway and utilities. Organized and group camp improvements and group picnic areas. Shoreline and fishermen's trail development. Wailea Beach improvements and park headquarters construction.	2009
Phase III Completion Golf course and golf clubhouse construction.	Future
Phase IV Completion Hapuna Beach park improvements. Tent, recreational vehicle, and camping area installations. Shoreline trail and additional picnic area improvements.	Future

Note: This schedule updates a schedule that was included in the June 1996 DEIS for the project. Construction start-up in the 1996 schedule showed a date of 1998-99. The present table reflects the current status of the project. The completion date for the latter phases of the current project is shown with an indefinite timeframe. This is to reflect the uncertainty of the schedule beyond 2009.

Program Management and Operation/Maintenance

Water safety, park security, and resource management requirements for this development alternative would increase the type and number of management and maintenance personnel at the park. It is estimated that the total program management and maintenance expenditures would cost the State of Hawaii about $2.4 million per year. Potential revenues from overnight camping fees of approximately $356,000 per year by 2015 would help absorb some of the annual park operations and maintenance costs. There is currently no charge for camping. Any fees collected for cabin rentals and concessions would go to the park's interpretive program.

The operations and maintenance of the proposed golf course would require an additional $2.7 million annually by the year 2015. If the golf course is managed, operated, and maintained by a private concessionaire, these costs could be borne entirely by the concessionaire through golf course revenues. The sum of these revenues could amount to $4.9 million annually.

2.4.3 Alternative B: Expansion of the Park to Encompass 526 Acres (No Golf Course)

2.4.3.1 General Concept

This project alternative is the same as Alternative A but does not include development of the golf course (Figure 2-12). As in Alternative A, Alternative B does not include acquisition of the private properties at Wailea Bay.

2.4.3.2 Project Benefits

Alternative B addresses most of the outdoor recreational demands that are needed for the area. It would include all project benefits that are outlined in Section 2.4.2.2, except for golf course benefits. Expanded opportunities for snorkeling/diving, overnight camping, picnicking, hiking, and shoreline fishing would be roughly one-third the total cost of Alternative A.

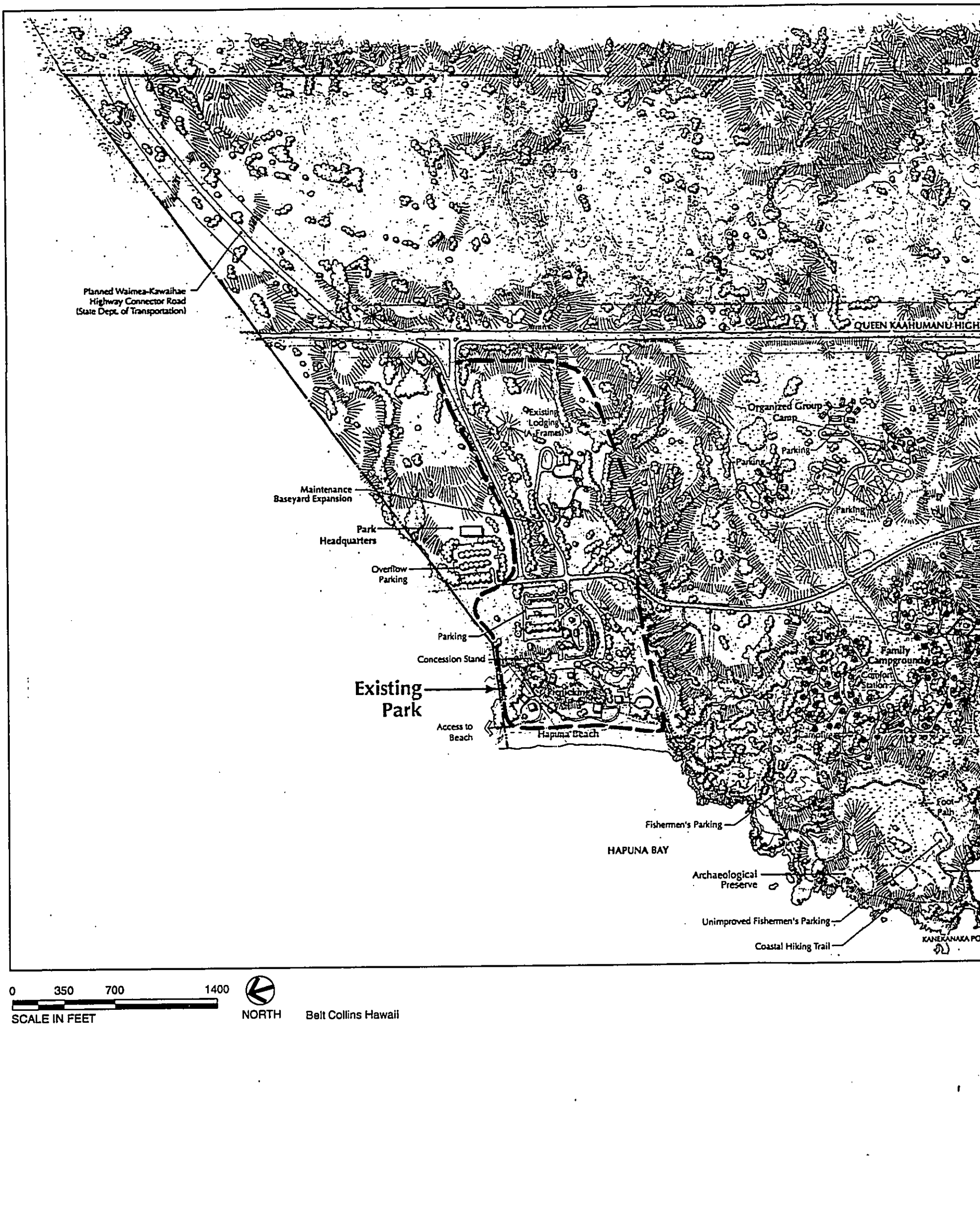
2.4.3.3 Potential Adverse Impacts

Potential adverse impacts associated with Alternative B would be almost identical to those summarized for Alternative A (see Section 2.4.2.3). The only exception would be that vehicular traffic impacts on Queen Ka'ahumanu Highway would be somewhat less with no golf course generated trips. Additionally, there would be less land alteration without the golf course and less use of irrigation water.

2.4.3.4 Public Resource Commitments

Approximately $23.3 million would be required to build the recreational sites, facilities, and supporting utility systems of Alternative B over the plan implementation period.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

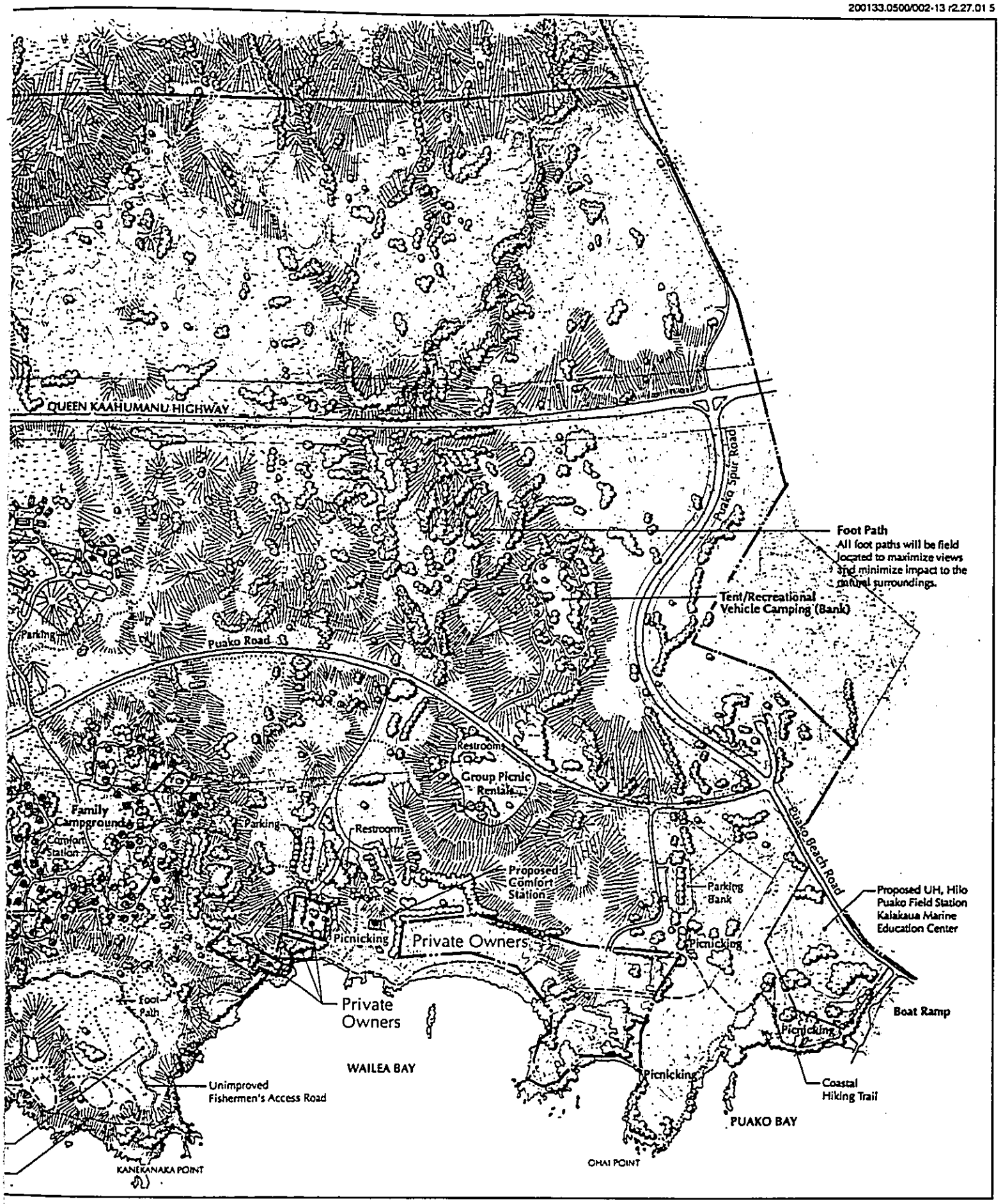


Figure 2-12
Hapuna Beach State Recreation Area Expansion
PROPOSED PROJECT - ALTERNATIVE B

Program management, operations, and maintenance activities would annually require approximately $2.4 million. Overnight camping revenues of approximately $356,000 per year by 2015 would help offset anticipated operations and maintenance expenditures.

2.4.4 Alternative C: Continued Use of the Existing Park (No Action)

2.4.4.1 General Concept

Alternative C represents the"no action" option, or the continued use of the existing 62-acre park. This assumes that any future facilities would be built within the existing park, with no expansion of recreational facilities and activities south of Hapuna Bay (Figure 2-13) and no acquisition of properties at Wailea Bay.

2.4.4.2 Project Benefits

This option would not require a sizable expenditure of public funds and would permit the State of Hawaii to allocate resources to other urgent capital improvement projects and/or the maintenance of other existing programs.

While the demand for camping facilities exceeds availability, a two-week survey of recreational participation and a capacity analysis conducted by Pedersen Planning Consultants, in June 1992, suggest that the existing park has considerable land capacity to meet anticipated demand to at least the year 2010.

2.4.4.3 Adverse Impacts

Alternative C would not address the local demand in the South Kohala area for families, organized groups, and visitor camping facilities. Available camping facilities at Spencer Beach Park and other smaller County beach parks can accommodate about 79 persons. Existing demands are significantly greater than the capacity of these facilities. Without the development of more camping sites, the demand for this activity will continue to be unmet.

Increased demands for affordable public golf play would also go unmet. Reduced fees and promotions offered by private courses will absorb some of the needs. However, there is still considerable demand for a public course in Kohala that would offer more affordable rates throughout the day.

A growing demand for hiking opportunities in the Kohala area will continue to be suppressed by the shortage of more accessible and defined hiking trails.

2.4.4.4 Public Resource Commitments

The continued use of the present park would require no significant expenditure of public funds for the development of new facilities. Some funds would occasionally be required for renovation or replacement of existing facilities.

Although Hapuna Beach State Recreation Area Expansion has considerable available capacity to accommodate future recreational demands, significantly more park users in the

State facility could gradually increase demands for other recreational activities. Financial resources and manpower commitments may be required to enhance on-site park management.

2.4.5 Alternative to Wailea Lots Acquisition

Two private lots were acquired by the State in 1994, thereby adding 400 linear feet of beach frontage to an existing 30-foot-wide public access road reserve leading to the beach. A 40-foot-wide road reserve also runs the length of the beach fronting the private properties. Acquisition of the remaining private lots behind Wailea Bay would be required to provide the maximum amount of open space, beach frontage and picnic area for park users.

If the private properties were not acquired, the park would have only limited direct physical and visual access to the shoreline that is important for establishing a coastal recreation environment. Although the 40-foot-wide road reserve lot provides open space over the length of the beach, shaded picnic amenities in this section of the park would be limited to 1.8 acres (the area of the two parcels that have been acquired) and State Parks Division will only partially meet its development objectives for the area.

Considering that many of the privately-owned properties are developed and currently occupied, Wailea Bay residents strongly prefer to have their homes remain. They have been owners or residents for many years and have grown deeply attached to the area. Several residents have taken on a personal responsibility of maintaining and cleaning the beach.

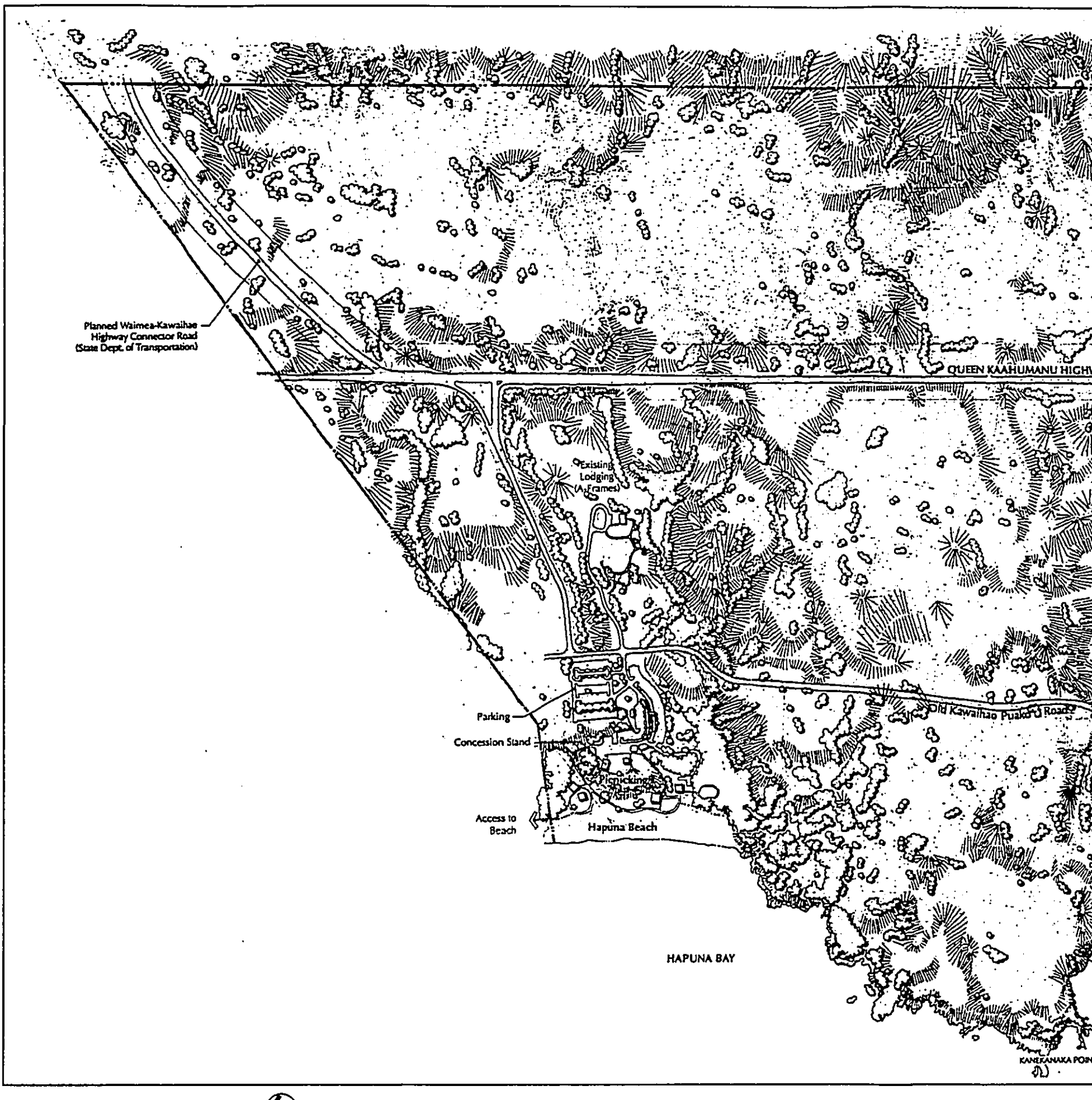
If the homes were allowed to stay, the property taxes for the residential real estate would continue to be paid to the County. No residents and rental unit guests would be displaced.

Acquisition of the private lots by the State would entail an enormous cost. It would also entail a relocation program. Alternatively, these funds could be used for other improvements within the park or for higher priority public improvement projects or programs.

Some residents of Wailea indicated that they could co-exist with the park expansion and, as a benefit to the State, continue to maintain the beach area around their homes. The Wailea residents, however, may experience conflicts with park user traffic during peak periods such as weekends and holidays. Additionally, the once isolated, quiet beach at their doorsteps will be more heavily used. Having a large number of people at Wailea may generate social concerns by the private owners.

There is a prevalent feeling among the Wailea residents that the beach is very fragile and would not be able to accommodate heavy public usage. The shoreline is dynamic and changes from a medium size beach to a narrow sand strip and back to a medium size beach during the year. Residents feel that their physical presence will prevent uncontrolled use of the shoreline. One suggestion is to make Wailea a "walk-in" beach to accommodate only the serious beachgoers who are more appreciative of the bay's natural resources and are willing to walk the extra distance to reach the shoreline resources.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

200133.0500/002-12 r3.22.01 4

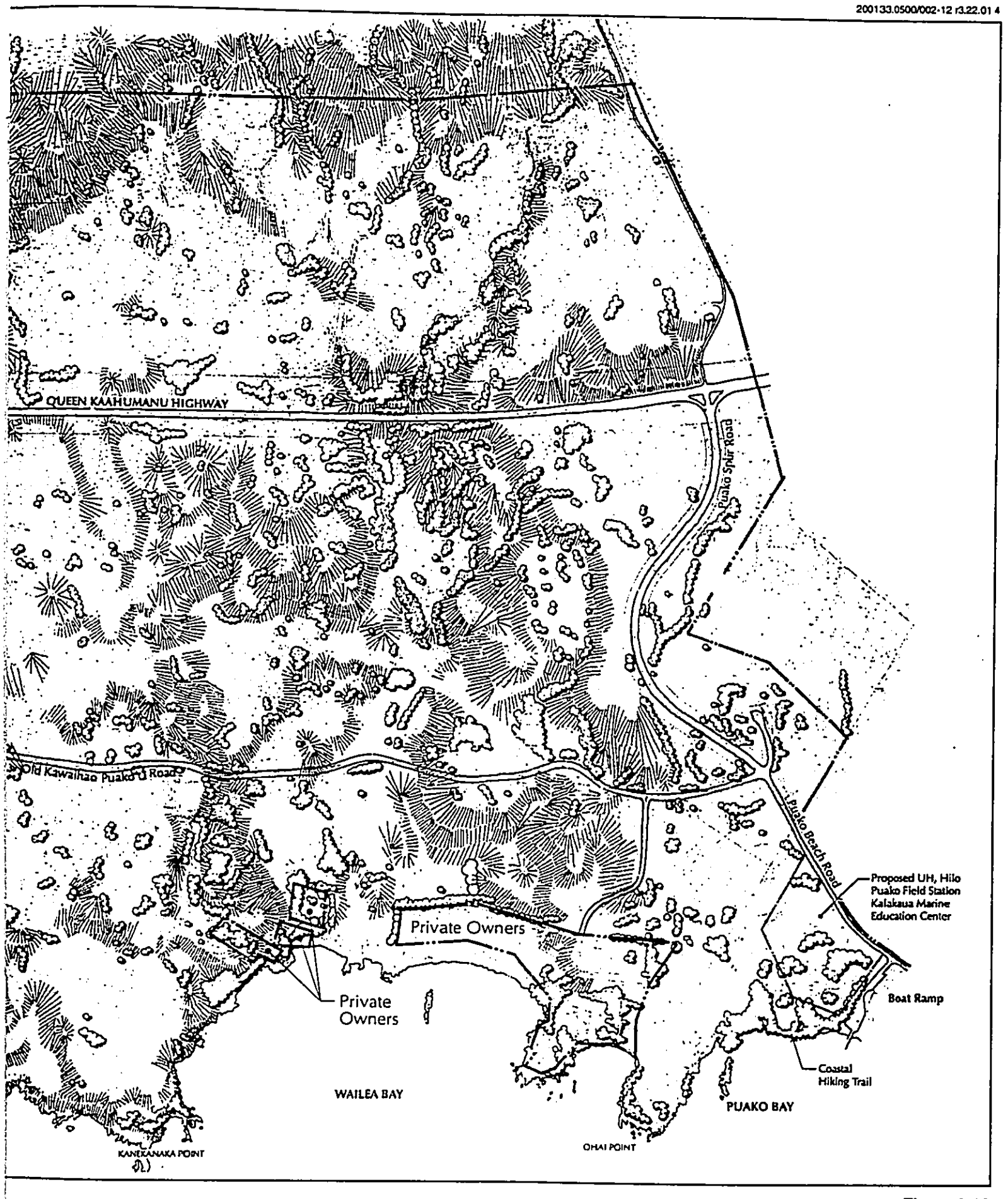


Figure 2-13
Hapuna Beach State Recreation Area Expansion
PROPOSED PROJECT - ALTERNATIVE C

In acknowledging the fragile nature of Wailea, Alternatives A and B of the park master plan are proposing to develop the bay as a walk-in beach. Beachgoers will be required to walk more than 400 feet to reach the shoreline. A special access and turnaround will be provided for equipment drop-off and persons with disabilities. Parking will be sized to control the number of people using the beach and picnic area.

2.4.6 Comparison of Project Alternatives

2.4.6.1 Criteria for Evaluation of Project Alternatives

An evaluation of the three alternatives was conducted by Belt Collins Hawaii to compare how the proposed alternatives would meet the Division of State Parks objectives and how they would impact the environment. A simple matrix was developed for the evaluation. The first section of this matrix lists the State Parks objectives which are described in detail in Chapter 1 of this document. The second section of the matrix consists of potential environmental impacts associated with the project.

In the first section of the evaluation, a "yes" or "no" would be required to indicate whether the proposed alternative accomplishes the State Parks objectives (Table 2-2). In the second section, the alternative is rated in terms of the type and significance of impact expected on the environment (see rating scale below).

Type of Impact	Value
Significant Beneficial Effect	+2
Beneficial Effect; Not Significant	+1
Little or No Effect	0
Adverse Effect; Not Significant	-1
Significant Adverse Effect	-2

In determining the type and significance of impact, it was assumed that feasible mitigation measures would be applied. For example, during construction, site work is expected to generate dust. It is assumed that the contractor would employ dust control measures, including the use of dust screens, frequent water sprinkling on exposed dirt areas, and immediate landscaping when grading work is completed. Without mitigation measures, construction work would generate adverse dust effects on neighboring properties. With proper mitigation measures, adverse impacts would be minimized.

This evaluation helped determine the preferred alternative for the Hapuna Beach State Recreation Area. Moreover, it provides reviewers of this document with a better understanding of the project's objectives and impacts. The results of the evaluation are discussed in the following section. Reviewers are encouraged to make a similar evaluation during their review of this document.

Table 2-2 Evaluation Scores of Alternative Proposed Actions

	Alternative A Park Expansion and Golf Course Development	Alternative B Park Expansion No Golf Course	Alternative C No Action (No Expansion)
Evaluation Criteria: State Parks Objectives			
• Provides resource-oriented recreation opportunities?	Yes	Yes	Yes
• Addresses demand for beach recreation, picnicking, camping, and hiking?	Yes	Yes	No
• Addresses demand for affordable golf?	Yes	No	No
• Manages water safety, security, maintenance, and other park management issues?	Yes	Yes	Yes
Potential Impacts*			
• Short-term construction impacts: erosion, noise, air quality, water quality, hazardous materials/waste	-1	0	0
• *Drainage/flood impacts*	0	0	0
• Impacts on groundwater quality	0	0	0
• Impacts on coastal water quality	0	0	0
• Impacts on marine biota	0	0	0
• Impacts on native and endangered species	0	0	0
• Impacts on significant cultural resources	-1	-1	0
• Visual impacts	-1	0	0
• Social impacts	+2	+1	0
• Economic impacts	+1	+1	0
Impacts on Public Services and Infrastructure			
• Parks and recreation	+2	+1	-1
• Police, fire, and emergency services	0	0	0
• Roads and traffic	-1	0	0
• Potable water supply and distribution	-1	-1	0
• Sewage disposal	0	0	0
• Solid waste disposal	0	0	0
• Electricity and telephone service	0	0	0
• Impacts on energy use and conservation	0	0	0
• Impacts on adjacent homeowners	0	0	0

* Assumes implementation of feasible mitigation measures
+2 = Significant beneficial impact
+1 = Beneficial impact, not significant
0 = Little or no impact
-1 = Adverse impact, not significant
-2 = Significant adverse impact

Note: None of the alternatives involve acquisition of private properties at Wailea Bay.

2.4.6.2 Summary of Comparative Evaluation

Table 2-2 presents the results of the evaluation. None of the alternatives include the acquisition of private property behind Wailea Bay.

Alternative A (park expansion and public golf course) meets all of the evaluation criteria for State Park objectives with the exception that full use of the property behind Wailea Bay will be limited, since acquisition of the private parcels at Wailea Bay is not being considered under the current proposal. Therefore, beach recreation and picnicking would be limited to the 30-foot-wide beach access road reserve, two parcels that the State has acquired, and the existing 40-foot-wide road reserve running the length of the beach.

Alternative A provides resource-oriented recreation opportunities with the development of limited access to the beach and shoreline areas, and the implementation of water safety and environmental awareness programs which are considered important public benefits.

Alternative B (park expansion only) will not meet the need for affordable golf in the region. All the other benefits associated with Alternative A would still be applicable.

Alternative C (no park expansion) will maintain the status quo of the existing park and will provide recreation opportunities only within it existing 62-acre area. It would not address future demand. There would be no affordable golf and no park headquarters to implement water safety and environmental awareness programs and improved park security.

In terms of potential environmental impacts, Alternative A would generate a number of significant beneficial effects which would offset a number of its adverse impacts. Overall, the net result would be on the positive side. Detailed discussions on these impacts are provided in the next chapter of this FEIS.

Alternative B would generate a number of beneficial effects but not as significant and not as many negative effects as Alternative A. This is primarily due to the elimination of the 18-hole golf course from the plan.

Finally, Alternative C maintains the present status of the existing park and thus would result in no new development. With no park expansion, no impacts, positive or negative, would be generated. It would, however, result in negative impacts on existing parks in the region when future demand for additional recreational activities must be met by existing West Hawaii facilities.

In summary, the alternatives were evaluated in terms of State Park objectives and potential environmental impacts. The purpose of the matrix was not to arrive at a sum score for each alternative and to compare the scores to determine the preferred plan. The matrix allowed the State Parks to identify the different alternatives and how they measured up to the agency objectives (see Table 2-2). Just as important, it allowed the State Parks to recognize the associated impacts that would be generated. This would assist the agency to identify potential mitigation measures for the project and to develop design or plan modifications, if necessary.

Alternative A met all of the State Parks objectives and would provide the most benefits to the community. On the other hand, it would also generate impacts to more aspects of the environment. Alternative B would not meet all of the State Park objectives but would have fewer environmental impacts. Alternative C, which proposes no action, would provide only limited benefits to the community and would have even fewer environmental impacts, if any.

The Division of State Parks selected Alternative A because it fulfills the recreational needs of the community as identified in Pedersen's assessment study prepared for the State in 1992 (see Appendix A). These benefits would far outweigh the negative effects to the environment when mitigation measures are applied to reduce or minimize impacts. It should be noted, the recreational needs for this area will continue to grow and the demand for facilities will necessitate State or County action.

CHAPTER 3
EXISTING CONDITIONS, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

3.1 OVERVIEW OF THE ENVIRONMENTAL SETTING

The Hapuna Beach State Recreation Area is located in the South Kohala District on the west coast of the Island of Hawaii (Figure 3-1). It is situated within the Kohala Coast Resort Region, an area consisting of high quality resort developments such as the Mauna Kea Resort, Mauna Lani Resort, and Waikoloa Beach Resort, and recently the Hualalai and Kona Village Resort.

The project site sits on the shoreline between the Mauna Kea Resort and the Puako Beach Lots residential community. Hapuna Beach and Wailea Beach are the most notable shoreline landmarks in the area (Figure 3-2).

The Queen Ka'ahumanu Highway, a regional State right-of-way, traverses the park expansion area and physically divides the project site into an approximately 320-acre mauka section and 526-acre makai section. The eastern boundary of the mauka section was created to accommodate a planned golf course above the highway; no legal description has been established for the eastern boundary. The approximately 846-acre project site is owned by the State of Hawaii (TMK 6-6-01: portion of 2; 6-9-01: portion of 1; 6-2-02:1; and 6-6-02:2, 6, 7, 31, 32, 34, 35, 40, 41 and 42). Additionally, TMK 6-6-02: 39 is a transfer station site and TMK 6-6-02: 43 is a tank site. Both of these parcels are owned by the State, but are not part of the park expansion area.

Queen Ka'ahumanu Highway provides the primary access to the project site. It links Kailua-Kona, the largest population center in West Hawaii, with Kawaihae Harbor, a deep-draft commercial port. The highway also provides access to Kona International Airport, which accommodates both mainland and interisland flights, and Honokohau Harbor, a State-operated small boat harbor.

Waimea, South Kohala District's largest population and commercial center, is approximately 12-3/4 miles to the northeast of Hapuna. It is the headquarters of the Parker Ranch and home to small businesses catering to the region's farming/ranching community, local residents, and recently the island's visitor population. Other residential communities within commuting distance of the project site are Kawaihae Village, Waikoloa Village, Puako Beach Lots, Hawi, and Kapa'au.

Recreational and cultural resources in the vicinity include Anaeho'omalu Bay, Samuel Spencer Beach Park, Pu'ukohola Heiau National Historic Site, and in the adjacent North Kohala District, Lapakahi State Historic Park, Mahukona Beach, and Mahukona Boat Ramp. A small marina and boat ramp are also located in Kawaihae Harbor.

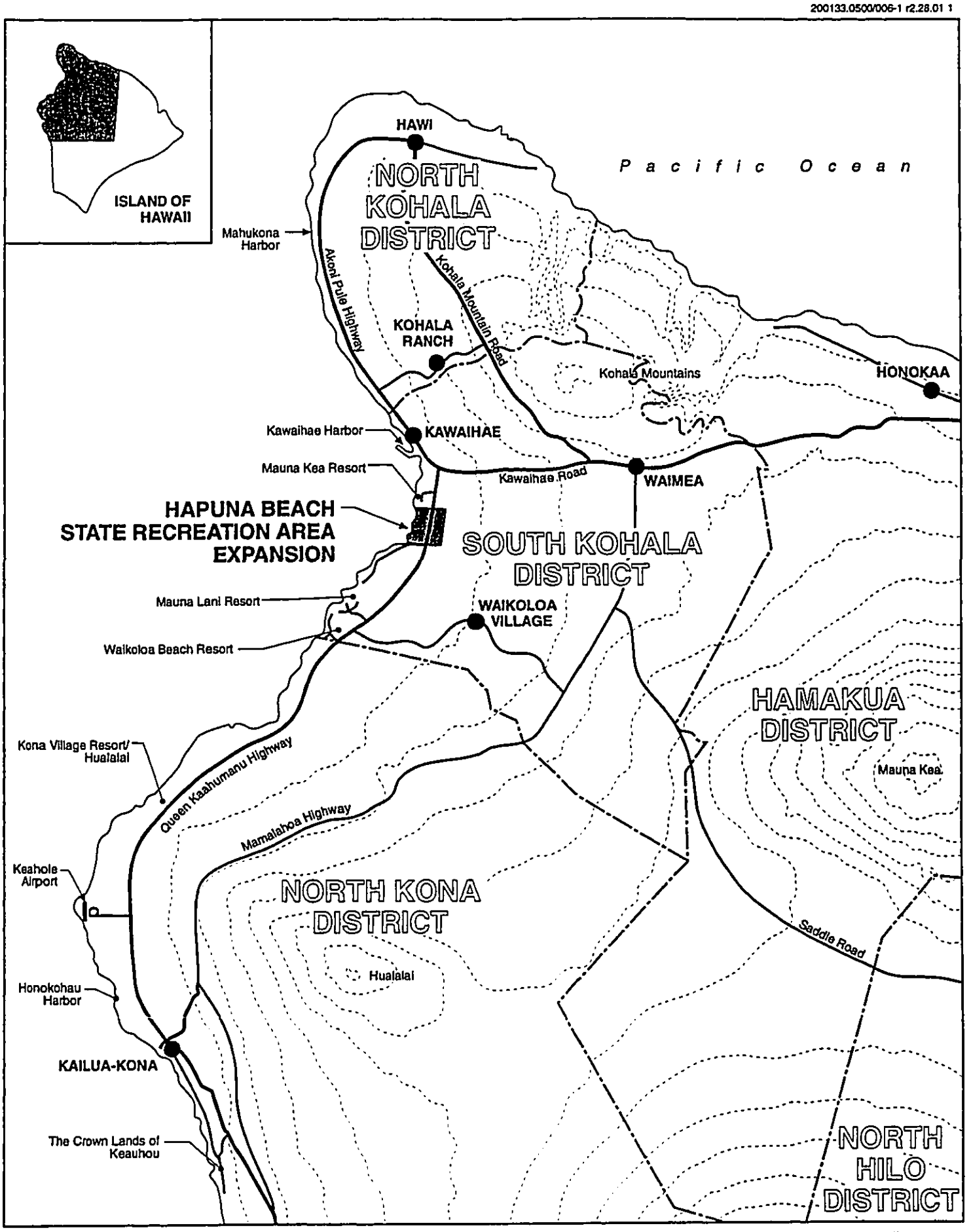
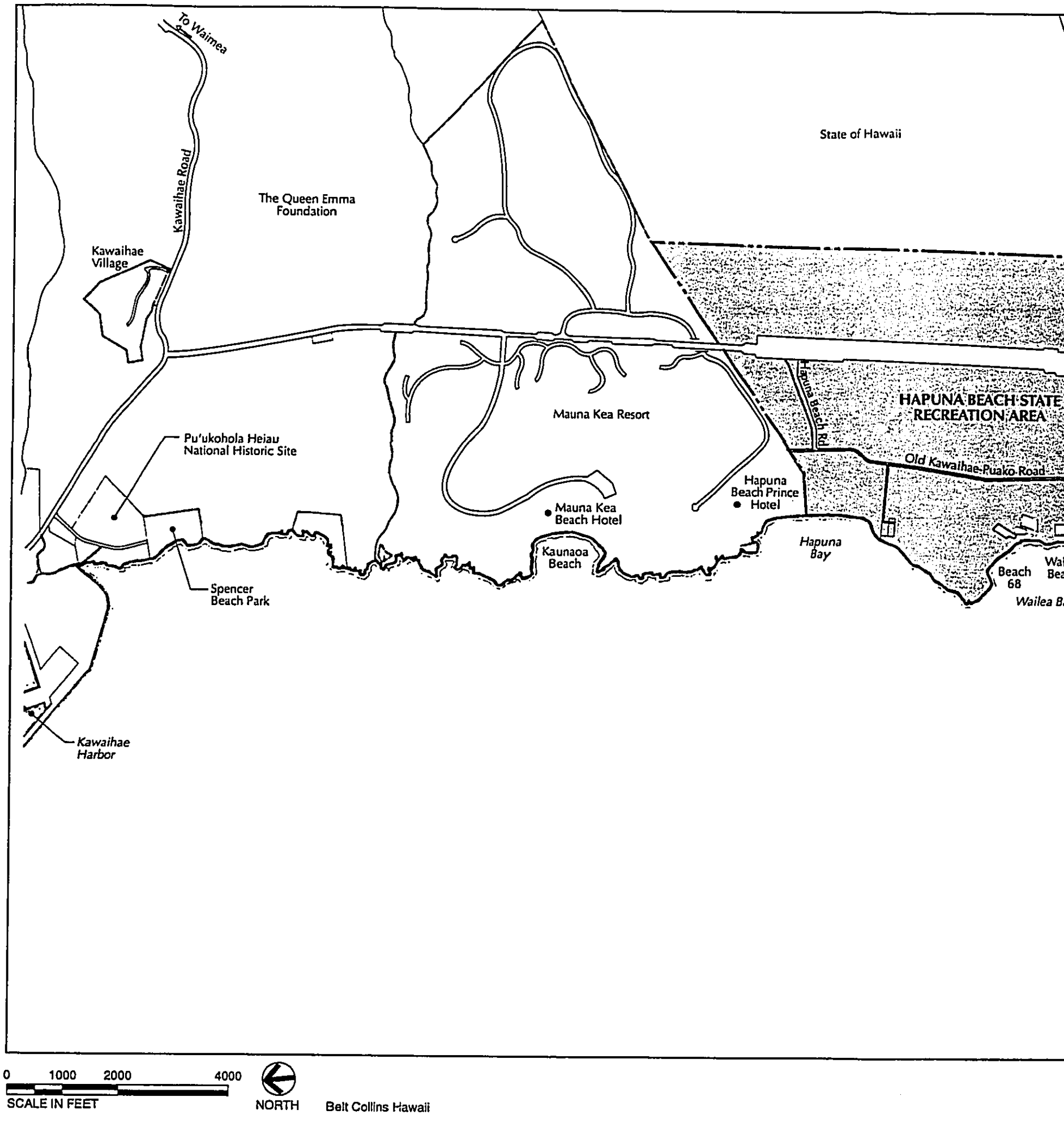


Figure 3-1
Hapuna Beach State Recreation Area Expansion
NORTH AND SOUTH KOHALA REGION


To Waimea
Kawaihae Road
The Queen Emma Foundation
State of Hawaii
Kawaihae Village
Hapuna Beach Rd
HAPUNA BEACH STATE RECREATION AREA
Mauna Kea Resort
Pu'ukohola Heiau National Historic Site
Old Kawaihae-Puako Road
Hapuna Beach Prince Hotel
Mauna Kea Beach Hotel
Kaunaoa Beach
Hapuna Bay
Beach 68
Spencer Beach Park
Kawaihae Harbor
0 1000 2000 4000
SCALE IN FEET
NORTH
Belt Collins Hawaii

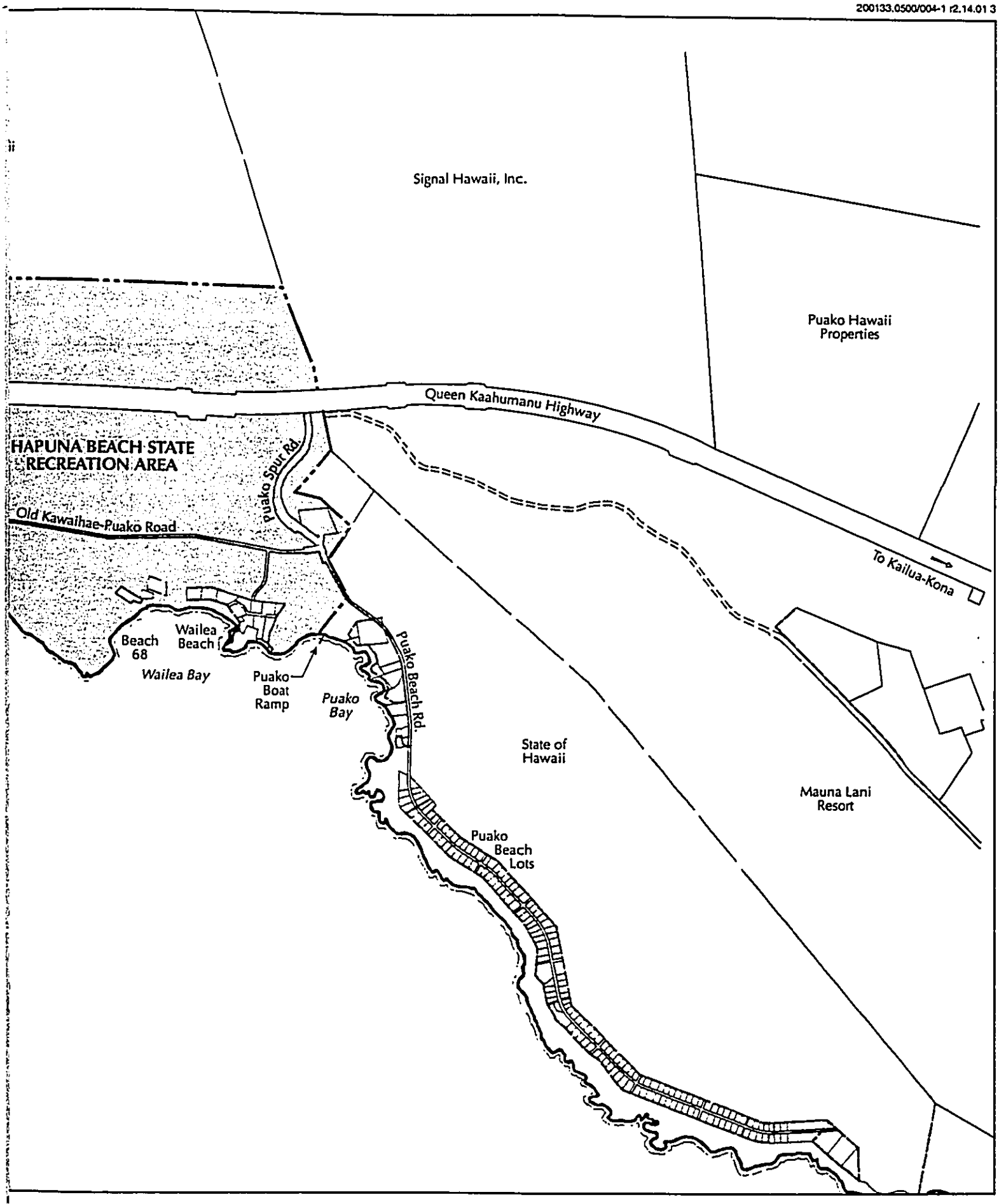


Figure 3-2
Hapuna Beach State Recreation Area Expansion
PROJECT VICINITY

The park expansion area is predominantly undeveloped. It is barren and covered with sparse vegetation. The developed portion consists of the existing 62-acre beach park at Hapuna Bay (Figure 3-3), 19 privately-owned residential lots behind Wailea Beach, Hapuna Beach Road, Puako Spur Road, and the old Kawaihae-Puako Road. These facilities comprise less than 14 percent of the property.

Existing land uses adjacent to the Hapuna Beach State Recreation Area are diverse in type and intensity of use. They consist of resort projects, beachfront residential homes, and open undeveloped lands. Makai and to the north of Queen Ka'ahumanu Highway is the Mauna Kea Resort which includes the world-famous Mauna Kea Beach Hotel, an 18-hole golf course, and a number of resort-residential units. A second 18-hole golf course, a 10-lot residential subdivision, and a new 350-room hotel, named the Hapuna Beach Prince Hotel, have been added to the resort. These recent facilities are part of a major expansion program at the Mauna Kea Resort that began in 1992. A portion of the resort expansion extends mauka of the Queen Ka'ahumanu Highway into a 390-acre area that is long-term planned for approximately 550 resort-residential units.

To the south is the Puako Boat Ramp and Puako Beach Lots residential community, comprising of approximately 170 developed and undeveloped lots. In addition to single-family homes, the community includes a four-story residential condominium, a general store and two churches. Access to this community is provided by Puako Beach Road from Queen Ka'ahumanu Highway.

On an approximately 5-acre site adjacent to the Puako Boat Ramp within the park expansion area, the University of Hawaii at Hilo plans to establish a marine education and research field station. It will be operated as part of the Kalakaua Marine Education Center and serve students at UH-Hilo and the West Hawaii Educational Facility as well as those of the UH-Manoa through the Hawaii Institute of Marine Biology and School for Ocean and Earth Sciences and Technology. Planning funds have been granted for the project and the University is now in the process of defining the project scope and initiating the planning work.

Two other major master-planned resorts, Mauna Lani Resort and Waikoloa Beach Resort, are located farther to the south. These resorts contain planned multiple hotels and golf courses with a large number of residential units and commercial facilities. A major portion of these resorts have already been completed.

Mauka of the highway is a large tract of undeveloped land owned by the State of Hawaii. Occupying a portion of this land are the County's Lalamilo well system, Lalamilo Ventures, Inc's wind-generated power plant (identified as Lalamilo Wells Windfarm), and Hawaii Electric Light Co.'s (HELCO) Mauna Lani substation. The Lalamilo well system is a source of water for most of the Kohala Coast Resort Region.

Lalamilo Venture's facility consists of 122 wind turbines that generate up to approximately 2.3 megawatts of electrical power (under ideal wind conditions). This power is sold to the County to energize its Lalamilo wells' electrical system. Any remaining power is then sold to HELCO for its use.

To the south and mauka of the highway is Nansay Hawaii's planned residential-recreational community which will contain six golf courses and more than 2,000 residential units. The schedule for development is not known at this time.

3.2 EXISTING RECREATIONAL AREAS AND FACILITIES

3.2.1 Hapuna Beach

The sand area of Hapuna Beach measures approximately 1,850 feet wide (approximately 1,200 feet fronts the project area) and 150 to 320 feet deep (from the water's edge to the vegetation line) during the summer months. It is the widest white sand beach on the island. During the winter months (usually from November through April), high surf often erodes the beach, leaving a depth of about 50 to 220 feet. The sand eventually returns during the summer months.

Existing facilities include landscaped lawns, concession and office building, three picnic pavilions, three comfort stations, outdoor showers, paved walkways, and an improved parking area (see Figures 3-3 and 3-4).

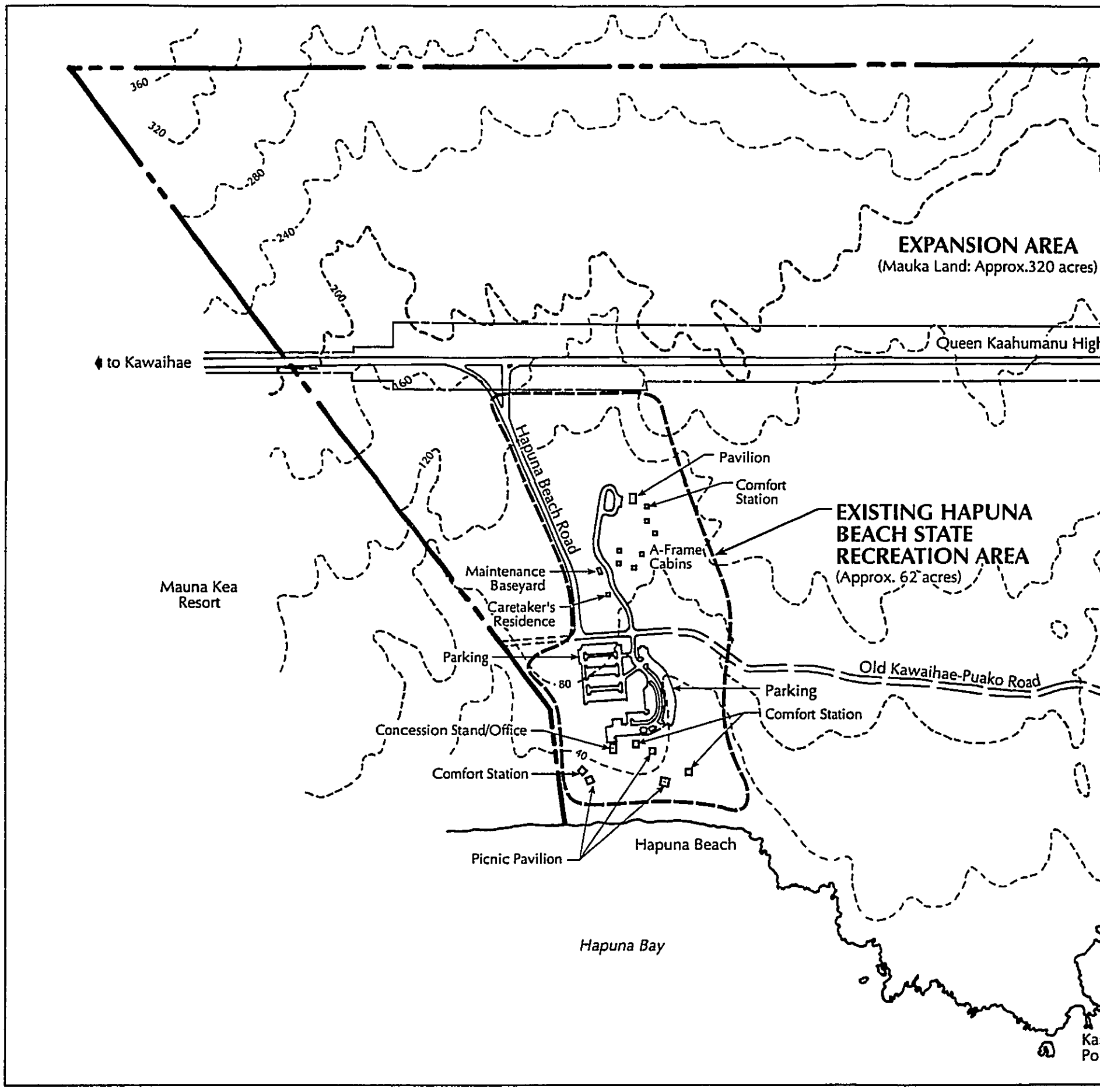
The park provides a wide variety of beach recreational opportunities for such activities as swimming, snorkeling, and nearshore scuba diving. At the southern end of the beach, in the rocky area of the bay, ocean jumping and diving activities occur. During the winter months, high surf generates rideable waves for surfing; however, only body-type surfing is permitted at Hapuna (Clark, 1985). Net and pole fishing activities occur along the rocky shoreline.

Two professional lifeguards are on duty at Hapuna Beach from 9:00 am to 5:00 pm every day of the week. When the lifeguards are off-duty, beach users in the area generally make the emergency rescues themselves. An emergency telephone with a direct line to the County Fire Department via the Hilo Police Department dispatcher is available in the park. The nearest fire and rescue station is located on Queen Ka'ahumanu Highway, about 2-1/4 miles from the beach.

Upslope of the beach facilities are six A-frame overnight cabins, a general pavilion, two small comfort stations, a caretaker's cottage, and a maintenance shop.

The cabins, each of which can accommodate up to four persons, have had considerable use since their initial construction in 1970.

Some of the cabins have been remodeled or reconstructed. The comfort stations will require some repair and/or replacement of plumbing and electrical fixtures.


360
320
280
240
200
160
120
80
40
EXPANSION AREA
(Mauka Land: Approx.320 acres)
to Kawaihae
Queen Kaahumanu High
Hapuna Beach Road
Pavilion
Comfort Station
EXISTING HAPUNA BEACH STATE RECREATION AREA
(Approx. 62 acres)
A-Frame Cabins
Maintenance Baseyard
Caretaker's Residence
Mauna Kea Resort
Parking
Old Kawaihae-Puako Road
Parking
Comfort Station
Concession Stand/Office
Comfort Station
Picnic Pavilion
Hapuna Beach
Hapuna Bay
0
350
700
1400
SCALE IN FEET
NORTH
Belt Collins Hawaii

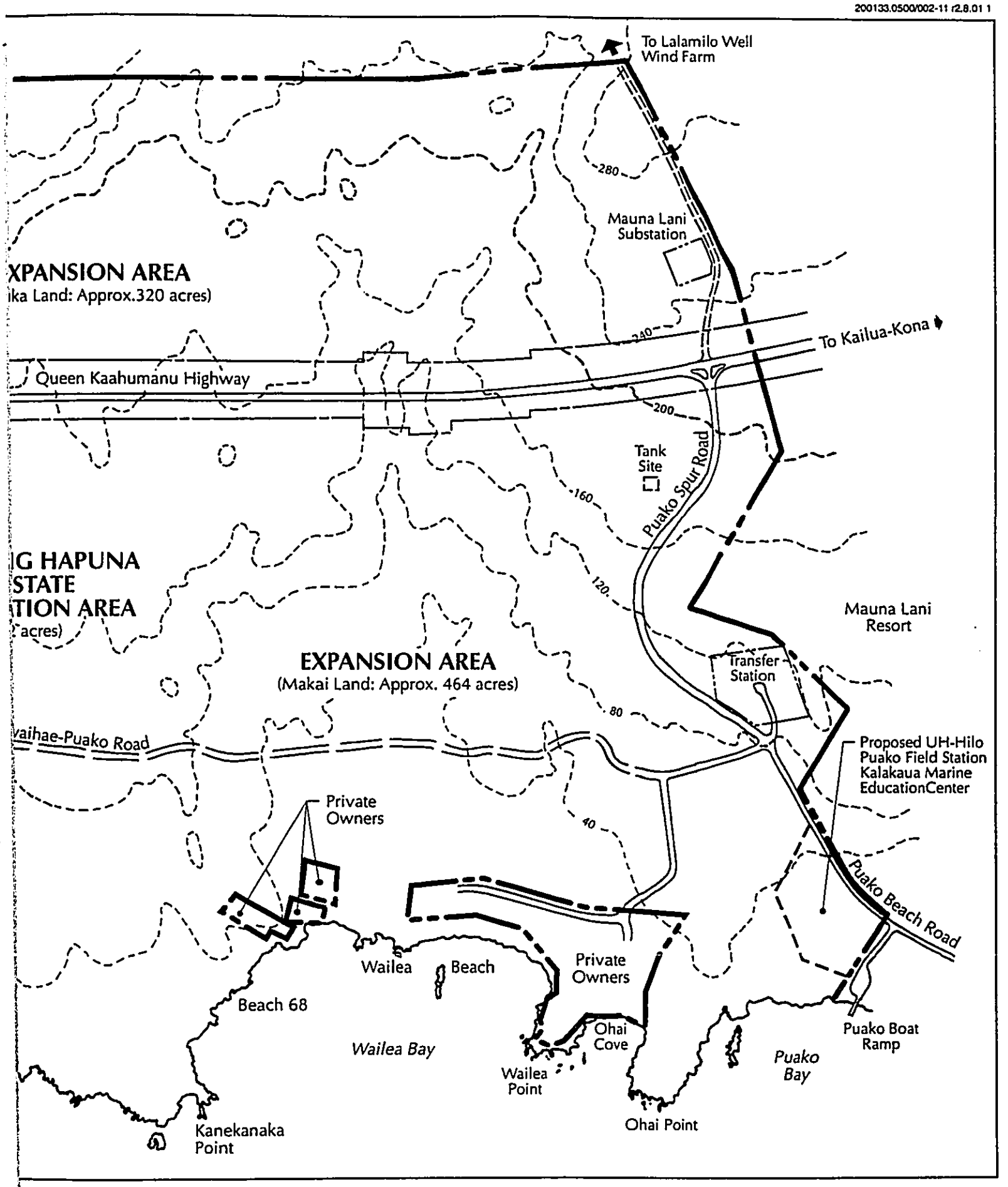
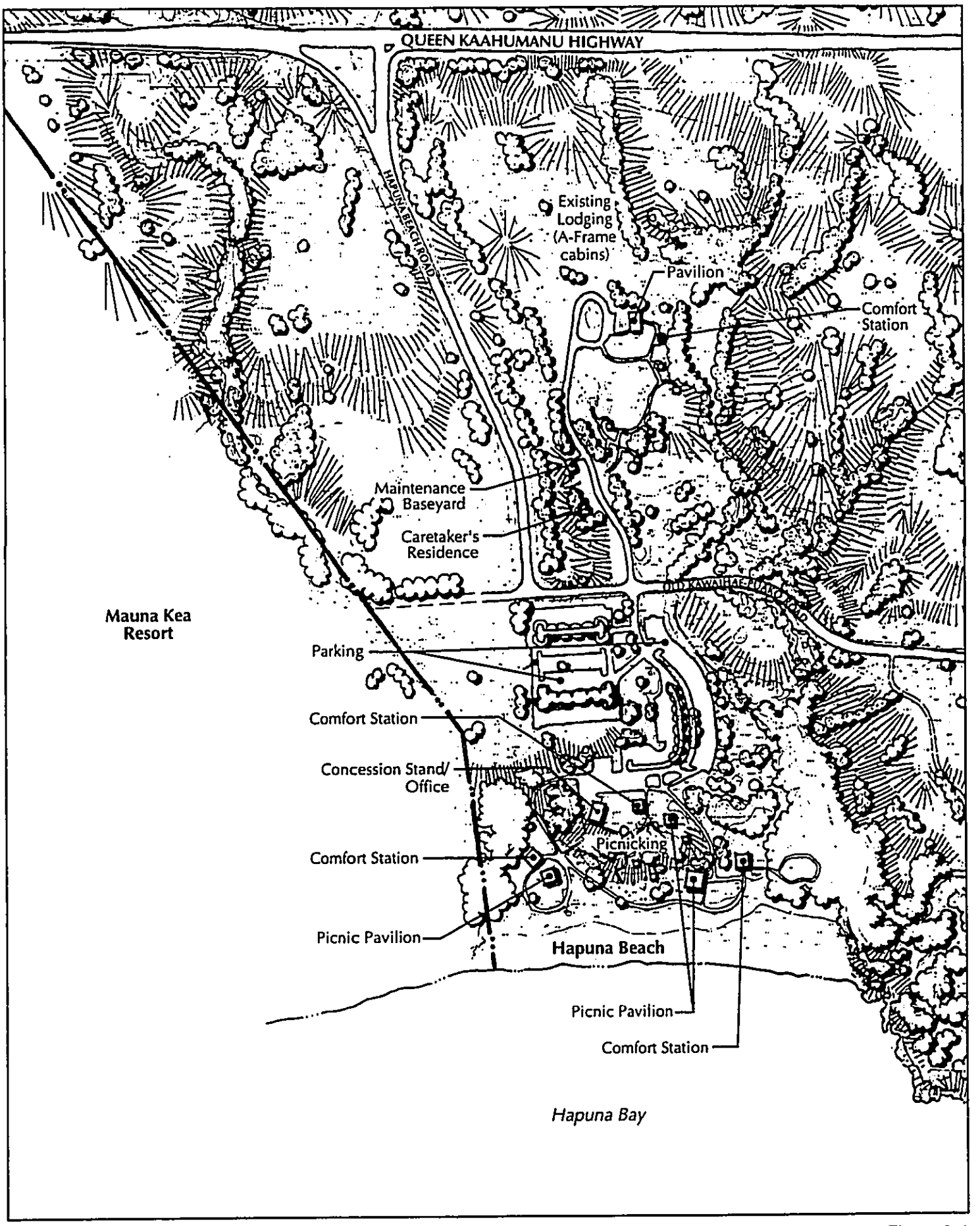


Figure 3-3
Hapuna Beach State Recreation Area Expansion
EXISTING RECREATION AREA

DOCUMENT CAPTURED AS RECEIVED



0 200 400
SCALE IN FEET

NORTH

Belt Collins Hawaii

Figure 3-4
Hapuna Beach State Recreation Area Expansion
EXISTING HAPUNA BEACH STATE RECREATION AREA

3.2.2 Beach 68

"Beach 68" is a 150-foot-wide by 35-foot-deep beach that is accessible from the old Kawaihae-Puako Road (some residents indicate that "Beach 68" is "Beach 69"). Lava outcrops occupy a portion of the beach leaving a usable area of approximately 100 feet by 35 feet. On either side of the beach, the shoreline is lined by sea cliffs ranging in height from 35 to 50 feet above mean sea level.

The term "Beach 68" is derived from the number posted on a telephone pole along the old Kawaihae-Puako Road. Access to the beach is provided by a jeep trail from the old road. At the end of the jeep trail is a dirt parking area and a walking trail to the shoreline. Beach 68 is popular for nude sunbathing, overnight camping, and swimming, and adjoins a unique cove immediately to the northwest. There are no public facilities at this beach.

3.2.3 Wailea Beach

Wailea Beach (Beach 69) is smaller than Hapuna Beach, measuring approximately 1,400 feet wide and approximately 40 to 80 feet deep. At about the center of Wailea is a lava outcropping that reduces the sand area of the beach. During high surf and winter seasons, the beach is subject to sand loss and the depth of the beach is reduced to less than 40 feet. Offshore within the bay is the Wailea Bay Marine Life Conservation District as designated by the Department of Land and Natural Resources.

Wailea is a relatively quiet and secluded beach reached by an unimproved road from the old Kawaihae-Puako Road. An unpaved parking area is located at the end of the unimproved road and adjacent to the beach. There are no public facilities.

The big winter surf in the bay is excellent for surfers and bodysurfers. Swimming, snorkeling, and scuba diving are popular near the shore. Windsurfing and small-craft sailing are also popular activities.

Inshore waters of the bay feature a sandy bottom. The ruins of a former boat landing are still evident near Wailea Point at the south end of the bay. A number of private homes occupy an area behind the beach and above the adjacent cliffs and rocky shoreline.

3.2.4 Puako Boat Ramp

At the southern end of the project expansion area is a small boat ramp and dock that are used all year around. Provided by the State, the facility includes also a paved parking area for vehicles and trailers and a boat washdown area. There are no restrooms on the property.

3.3 TOPOGRAPHY, GEOLOGY, AND SOILS

3.3.1 Existing Conditions

3.3.1.1 Physiography

The park's existing and expanded area measures approximately 7,800 feet by 5,080 feet and encompasses approximately 846 acres (Figure 3-3). It rises from the shoreline to an elevation of about 320 feet. The average slope is approximately 4.5 percent.

The surface of the property is typically uneven, with minor knolls, small ravines, and gullies. Two major drainage channels traverse the site from east to west and ultimately connect with the shoreline at Hapuna and Wailea Bays. Other than the shoreline area, which will be described in detail in the following sections, there are no unique or dramatic landforms or features that make the property distinct.

3.3.1.2 Geology

Over centuries of geological formation, the project site has been subjected to basaltic lava flows and volcanic ash deposits from Mauna Kea. A study by Stearns and Macdonald classifies the volcanic rocks in the vicinity as part of the Hamakua Volcanic Series. The ash deposits covering the volcanic rock is believed to have resulted from earlier volcanic eruptions on Mauna Kea and from local tradewinds blowing ash southwesterly over the region (Harding Lawson Associates, 1991).

Field investigations by Harding Lawson Associates in 1991 identified primarily a'a lava on the site (see Appendix C). This finding contrasts with the generalized U.S. Soil Conservation Service mappings, which indicate the site is primarily underlain by pahoehoe lava and, secondarily, by a'a lava.

Harding Lawson further noted that over time, the a'a lava in most places weathered to form a very stony, sandy silt soil that varies in depth from 0 to 3 feet. Harding Lawson's investigation also found pockets of yellowish, weathered volcanic ash covering the a'a basalt in several road cuts and along the shoreline. The ash layer varied in depth from 1 to 4 feet and may be part of the Pahala ash deposit.

No significant geologic structures, such as faults, lava tubes, or collapsed lava flow structures, were found. Two caves, however, were discovered at the site: one along the shoreline between Hapuna Bay and Wailea Bay, and the other in a ravine in the southeastern section of the property. These caves appear to have been formed by erosion of the less-resistant clinker layer by wave action and surface water runoff. Additionally, in the same area along the shoreline, there is an arch rock structure measuring 15 to 20 feet high and 10 to 15 feet wide. It appears this structure was formed also by wave action.

3.3.1.3 Geologic Hazards

The Island of Hawaii is the youngest of the Hawaiian islands and the most active in volcanic activity. It is thus subject to volcanic eruption-related hazards. The project area is located in Zone 8, which is the eighth least-hazardous of 9 zones relative to lava flow hazards. As defined by Mullineaux, et al., Zone 8 is a large area on the lower flanks of Mauna Kea that has not been affected by lava flows for at least 10,000 years. Other related volcanic activities such as deposition of tephra (volcanic ash), pyroclastic surges (explosive eruptions), volcanic gases, ground fractures, subsidences, and collapsed features have not been significant occurrences in the project area during historical times (Harding Lawson Associates, 1991).

Earthquakes are also a geological occurrence that may affect the site. According to Harding Lawson, the greatest number of earthquakes on the island occur beneath the summits or near the rift zones of Kilauea and Mauna Loa. One of two major earthquakes to have occurred in West Hawaii was in August of 1951. It had a magnitude of 6.75 to 7.0 on the Richter scale and a Modified Mercalli intensity rating of approximately IV (Macdonald and Wentworth, 1952). This intensity level resembles the nondestructive ground motion felt by many people indoors. The other major quake in West Hawaii occurred in October of 1929, which had a magnitude of 6.5. The epicenter was identified to be located under Hualalai volcano, but its intensity level under the project area was not recorded.

For purposes of determining structural design requirements, the entire Island of Hawaii is in Seismic Zone 3 according to the Uniform Building Code and Hawaii County Building Code amendments. Thus, all new structures must be designed to resist forces that might be expected in Zone 3 areas. The proposed park improvements notably will not contain major building structures that could easily suffer major damages. There would be primarily ground improvements and low-profile structures.

3.3.1.4 Soil

With the exception of beach sand at Hapuna and Wailea Bays, the U.S. Soil Conservation Service classifies all soils on the property as *Kawaihae extremely stony very fine sandy loam* (KNC). This soil type is reported to average about 33 inches in depth.

Further, according to the U.S. Soil Conservation Service, the permeability of this soil is moderate, runoff is medium, and erosion hazard is moderate. Its Capability Classification is VII_s, which indicates the soil has very severe limitations that make it unsuited to cultivation and suited more to pasture, range, woodland, or wildlife use. The subscript "s" indicates the limitation of the soil is due mainly to its shallow, droughty, or stony characteristics.

Harding Lawson Associates believes the existing surface soils represent a mixture of ash deposits and weathered clinker on basaltic a'a lava flow surfaces. In addition, these soils contain soluble sulfate concentrations that are capable of being detrimental to concrete (see Appendix C).

The University of Hawaii Land Study Bureau classifies Hapuna Beach as Land Type 327, Sands. Soils mauka of the beach are Land Type 93 Kawaihae soils series which is characterized as rocky, very well-drained, arid, and unsuitable for machine tills. Its Master Productivity Rating, which is an indicator of overall land productivity, is "E" on a scale ranging from "A" to "E." An "E" rating signifies the land type is very poorly suited for agricultural use.

In terms of grazing use capacity, the project site is assigned to Class "e", which designates lands with the lowest carrying capacity—more than 30 acres per Animal Unit Year (AUY), or estimated live beef gains of nine pounds or less per acre per year (U.S. Soil Conservation Service). Comparing this with Class "a," the carrying capacity of the highest class is less than 2.5 acres per AUY or estimated live beef gains 110 lbs. per acre per year or greater.

The State Department of Agriculture does not have a designation for the project site on its Agricultural Lands of Importance to the State of Hawaii (ALISH) map. The State document includes identification of prime agricultural lands, unique agricultural lands, and other important agricultural lands.

3.3.2 Potential Impacts and Proposed Mitigation

The proposed action will result in alteration to the existing terrain and drainage patterns during the construction phase of the project. Site preparation will involve selective clearing and grading in the park expansion area. This is in line with the design objective of the park to integrate park improvements with the natural environment and to preserve resource-oriented recreational opportunities. Although the park expansion area will encompass approximately 526 acres below Queen Ka'ahumanu Highway, less than one-third of the area will be actually improved. The remainder will be in open space and preserved in its natural state.

Similarly, the proposed golf course will be developed over selected areas of the mauka land. Less than 40 percent of the 320 acres above the highway will be converted to fairways, greens, and tees. The expanse of available land for the golf course allows the designer to work with the terrain and avoid substantial grading.

The impact on drainage will be reduced by the implementation of erosion and sedimentation control measures provided by the construction contractor. Best management practices will be employed and grading plans will be submitted to the county government for review and approval.

For grading of the site, no importation or exportation of soil will be needed. Importation of top soil for grass turf on the golf course, however, will be required. The soil will come from an approved source and will be contaminant free.

3.4 CLIMATE

3.4.1 Existing Conditions

Kawaihae of the South Kohala District is one of the Big Island's driest areas. Average annual rainfall at the U.S. Weather Bureau's Puako gauge near the project site is about nine inches. Most of this rainfall typically occurs during a short period in the October to April winter season. Intense storms or torrential rainfalls are rare along the Kohala coast.

More than 90 percent of the days in the year are sunny and free of cloud cover. Low humidity levels (commonly under 40 percent) and cool breezes maintain a consistent level of comfort throughout the year.

The mean annual temperature is about 78%F, with relatively small daily and seasonal variations. Daytime highs above 90%F or nighttime lows below 63%F are rare. The mauka lands above the Queen Ka'ahumanu Highway are normally cooler during nighttime hours.

Airflow is most common onshore from mid-morning until just before sunset and offshore from early evening until the following morning. This diurnal pattern contrasts with the relatively constant northeast tradewinds prevalent in most other areas of the state. The average wind velocity is also less—7 to 8 miles per hour (mph) for the land-to-sea breeze, compared with 12 to 14 mph for the tradewinds. Under certain atmospheric conditions, gusty winds blowing through the saddle between the Kohala Mountains and Mauna Kea reach the shoreline. An observation by an area resident noted that winds during some periods average 35-45 mph and last from 15 minutes to days, weeks, and longer.

Hurricane season in Hawaii is generally from June to November. In the last 25 years, two major hurricanes (known in meteorological terms as tropical cyclones) have hit the Hawaiian Islands. Both took a path near or across the Island of Kauai. The other islands experienced the outer edge of the hurricanes which generated strong winds and heavy rain as well as high surf. The Island of Hawaii was fortunate to survive with minor, if any, effects from the storm.

3.4.2 Potential Impacts and Proposed Mitigation

The weather in the South Kohala coastal plain is generally mild but is subject to periods of high winds. Rainfall, though low on average throughout the year, can be very heavy during intense atmospheric disturbances. All park structures will be designed to meet building code requirements and include special structural provisions for adaptation to local conditions.

In the event that a hurricane is anticipated to occur near or through Hapuna, park personnel will implement evacuation procedures. This will be in addition to the State and County early warning systems that will go into effect.

For major structures, the architect may consider the use of hurricane clips and foundation anchors. Most of the other park facilities would be primarily ground improvements or park furniture and would receive only minor damage from the severe winds.

3.5 DRAINAGE

3.5.1 Existing Conditions

The project site is traversed by drainageways that originate from eight drainage basins. Some of these basins extend from the shoreline to well above the project site and range in size, above the Queen Ka'ahumanu Highway, from 40 acres to as large as 7,070 acres. The head of the largest basin is at about the 2,200-foot elevation in the South Kohala District highlands.

Drainage across three of the four roadways that traverse the project site is accommodated by culverts located beneath the road pavements. There are eight culverts beneath the Queen Ka'ahumanu Highway, two beneath the old Kawaihae-Puako Road, and two under the Puako Spur Road. These culverts (Figure 3-5), which are located within State rights-of-way, are maintained by the Department of Transportation. Drainage information for the culverts within the Queen Ka'ahumanu Highway are provided in Table 3-1.

Table 3-1 TR55 Runoff Quantities for the Basins (Mauka of Queen Ka'ahumanu Highway)

Culvert	Total Basin Area (in acres)	Flow (in cfs)
A	7,072.0	4,063
B	41.3	46
C	192.0	273
D	39.5	59
E	227.7	250
F	136.0	194
G	2,131.0	1,231
H	46.8	79

3.5.2 Potential Impacts and Proposed Mitigation

The proposed project will involve clearing, grubbing, grading, and landscaping. There will be new grass areas, park furnitures, small building structures, access roads, and vehicular parking. Land alteration makai of the highway will be minimal with few site improvements. The proposed project will maintain existing terrain as much as possible, thus minimizing grading. Mauka of the highway, the golf course will require more earthwork to establish the grass fairways, greens and tees, although the design will rely on existing landforms wherever possible.

Development of access roads, paved parking areas and park structures will create impervious surfaces that will increase surface runoff. Compared to the overall site, the new impervious surfaces represent less than five percent of the project area. Overall, no net increase in normal runoff from the proposed improvements is expected. There should be, in fact, a decrease in runoff after the construction of the golf course. Experience has shown that project sites consisting of golf course development are capable of retaining water on the turf surface to allow improved conditions for ground percolation. Also, golf course designs include provisions for grassed swales, dry wells, ponds, and catchment basins to control runoff.

A runoff analysis was conducted on the project site's pre-development and post-development conditions. Technical Release 55 Method, as provided in the U.S. Department of Agriculture, Soil Conservation Service's manual, *Urban Hydrology for Small Watersheds*, was used in the runoff calculations and the results (showing no net increase in runoff) are shown below in Table 3-2.

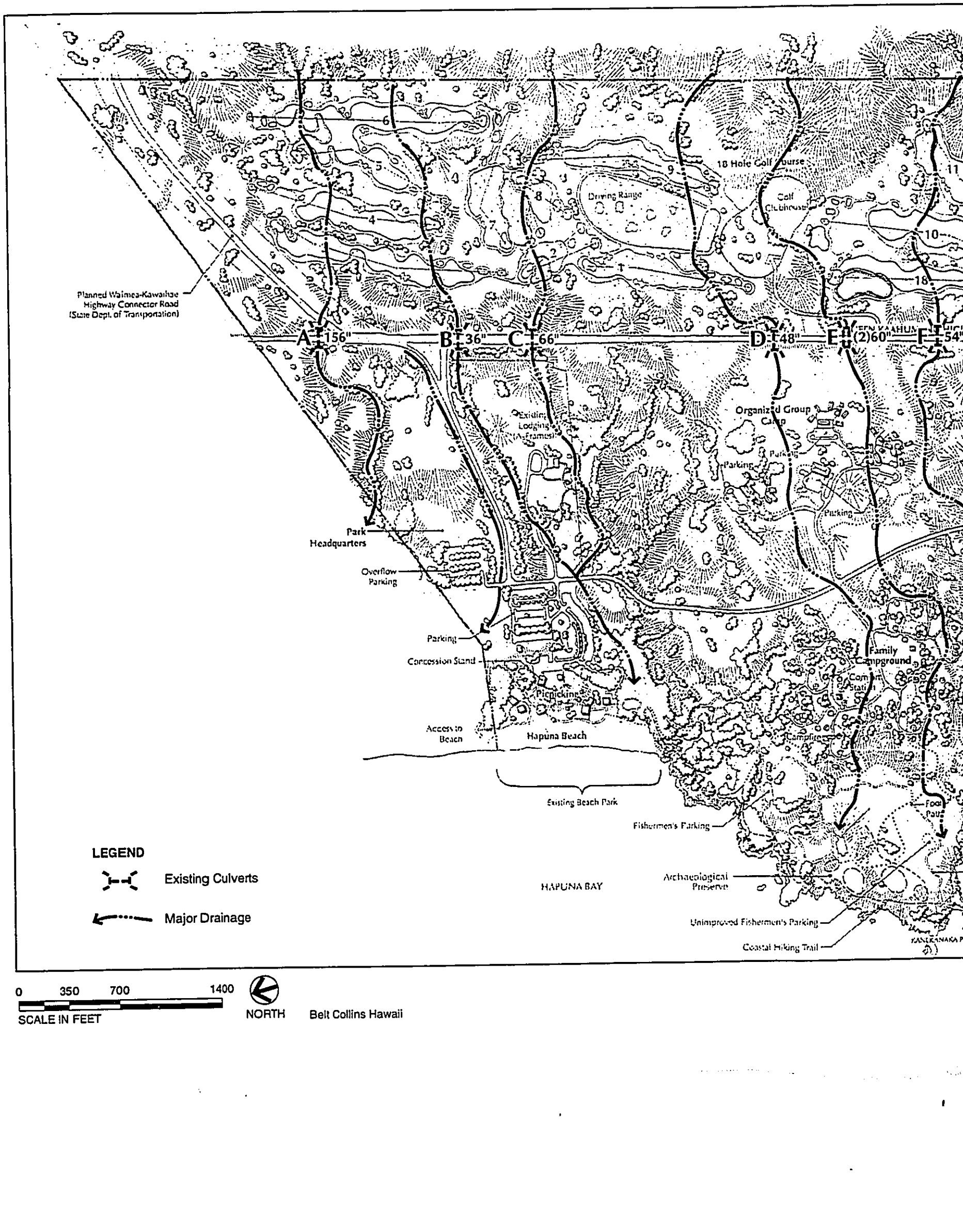
Table 3-2 Net Flow Over Project Area

Culvert	Total Basin (acres)	Project Development Area (acres)	Pre-Developed Flow (cfs)	Post-Developed Flow (cfs)
A	7,072.0	66.1	4,063	4,061
B	41.3	20.0	46	41
C	192.0	46.7	273	262
D	39.5	39.5	59	50
E	227.7	32.6	250	249
F	136.0	38.8	194	184
G	2,131.0	80.3	1,231	1,228
H	46.8	25.8	79	71

The proposed old Kawaihae–Puako Road realignment (to be known as Puako Road) will require new culverts for existing drainage to flow past the right-of-way. The new culverts have been preliminarily designed to accommodate at least 50-year storm flows, which is the current design standard for public roadways. For drainage areas that are larger than 100 acres, a special analysis was conducted to determine the drainage flow and its appropriate culvert size.

The two existing culverts, which traverse the current old Kawaihae–Puako Road, will be modified to accommodate the proposed Puako Road realignment. This modification will include lengthening of the culverts and construction of new headwalls (Figure 3-6). The size and design flow of all new culverts in the project area are presented in Table 3-3.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

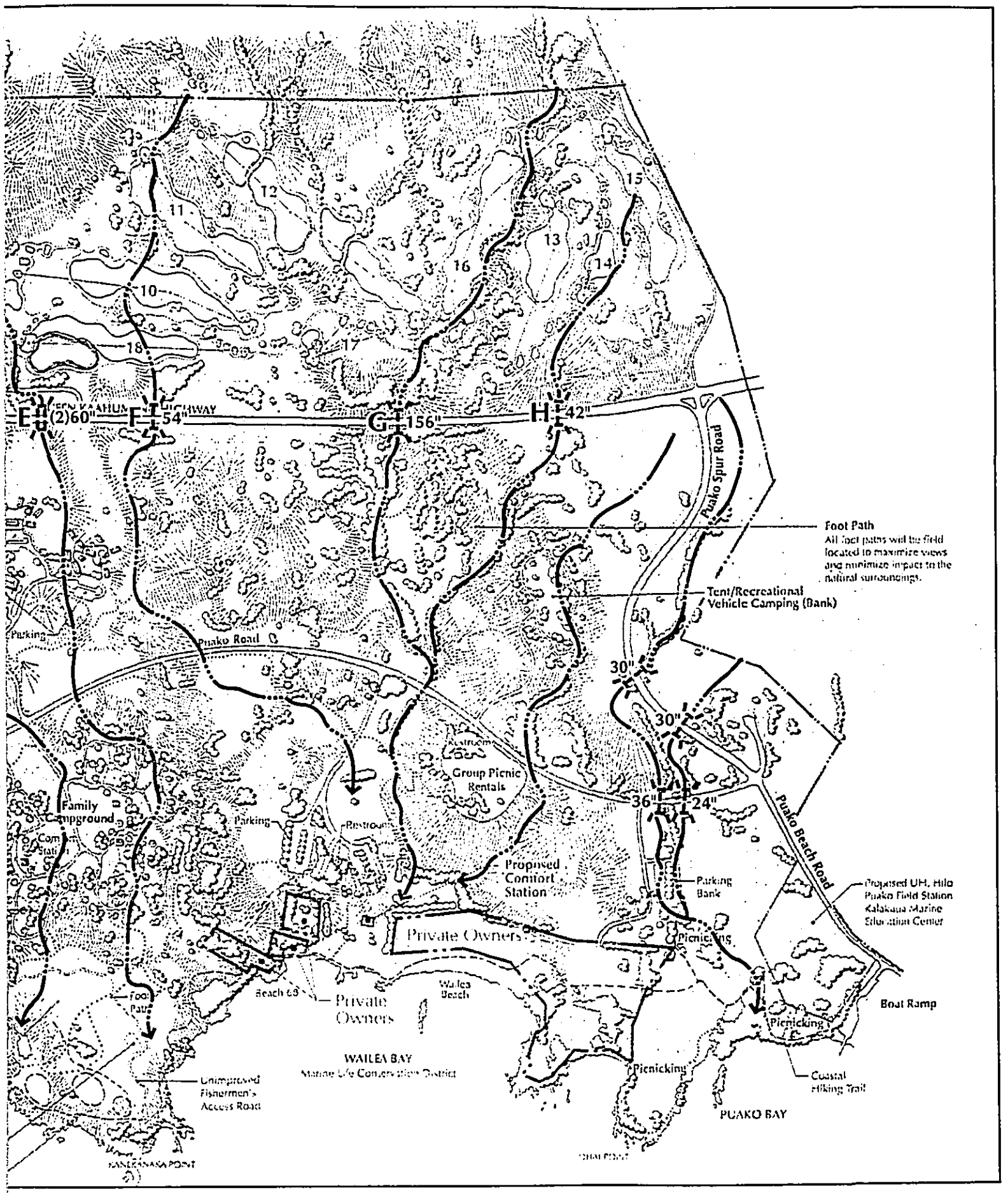
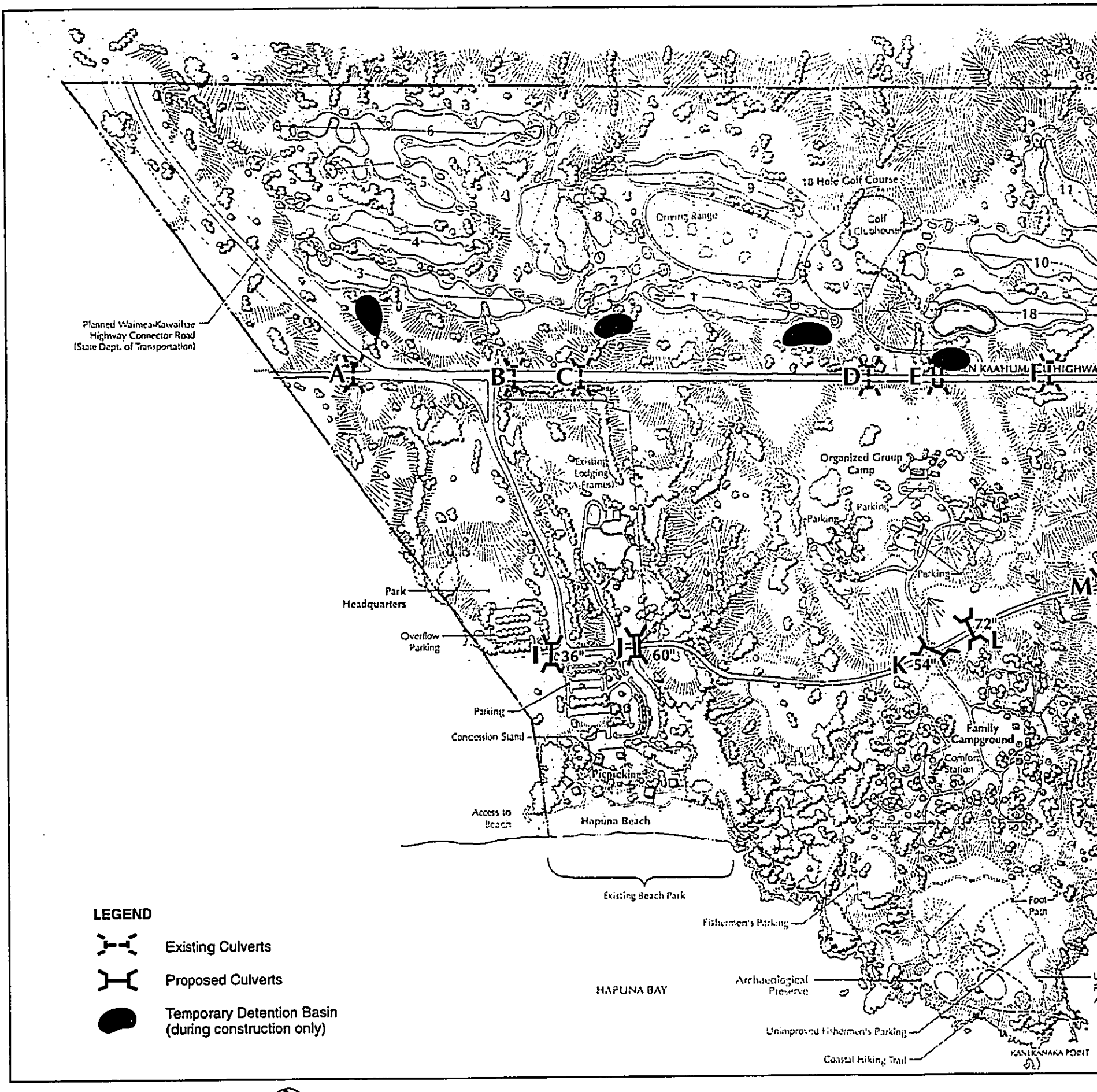


Figure 3-5
Hapuna Beach State Recreation Area Expansion
EXISTING DRAINAGE

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

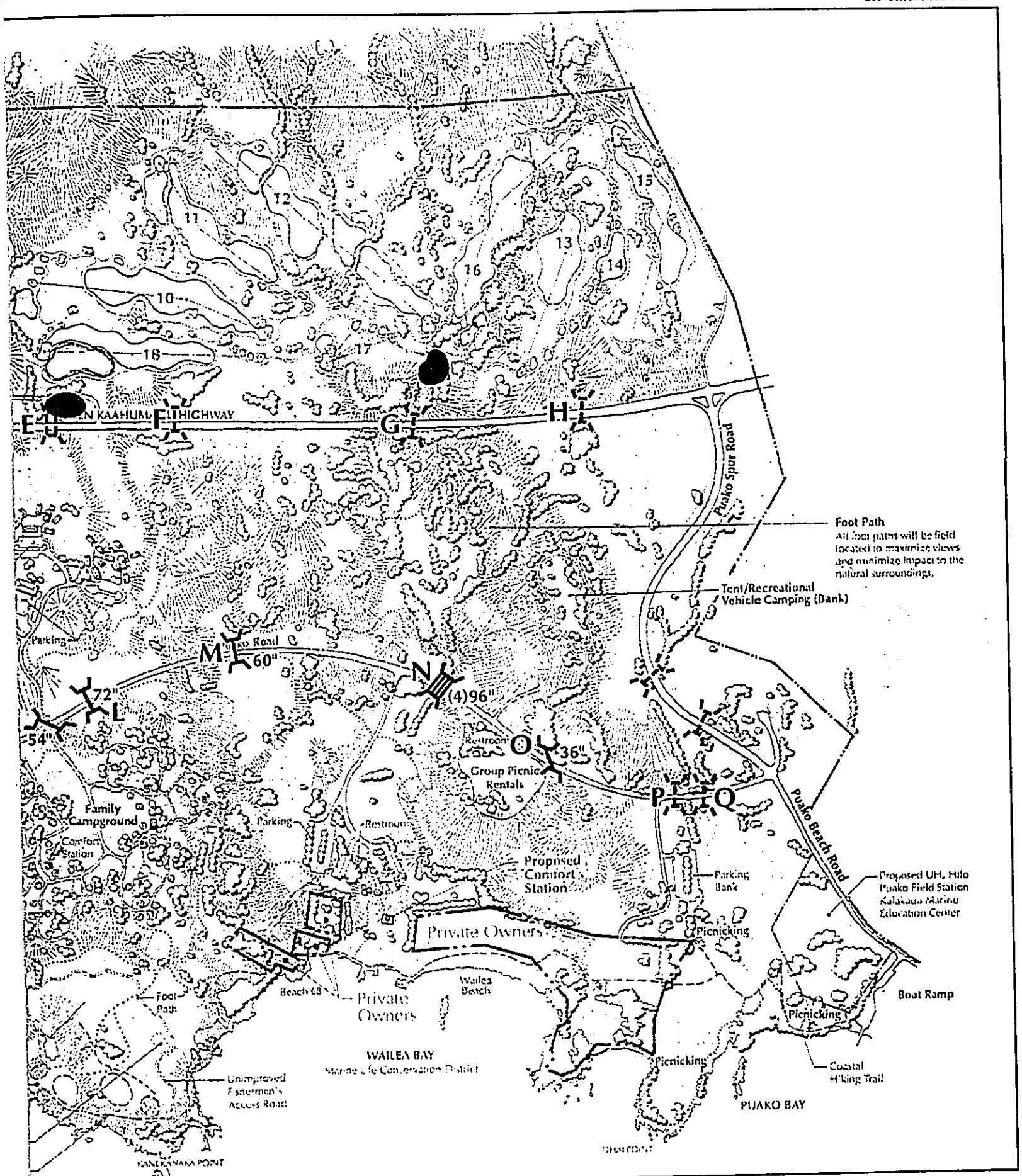


Figure 3-6
Hapuna Beach State Recreation Area Expansion
DRAINAGE IMPROVEMENT PLAN

Table 3-3 Culvert Size and Design Flow for Old Kawaihae-Puako Road Realignment

Culvert	Status	Design Flow (cfs)	Culvert Size (inch)	Quantity of Culverts
I	Proposed	40	36	1
J	Proposed	330	60	2
K	Proposed	120	54	1
L	Proposed	250	72	1
M	Proposed	170	60	1
N	Proposed	1,300	96	4
O	Proposed	50	36	1
P	Modification	–	36	1
Q	Modification	–	24	1

The property has been known to flood in the flat, low area behind Wailea Bay and empty into the bay resulting in murky waters. This condition provides a natural sedimentation basin for runoff which originates in the mauka land and eventually enter the bay. The proposed improvements will include culverts to accommodate surface runoff and prevent backwater flooding mauka of the new Puako Road as well as to avoid topovers at road crossings so continued access can be maintained.

In the adjoining property to the north, Mauna Kea Resort experienced a few serious floodings that caused property damage. It was determined that the culvert sizes in the highway above the resort were undersized for severe storms and in combination with other factors (inability of the existing ground to adequately absorb water and slope of ground) caused flooding and property damages. A diversion channel was designed and constructed to divert this potential flow above the resort into an adjacent gulch in the State park land. As one of the major gulches in this area, the gulch traverses the northern portion of the park property and connects with the shoreline at Hapuna Beach. The culvert beneath the Queen Ka'ahumanu Highway serving this drainageway is more than adequate to accommodate the additional flow. It was constructed with the new segment of Queen Ka'ahumanu Highway which used updated drainage design standards.

The grass lawns of the park and golf course areas will provide a form of flood control for the project. Grass surface treatment will help slow the flow of water over the project site and improve surface runoff retention and ground absorption rate. For normal heavy flows, grass lawns will reduce the quantity of heavy sedimentation and murky runoff generated from various areas of the park. Sedimentation basins and other possible erosion control measures which are planned in the golf course and park area will help to reduce these impacts.

During construction of the Hapuna Beach State Recreation Area expansion, short-term erosion and sedimentation impacts are expected to occur. The actual site work involving earthmoving activity will occur only during a portion of the construction period. Only

about five to 15 acres makai of the highway are expected to be graded at any one time. The land alterations are anticipated to move from one area of the project site to another area as development on the park occurs.

Mauka of the highway, grading for the golf course will occur at one time. Site preparation, grading, and landscaping for each golf hole will be scheduled for completion at the same time.

The contractor for the project is expected to use necessary erosion and sedimentation control measures as part of the park and golf course construction. Approval of these measures will be required by the County Chief Engineer before any grading permit is issued.

3.6 HYDROLOGY AND WATER RESOURCES

3.6.1 Existing Conditions

Groundwater along the South Kohala coast occurs as a basal lens in hydraulic continuity with the ocean. Calculations of the total groundwater flow in the area have provided a probable range of three to seven million gallons per day per coastal mile (Bowles, 1974; Kanehiro and Peterson, 1977; and Nance, 1981). Near the shoreline, groundwater exists in a brackish quality, but landowners have drawn this water from the ground and have successfully used it for golf course irrigation (see Table 3-4). At distances of four or more miles inland of the shoreline, groundwater is of a potable quality. Wells consequently have been developed to supply the domestic water requirements for the coastal region.

Shoreline discharges of groundwater tend to concentrate at cracks and other small-scale, localized fissures. Shoreline discharges in the project area are known to take place at the south end of Hapuna Bay and are noticeable by a distinct temperature gradient and refraction of light. When the coastal waters are extremely calm, a surface layer of brackish groundwater is clearly evident.

3.6.2 Potential Impacts and Proposed Mitigation

The proposed project will require the development of wells for potable water and irrigation water. Potable water will serve the park facilities and golf course clubhouse. Irrigation water will serve the park landscaping and golf course grounds. The impacts from these uses are discussed in Section 3.12.2.1 of this document.

During operations of the expanded park and golf course, fertilizer and pesticide application will be used for ground maintenance. The active ingredients in the application will have the potential to infiltrate deep into the ground and impact groundwater. Some of these ingredients could travel to the shoreline and impact the coastal ecosystem. These conditions, their potential impact, and proposed mitigation measures are addressed in Section 3.7.2.3.

Table 3-4 Selected Water Well Data in the Vicinity of the Hapuna Beach State Recreation Area Expansion

Well Identification (Well Number)	Owner or User/ Year Drilled/ Type of Use	Ground Elevation (feet above MSL[a])	Static Water Level (feet above MSL)	Well Casing Diameter (Inch)/ Depth (Feet)	Chlorides	Total Alkalinity	pH	Turbidity	Temper-ature	Conductivity (UMHOS/cm)
5948-01 Hapuna Beach Park	State Parks 1970 irrigation	244	2.6	10/266	420-430 ppm	78 ppm as $CaCO_3$	7.3	ND[b]	ND	1,670
5949-01 Camp Drewes	USMC 1944 unused	90	ND	ND	ND	ND	ND	ND	ND	ND
6048-02 Mauna Kea Beach Hotel 1	Mauna Kea Beach Hotel 1963 irrigation	340	4.5	10/ND (total depth drilled = 376 ft.)	550.0 ppm	78 ppm as $CaCO_3$	7.7	10	82.4°F	ND
6049-01 Mauna Kea Beach Hotel 2	Mauna Kea Beach Hotel 1963 irrigation	188	2.0	12/218	640 ppm as NaCl	ND	ND	ND	77°F	ND
6049-05 Ouli A	Olohana Corp. 1979 irrigation	300	3.2	14/322	ND	ND	ND	ND	ND	ND

[a] MSL = Mean sea level
[b] ND = No Data

Source: Harding Lawson Associates, 1991.

3.7 COASTAL AND MARINE ENVIRONMENT

3.7.1 Existing Conditions

The project expansion area has approximately 10,800 feet of shoreline, including 1,200, 1,000 and 150 feet of sandy beach at Hapuna, Wailea, and Beach 68, respectively. The remainder of the shoreline is rocky.

The nearshore waters are classified by the State Department of Health (DOH) as Class AA. According to Chapter 54 of the DOH's Administrative Rules, the objective of these waters is that they 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 action. Further, to the extent practicable, the wilderness character of this area shall be protected. No zones of mixing shall be permitted in this class.

It is also stated that the uses to be protected in these waters are oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment.

In 1991, Marine Research Consultants conducted a marine environmental survey of the nearshore waters at Hapuna and Wailea to identify the existing physical, chemical, and biological characteristics of the area. The survey was also conducted to provide a base from which potential impacts generated by the proposed development onto the nearshore waters could be measured (Appendix D).

3.7.1.1 Physical Characteristics

The predominant physical feature of the project shoreline is the basaltic cliff of pahoehoe lava, interspersed with pockets of white calcareous sand areas at Hapuna Beach, Wailea Beach, and Beach 68.

The nearshore subtidal areas which do not front a sand beach are composed of basaltic boulders and sharp lava fingers. The seaward edge of these lava shoreline areas consists of either a relatively flat basaltic bench or vertical sea ledge of approximately three- to six-feet in depth.

The reef area is divided into three major zones: (1) a shallow nearshore zone characterized by a flat reef platform; (2) a mid-reef zone composed of irregular bottom topography characterized by extensive reef growth; and (3) a deep reef zone composed of dome-shaped elongated ridges of accumulated coral growth separated by sand channels. Such a zonation scheme is atypical of the West Hawaii area which is usually characterized by a deep reef slope.

The flat reef platform in the nearshore area is covered with a limestone veneer, along with scattered basaltic boulders that have entered the ocean after breaking off from the shoreline. Areas of sandy bottom are also common throughout this underwater zone. A dominant characteristic of the bench is extensive pitting by the bioerosional action of sea urchins. This characteristic is most pronounced in the inner areas of Wailea Bay. On the

other hand, the relatively barren nature of the inner areas of Puako Bay suggests it may have been recently affected by events that have increased siltation to the point that it has killed reef corals. In areas fronting sand beaches, for example, the most shoreward reef zones are essentially absent of coral. They have bottom structures consisting of expanses of white sand.

Between 80 and 160 feet of the shoreline, the reef platform changes from a flat bench to uneven hummocky surfaces separated by sand patches. Coral coverage increases gradually with distance from the shore.

Beyond the reef platform, bottom topography gradually slopes to abyssal depths. This is not characteristic of the rest of the South Kona to North Kohala bathymetry, which typically consists of a narrow nearshore reef bench and steep reef slope.

The outer reef area of the project site displays a rather unique structure. Extending seaward, the coral hummocks gradually change orientation from a random pattern to a series of elongated fingers with long axes perpendicular to the shoreline. At the 30- to 60-foot depth, the fingers have the appearance of elongated knolls or ridges that rise off the sea bottom by as much as 15 feet. They stretch out to 160 feet and are generally 30 to 50 feet wide. These elongated fingers are regularly spaced and are separated by channels of fine white sand. It appears these ridges were not composed of any underlying core of basalt, but were the result of bioaccumulation of calcium carbonate generated through an active reef building process.

3.7.1.2 Water Chemistry Analyses

An evaluation of the area's nearshore water chemistry was conducted by Marine Research Consultants in March 1991 (see Appendix D). A total of 57 water samples were collected from five transect lines located offshore of the project area. The transects extended approximately 825 feet offshore and perpendicular to the shoreline. Three transects were in Hapuna Bay and the remainder were located in Wailea and Puako Bays. From the samples, an analysis of 13 water chemistry constituents were performed, including all parameters specified in the State Department of Health's water quality standards.

Results of the analysis showed that several dissolved nutrients (nitrate [NO_3^-], total nitrogen [TN], orthophosphate phosphorus [PO_4^{-3}], and silica [Si]) displayed horizontal gradients with highest values closest to shore and lowest values at the most seaward sampling sites. Correspondingly, salinity was the lowest closest to the shoreline. These patterns indicate that groundwater is entering the marine environment near the shoreline and mixing with ocean water. It was especially evident at the southern end of Hapuna Bay, and least distinct in the center of the bay. Other water chemistry constituents that are not related to groundwater efflux (dissolved organic nitrogen [DON], dissolved organic phosphorus [DOP], and ammonium nitrogen [NH_4^+]) do not display the steep gradient with respect to distance from the shoreline and further substantiate the presence of groundwater efflux.

Along with horizontal gradients in water chemistry constituents, there is also vertical stratification within the water column. Such stratification is the result of incomplete mixing of a low-density surface layer originating from groundwater and stream water overlying a layer of denser ocean water. Vertical stratification is evident from the nutrient (NO_3^-, PO_4^{-3}, and Si) concentrations measured in the surface and deep waters at various distances from the shoreline. Based on these measurements, the greatest differences between surface and deep water nutrient concentrations occur at the nearshore locations and decrease with increasing distances from the shoreline.

All water samples were analyzed and compared to DOH criteria for open coastal waters under "wet" conditions. Of these samplings, only NO_3^- was found to exceed DOH criteria levels. This exceedance is attributed to the groundwater efflux occurring at the nearshore interface and are therefore part of a natural process.

While turbidity and chlorophyll levels did not exceed DOH criteria levels, they were noticeably higher at the southern end of Hapuna Bay. These elevated concentrations are possibly a result of planktonic populations that may be trapped within the corner of Hapuna Bay.

3.7.1.3 *Biological Characteristics*

An assessment of the benthic and reef fish community structure in the marine waters off the project area was conducted by Marine Research Consultants (see Appendix D). Nine transects were evaluated at three stations.

The study showed that the area's coral community structure differs substantially in each reef zone. The shallow reef bench is comprised of small encrustations of corals that can withstand the rigors of sediment, freshwater input, and water motion. The mid-depth reef is characterized by very large coral colonies of *P. lobata* which indicate the area is relatively protected from severe wave stress. The deep reef ridges appear to be composed of predominantly one species of coral (*P. compressa*). Notably, the coral cover of the hard sea bottom increases with depth while species diversity decreases.

The reef fish community structure at Hapuna is fairly typical of the communities found in other undisturbed Hawaiian reef environments, and is characterized by six general categories: juveniles, plantivorous damselfishes, herbivores, rubble-dwellers, swarming tetrodonts, and surge-zone fishes (see Appendix D). The relative scarcity and timid behavior of some fish indicates that they have experienced predation and that the area has been subjected to fishing.

3.7.2 Potential Impacts and Proposed Mitigation

3.7.2.1 Shoreline Modification and Surface Runoff

The absence of any plans by State Parks to modify the shoreline or nearshore environment eliminates the potential for direct alteration of the ecosystems, according to Marine Research Consultants. Stresses from natural forces that are factors in influencing community structure (e.g., freshwater and sediment input) may actually be reduced with

shoreline development. Secondary impacts associated with runoff of materials from the proposed development do not appear to present the potential for changes based on similar projects elsewhere. Construction and operation of park improvements and a golf course do not appear to present a potential for permanent adverse impact to the marine environment. Proper construction and management methods would eliminate impacts on the shoreline.

While significant alterations in marine waters are not expected from the proposed project, it is recommended that the present baseline survey serve as the initial increment in an ongoing monitoring program. The monitoring program should be designed to establish a preconstruction baseline of conditions in order to evaluate any changes that might occur during the construction and operational phases of the project. Such a monitoring program should also be designed so that if any environmental alterations are identified, mitigative measures can be applied prior to the degradation of the water quality and biotic community structure in the offshore areas.

3.7.2.2 Ciguatera

In Hawaii and other Pacific island areas, there have been sporadic outbreaks of ciguatera, a disease caused by the ingestion of a wide variety of coral reef fishes that contain toxins accumulated via the marine food chain. The source of the ciguatera toxin is a photosynthetic benthic dinoflagellate, *Gambierdiscus toxicus*.

When a benthic dinoflagellate was first identified as a source, it was hypothesized that any disruption of the marine environment that caused new surfaces to be exposed would trigger ciguatera outbreaks. Although there is circumstantial evidence of a relationship between dredging and ciguatera, definitive cause and effect relationships between environmental alteration and toxic outbreaks have not been verified. The proposed project will not disturb nearshore waters of the park land and thus would not create conditions that might result in ciguatera toxicity.

3.7.2.3 Fertilizer and Pesticides

In May 1991, Charles L. Murdoch, Ph.D. and Richard E. Green, Ph.D. assessed the potential environmental impacts of fertilizers and pesticides on the groundwater and nearshore waters of the project area (Appendix E).

The regular maintenance of the planned golf course will require significant quantities of fertilizers and pesticides to keep the fairways in lush, green, and generally healthy condition (in the remainder of the project, particularly in the park lands, minor quantities are expected to be used). The use of fertilizers and pesticides is the most common maintenance practice, and its application often raises questions regarding its effect on the environment. Fertilizers are normally applied to greens, tees and fairways, and only parts of the golf course roughs. The main components of fertilizers include nitrogen, phosphorus, and potassium. It is estimated that approximately 86 acres of the 200-acre golf course would be fertilized. Actual fertilization would occur every 2 weeks on the greens, every 3 weeks on the tees, every 8 weeks on the fairways, and every 12 weeks on

parts of the roughs. A total 14.6 tons of fertilizer may be applied to the golf course per year (Table 3-5).

Table 3-5 Approximate Fertilizer Use for an 18-Hole Golf Course in Hawaii

Type of Turf	Area (acres)	Application Frequency (times per week)	Total Annual Application (tons)
Greens	3	2	0.85
Tees	3	3	1.15
Fairways	50	8	10.00
Roughs	30	12	2.60
Total	86		14.60

Pesticides, which include herbicides, insecticides, and fungicides, would also be used on the golf course (Table 3-6). They are normally applied only in response to outbreaks of pests. Other than herbicides, few pesticides are applied regularly.

Irrigation influences the movement of soluble nitrogen fertilizers in soils. If excessive irrigation occurs after fertilization, the likelihood of runoff or leaching of nitrogen below the root zone increases.

Murdoch and Green's study concluded that the proposed park expansion and golf course would not result in any adverse impact to the project area's groundwater quality. With current low rainfall conditions and high evapotranspiration from turf in the area, groundwater recharge under normal conditions does not occur. Moreover, the groundwater in the area is brackish and will not be used for human consumption.

The proposed park expansion and golf course are also expected to have no adverse effect on the area's nearshore marine waters. In the unlikely event that lawn chemicals do leach to groundwater during winter rains, the dilution and dispersion that would occur during groundwater flow through the buffer area (3,200 feet wide) between the golf course and the shoreline would likely reduce the concentration of applied chemicals so no significant impact on nearshore marine waters would result.

Surface runoff of golf course turf management chemicals is also not expected to have any negative effect on the nearshore waters. The wide buffer area between the golf course and shoreline is intended to provide a large absorption field during periods of light to moderate showers. When heavy runoff occurs, it will be diluted by water originating mauka of the facility, further reducing the likelihood of significant concentrations of nitrate or pesticides reaching the ocean in runoff water.

Table 3-6 Approximate Pesticide Use for an 18-Hole Golf Course in Hawaii

Turfgrass	Area (acres)	Chemical	Frequency (times/year)	Annual Total (lb(ai))
Herbicides:				
Greens	3	MSMA	6	36
		Bensulide	2	72
Tees	3	MSMA	6	36
		Trimec®	3	9 pints
		Bensulide	2	72
Fairways	50	MSMA	6	600
		Trimec®	3	19 gallons
		metribuzin	2	75
Roughs	30	MSMA	2	144
		metribuzin	1	18
Insecticides:				
Greens	3	chlorphyrifos	AN	18
Tees	3	chlorphyrifos	AN	18
Fairways	Spot Treatment	chlorphyrifos	AN	50
Fungicides:				
Greens	3	metalaxyl	AN	25
		chlorothalonil	AN	72
Tees	3	metalaxyl	AN	25
		chlorothalonil	AN	72
Fairways	Spot Treatment	chlorothalonil	AN	250

Notes: lb = pounds AN = as needed ai = active ingredient

Although the Murdoch and Green study concluded that the proposed park expansion, including the golf course, is not expected to have any adverse impact on the area's groundwater and nearshore water quality, mitigative measures could still be employed as additional precaution. The study suggested that well-managed irrigation will reduce the likelihood of groundwater recharge from turf irrigation. Also suggested was the use of adequate depth of surface or top soil on the golf course, use of slow-release nitrogen fertilizers, selection of pesticides that are effective against the pests but are not likely to move from the site of application, and implementation of integrated pest management. All of these management practices should be overseen by a well qualified golf course superintendent.

3.7.3 Natural Marine Hazards/Water Safety

3.7.3.1 Existing Conditions

3.7.3.1.1 Rocky Shoreline

The rocky portions of the shoreline can pose a danger to beachgoers who climb the rocks or walk too close to the rocky ledges. The area is frequently used by fishermen, hikers, explorers, and persons with a shoreline destination. An unimproved trail currently follows the makai property line, but it is not always clearly defined especially over rocky areas. Travelers wandering off the trail may place themselves in danger.

3.7.3.1.2 Rip Currents

Wave currents in Hapuna Bay are very active, especially during the winter months. Nearshore water conditions during this period tend to be ideal for rip currents, which occur when incoming sets of waves move large volumes of water into the bay area. As the overall volume of this water begins to build, it starts to flow laterally along the shoreline and subsequently out to sea. The outward rush of water is the danger that is posed on inexperienced swimmers, who tend to exhaust themselves in an attempt to swim back to shore against the current.

Shorebreaks of four feet or higher could also present a problem. Inexperienced swimmers could be unaware of the considerable downward force of water when it breaks on the beach. The heavy force could render a swimmer helpless after being shoved to the ocean bottom, suffering a loss of breath, and being disoriented.

Undertows are often associated with heavy shorebreaks on steeply sloped beaches. The backwash from a wave can pick up significant speed as it flows back into the ocean, and a swimmer would feel as if he or she is being pulled under the water as another wave is breaking over the swimmer.

3.7.3.1.3 High Surf/Storm Swells

The land mass of the Big Island and neighboring islands to the northwest provide substantial shielding from the North Pacific swells, limiting the direct wave exposure on Hapuna Bay to the sector of the bay bearing the 225 to 300 degrees direction. With this confined exposure, only relatively small segments of the northern swells, as well as the Kona storm waves, can reach the bay without significant loss of height and energy.

Data on actual waves off Hapuna are not available, but hindcasting and wave measurements done for the Ocean Thermal Energy Conversion (OTEC) cold water pipe testing program off Keahole Point provide information that is reasonably indicative of prevailing conditions. In reviewing the OTEC measurements, wave heights of less than two feet occurred 47 percent of the time, wave heights less than four feet occurred 94 percent of the time, and higher waves occurred 6 percent of the time. Wave periods were generally less than 12 seconds (Edward K. Noda and Associates, 1986). Conditions at Hapuna are

expected to be even calmer than Keahole Point, which has a wider exposure to both the north and south.

Storm waves approach Hapuna Bay on occasion in the winter and very infrequently in other seasons. The height and frequency of occurrence, as listed in previous studies of the Kona coast, are summarized in Table 3-7. North Pacific swells from the west-northwest are considerably more significant than Kona storm waves. Their expected heights for a given recurrence interval are greater, and their localized effects of refraction have more impact than for Kona storm waves.

Table 3-7 Summary of Storm Wave Heights and Frequencies of Occurrence – West Hawaii

	Evans-Hamilton, Inc. (undated)		Sea Engineering (1984)		Rocheleau (1977)
Return Period (years)	WNW Swells (Feet)	Kona Storm (Feet)	WNW Swells (Feet)	Kona Storm (Feet)	All Deepwater Waves (Feet)
2	17.0	10.2	10 to 15		15.7
10	19.7	13.1	20 to 25		25.2
25	21.6	14.8	25 to 30	17.0	33.0
50	22.6	16.2	30 +		33.0
100	23.8	17.5	—		36.5

The high surf caused by winter storms poses a serious hazard at Hapuna Bay. As high surf strikes the beach, dangerous shorebreak waves and extremely fast flowing, shifting rip currents are generated, as described in the above section. Beach erosion also occurs, but buildings and structures located farther mauka are generally not damaged.

3.7.3.1.4 Tsunamis

Tsunami inundation is a potential hazard that has affected different parts of the Hawaii island shoreline. It is generated when an abrupt movement of the ocean floor displaces a large mass of water—such as when an earthquake occurs. It can originate from remote areas such as the Pacific Rim countries. Should that be the case, Hawaii's early warning system will provide ample warning to Hawaii's populace of any forthcoming tsunami.

Earthquakes have also occurred at closer range, especially around the Island of Hawaii itself. Rarely, however, are significant tsunamis generated as a result of a local quake.

The maximum recorded height reached by a tsunami in the Hawaiian Islands was 53 to 56 feet (Tilling et al., 1976). About 50 tsunamis have been reported around the state since the early nineteenth century (Macdonald et al., 1947).

In a report by Loomis (1976), tsunami inundation on Hawaii's shorelines were reported for 1946, 1952, 1957, 1960, and 1964. According to the Pacific Tsunami Warning Center of the National Weather Service, there were no major tsunamis after 1964 that caused property damages on the Big Island. Data on the nearest runup to the project site were recorded at Waiulaula Point and Kawaihae which are approximately 2.5 to 3 miles north of Hapuna Bay. At Waiulaula Point, the highest inundation occurred in 1946, with a runup to the 10-foot elevation mean sea level (MSL). At Kawaihae, the highest inundation reached the 12-foot elevation.

The Flood Insurance Rate Map for the area, prepared by the Federal Emergency Management Agency (FEMA) shows a coastal high hazard area (Zone VE)[1] along Hapuna Beach, Wailea Beach, and portions of the rocky shoreline. At Hapuna Beach, a 100-year coastal flood would extend approximately 100 feet inland and have a base flood elevation of about 8 feet (elevation based on the National Geodetic Vertical Datum of 1929). At Wailua Beach, a potential coastal flood would extend about 200 feet inland and have also an 8-foot base flood elevation. These coastal flood zones are below any proposed park structures and are not expected to result in any severe property damage. Existing residences behind Wailea Bay, however, may be subject to damage from tsunami inundation.

3.7.3.2 Potential Impacts and Proposed Mitigation

Although Hapuna is blessed with a beautiful beach, there are natural hazards that pose a threat to human life and safety. With increased use of the beach and rocky shoreline area, the frequency of accidents, mishaps or emergencies are expected to correspondingly increase.

With the operations of the park expansion, a safety awareness program will be implemented. Park personnel and lifeguards will provide assistance where they can, but a safety awareness program would also be beneficial. An information desk at the park headquarters can provide literature on park amenities as well as danger spots. Warning signs will be posted at hazardous areas, and for impending tsunamis, warning sirens will be sounded to notify park users to take necessary precautions. Necessary upgrades in the siren system may be required as development continues to occur in the South Kohala coastal region.

Mitigative measures could also be provided through design. Park features will be constructed to withstand natural hazards such as high surf and tsunami inundation. Park facility designs will comply with local building codes that incorporate hazardous condition considerations.

[1] Zone VE is defined as special flood hazard areas along coasts subject to inundation by a 100-year flood with additional hazards due to velocity (wave action). Mandatory flood insurance purchase requirements apply.

3.8 BIRDS AND WILDLIFE

3.8.1 Existing Conditions

A number of avifauna and feral mammal studies have been conducted in the South Kohala coastal area over the past 15 years. The closest study to the Hapuna Beach State Recreation Area was conducted in 1984 by biologist Phillip Bruner for the Hapuna Beach Prince Hotel property. Because the resort property is very similar to the project site in terms of vegetation, topography, landforms, and climate, the findings in the 1984 study are representative of the project site.

The most abundant species found mauka of the highway was the Japanese quail (*Coturnix japonica*). The extensive open grasslands provide a very suitable habitat for the quail. Also found were mourning doves (*Zenaidura macroura*) and a single short-eared owl or pueo (*Asio flammeus sandwichensis*).

In the makai land below the highway, zebra dove (*Geopelia striata*), warbling silverbill (*Lonchura malabarica*), gray francolin (*Francolinus pondicerianus*), and spotted dove (*Streptopelia chinensis*) were common. The exposed offshore shelf of the rocky shoreline, particularly at low tide, is an important foraging site for the Pacific golden plover (*Pluvialis fulva*), wandering tattler (*Heteroscelus incanus*), and ruddy turnstone (*Arenaria interpres*). None of these species, however, were recorded during the survey.

The Indian mongoose (*Herpestes auropunctatus*) is the most common mammal in the area. Feral cats (*Felis catus*) have been recorded along the South Kohala coast, and the endangered Hawaiian hoary bat (*Lasiurus cinerus semotus*) has occurred on the Island of Hawaii and may frequent the coastal lands. None, however, have been sighted over the project area and none have been reported in the vicinity since a dead specimen was found several years ago on the grounds of The Royal Waikoloan site, about 5 miles from the park property. Most sightings of the hoary bat have been recorded in Hilo and in the relatively wet forests of the island's upland elevations.

3.8.2 Potential Impacts and Proposed Mitigation

The project area is a habitat for a wide range of species. With construction of the park expansion and golf course, the Pacific golden plover is expected to increase in numbers, especially on the short, grassy areas of the expanded park and golf course fairways. Other species expected to increase in numbers are the house sparrow (*Passer domesticus*), northern cardinal (*Cardinalis cardinalis*), common myna (*Acridotheres tristis*), and Japanese white-eye (*Zosterops japonicus*). These low-land urban species tend to favor the wetter habitats that are created by irrigated grass areas. Conversely, the proposed project is expected to decrease the population of gray francolin, Japanese quail (*Coturnix japonica*), zebra dove, and warbling silverbill.

Other wildlife species including mongoose and feral cats would stray away from the project site. The surrounding coastal plain and mauka land are similar in environmental characteristics as the park expansion site. These faunal species are very mobile and are expected to readily inhabit the vast undeveloped adjacent areas.

No mitigation of project impacts is required.

3.9 TERRESTRIAL FLORA

3.9.1 Existing Conditions

A botanical survey of the project site was conducted by Char & Associates from December 27 to 30, 1993 (Appendix F). The objective of the survey was to: (1) describe the major vegetation types; (2) inventory the flora; (3) search for threatened and endangered species, as well as rare and vulnerable plants; (4) identify areas of potential environmental problems or concerns resulting from development of the property; and (5) propose appropriate mitigation measures.

The survey used a walk-through method and involved four botanists. No detailed survey was conducted through improved or landscaped areas of existing park and residential areas. The survey was conducted during the rainy season; slight variations in the species inventory, especially in the weedy, annual plant variety, are anticipated in other seasons of the year.

The property can be classified by three general vegetation types. The first type, coastal groundcover, occurs behind the sand and cobble beaches and on rocky headlands. Species that were recorded in the area include buffel grass, alena, hairy merremia vines, Australian saltbush, bristly foxtail grass, 'ilima, West Indian beggar's tick, 'ihi, 'aheahea or 'aweoweo shrubs, kipukai or nena, and pa'u o hi'iaka. The predominant tree is the kiawe. Branches of this tree interlock with each other, forming a canopy cover greater than 60 percent of the area. Other tree species include ironwood, tree heliotrope, kou, and milo.

Grassland vegetation comprises the second vegetation type on the property. This area is generally characterized as wide open with low clumps of grass and scattered small trees. The predominant species, buffelgrass, covers approximately 50 to 60 percent of the property. The remainder of the area is barren with stony soil conditions. Widely scattered throughout the grassland are kiawe and other less predominant species including: 'uhaloa, 'ilima, hairy spurge, pa'u o hi'iaka, hairy merremia, fountain grass, swollen fingergrass, threadstem carpetweed, graceful spurge, Cuba jute, *Chamaesyce hyssopifolia*, pili grass, and *Eragrostis atropioides*.

Gulch vegetation comprises the third vegetation type. It includes species found in a particular large gulch near the southern boundary of the property. This gulch has some seeps and small pools of water. At the time of the survey, a few guppies were found in the pools. The makai segment of the gulch, which is known to dry out quickly, is covered by buffel grass, as are the other gulches on the property. In the seeps and small pool areas, the damp gulch bottom consists of woodfern, pteris, hairy sword fern, maiden-hair fern, kumu-niu or 'iwa'iwa, kili'o'opu, *Galinsoga parviflora*, guava, pualele, cocklebur, and peppergrass.

A total of 73 species were inventoried on the property. Sixty-one are introduced or alien species, one is originally of Polynesian introduction, and 11 are native. Of the native

species, seven are indigenous and four are endemic. None of the plants are listed threatened or endangered, nor are they proposed or candidate for such status.

Although the endangered ko'oloa'ula (*Abutilon menziesii*) is known from the nearby Nansay Hawaii Puako property, none was found on the project site. Additionally, the candidate endangered pololei fern *(Ophioglossum concinnum)*, which is known to occur on nearby lands at Pu'u o Kohala and Mauna Lani Resort, has been reclassified to a common *Ophioglossum polyphyllum* complex. It has been removed from the U.S. Fish and Wildlife Service—Proposed Endangered Species List.

3.9.2 Potential Impacts and Proposed Mitigation

Construction will result in selective clearing of existing vegetation in the park expansion area and extensive but also selective clearing in the golf course area. In the park expansion area, clearing will only be required in the camp sites, picnic areas, headquarters, pedestrian paths, access roads, and parking areas. The vast majority of the expansion area will be maintained in its natural condition. Cleared areas will be re-landscaped with hearty new plants and furnished with an irrigation system.

Chapter 103-24.6, HRS, enacted by the Hawaii State Legislature in 1992, mandates that any new or renovated landscape for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants wherever and whenever possible. The botanical study notes that the use of native plants on the property would take little effort. Native plants found in the area are already adapted to the local environment and require little water and maintenance. Some of these species, in addition to Polynesian introduced or Polynesian heritage plants, consist of pa'u o Hi'iaka, milo, kou, 'ulei, coconut, hau, beach morning-glory, and beach naupaka. Other species which may be incorporated with the park landscaping include wiliwili, pohinahina, a'ali'i, false sandalwood, 'akia, and nehe.

The areas cleared for golf course construction will also be revegetated. There will be opportunities to use native plants on the fairways, roughs and grounds of the clubhouse. As part of the turf and golf clubhouse landscaping, an irrigation system will be installed.

3.10 CULTURAL RESOURCES

3.10.1 Existing Conditions

Since 1990, Paul H. Rosendahl, Ph.D., Inc. has conducted a three-phased archaeological inventory survey of the project site (Appendix G). Phase I of the survey, undertaken in 1990, involved initial site identification field work. Phase II was conducted in 1992 and involved completion of the inventory-level field work at those sites which required additional evaluation and documentation. And finally, Phase III was completed in 1994 and involved analysis of all recovered cultural materials, including site and feature distributions, as well as a description and analysis of recovered portable cultural material and ecofactual[2] remains.

[2] A material or object not made by man but used by man.

The basic objectives of the inventory survey were: (1) to identify (find and locate) all sites and site complexes present within the project area; (2) to evaluate the potential general significance of all identified archaeological remains; (3) to determine the possible impacts of the proposed park expansion upon the identified remains; and (4) to define the general scope of subsequent data collection and/or other mitigation work that might be necessary or appropriate. All aspects of the inventory survey were conducted in accordance with the standards for inventory-level survey recommended by the State Historic Preservation Division (SHPD), Department of Land and Natural Resources.

A total of 259 sites and site complexes containing an estimated 627 component features were identified during the Phase I survey work (Figure 3-7). The features can be divided into an indigenous group and non-indigenous group. As inferred by PHRI's data, the predominant functional activities represented in the indigenous group appeared to include temporary habitation, agriculture, long-term habitation, and transportation. Obviously, exploitation of the area's marine resources, coupled with agricultural activity within gulch areas, while operating from both permanently occupied feature complexes as well as temporarily occupied sites, represented important activities for native Hawaiian occupants of the region.

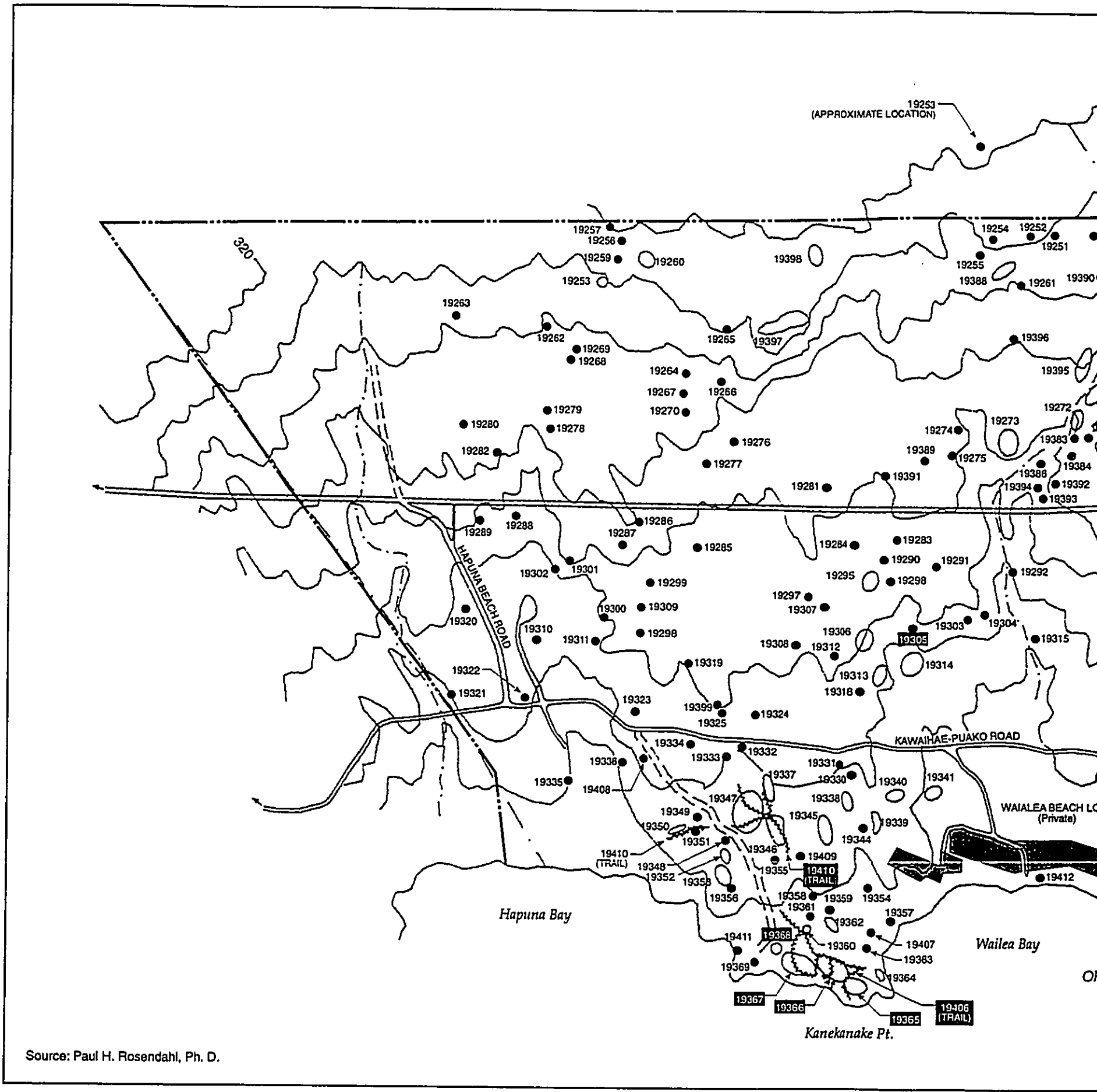
In a historical documentary research report by Kepa Maly for Paul H. Rosendahl, a *descriptive overview of settlement patterns and cultural practices in the Hapuna - Wailea* area was provided (see Appendix G). The report presents a compilation of information from recently translated Hawaiian legends, Land Commission Award records and previous archaeological or ethnographic studies. It looks into the stories and legends surrounding the people connected with the place names of the project area.

There were several accounts specifically of Lalamilo and Puako whose lives together were legendary for finding the sacred lure that enabled Lalamilo to catch an endless supply of octopus.

The report indicated that recent archaeological studies provide evidence that the initial settlement in the Anaehoomalu to Hapuna area occurred as early as about 1200 A.D. These studies also tell us that fishing was an important occupation for residents in the coastal area and extensive agriculture was the main activity for residents in the upland areas. Many accounts tell of the trading of food resources between the upland families and coastal communities.

After the death of King Kamehameha I in 1819, American missionaries arrived in the Hawaiian Islands. Upon reaching the Big Island, missionary William Ellis described Puako as a "considerable village". A number of years later, another Christian minister, Lorenzo Lyon, arrived on the island. He replaced Reverend Dwight Baldwin as minister at Waimea.

Around the 1840s, Lyon estimated the population of Kawaihae-Puako to be approximately 734. In 1859, Lyon completed a church at Puako. Lyon described Puako as a place on the shore that is very much like Kawaihae, but larger. It has a small harbor in which native vessels anchor. There are coconut groves that give the area a verdant aspect. There is, however, no food that is grown. People in the village instead make salt and catch



Source: Paul H. Rosendahl, Ph. D.

0 500 1000 2000

SCALE IN FEET

NORTH

Belt Collins Hawaii

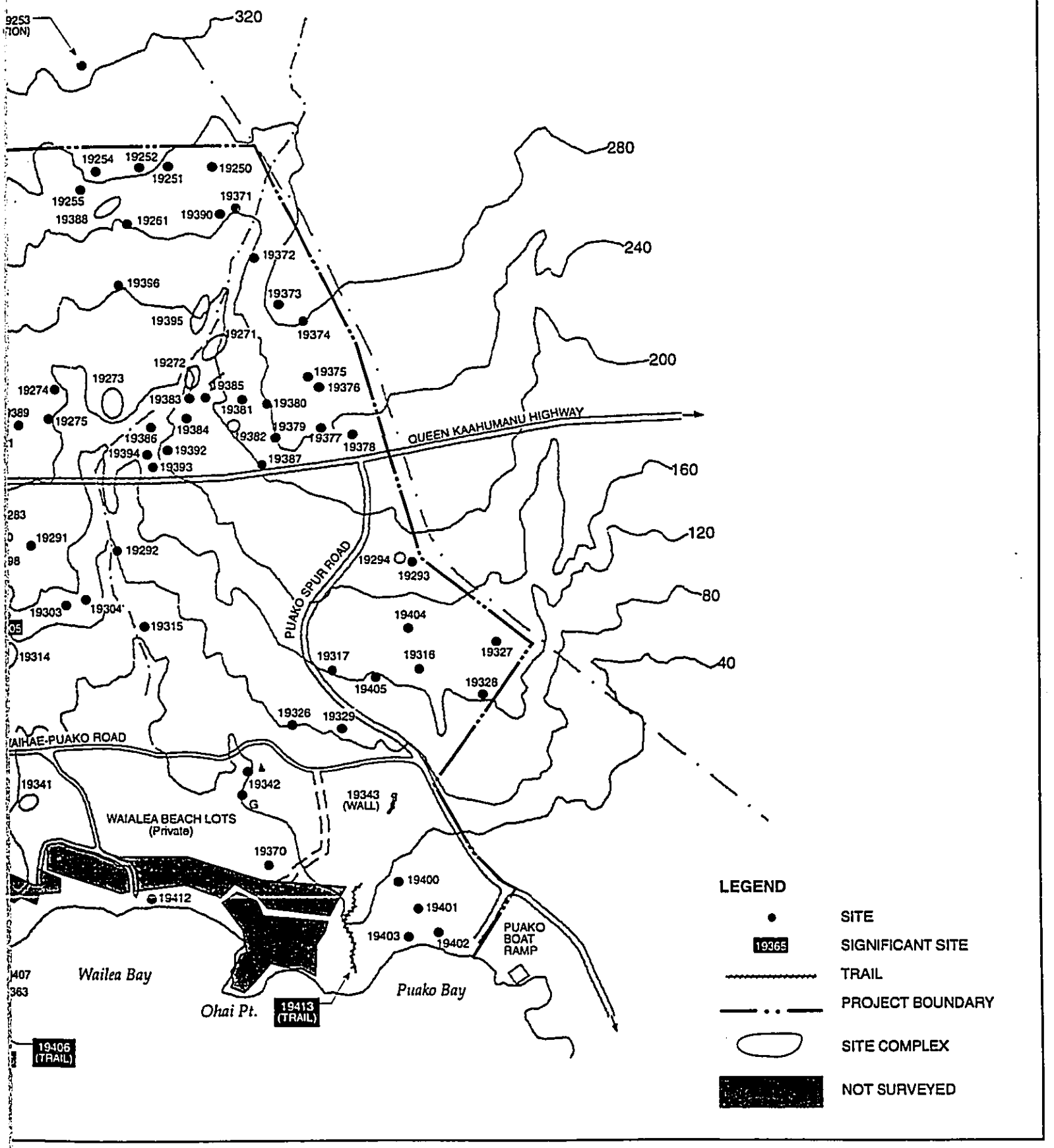


Figure 3-7
Hapuna Beach State Recreation Area Expansion
ARCHAEOLOGICAL SITES

fish. These are exchanged for vegetables grown elsewhere. Later accounts tell that sweet potato patches were developed in the region.

After the Great Mahele, land ownership was opened not only to native Hawaiian commoners, but also to foreigners including business interests, primarily American. This set the stage for the full development of a variety of businesses, including Hawaii's sugar industry. Interestingly, sugar was tried in the Puako area but without success. Later other crops were tried including alfalfa.

Although not described in the Kepa Maly report, Hapuna was also used for military exercise. Evidences of military training activity are found on the coastal plain. Today, Hapuna - Wailea is an undeveloped area which sits behind an active recreation area used by residents and visitors alike for shoreline and ocean activities.

At the conclusion of PHRI's Phase I study, it was determined that none of the sites or features are considered extraordinarily significant. During the Phase II work, the number of identified sites on the property was reduced to 164 with an estimated 425 component features. This was the result of a reinvestigation of the archaeological sites which showed that 13 of the original 259 sites were determined to be located outside of the project area, 30 were determined to be either wholly contemporary hunting blinds or other recreational-related features, and 95 were either not relocated, were reinvestigated and determined not to be cultural features, or had been destroyed during the interval between Phase I and Phase II field survey works. Of the remaining 164 sites, 121 sites were originally identified in the Phase I field work, and 43 sites were newly identified and were recorded during the Phase II field survey work.

3.10.2 Study Findings and Recommendations

Of the 164 sites identified and recorded within the project site, eight are considered culturally significant and require some level of preservation and further study. The other 156 sites are assessed to be significant or potentially significant solely for information content. Documentation for 138 of the 156 sites is considered sufficient and no further archaeological data collection is warranted; the remaining 18 of the 156 sites are recommended for further data collection/recovery work. The eight sites that are considered culturally significant require additional data recovery work followed by some level of preservation with interpretive development. These sites consist of four coastal complex sites, three trails/trail segments and one modified outcrop.

Table 3-8 provides a summary of PHRI's recommendations for the eight sites that require additional archaeological work. Of these sites, one will not be affected by development. Three others are historic trails that will be included in the park pedestrian pathway system. The remaining four sites located near the shoreline at Kanekanaka Point will be preserved as recommended.

Table 3-8 Summary of General Significance Assessments and Recommended General Treatments for Eight (8) Significant Sites

¤SIHP	Significance Category				Recommended Treatment			
Site No.	*A*	*X*	*B*	*C*	*FDC*	*NFW*	*PID*	*PAI*
19406	X		X		X			
19410	X		X		X			
19413	X		X		X			
19367	X		X		X		X	
19368	X		X		X		X	
19365	X		X	X	X		X	ø
19366	X		X	X	X		X	
19305	X			ø	X		ø	

General Significance Categories:

A = Important for information content, further data collection necessary (PHRI = research value)
X = Important for information content, no further data collection necessary (PHRI = research value, SHPO = not significant)
B = Excellent example of site type at local, region, island, State, or National level (PHRI = interpretive value); and
C = Culturally significant (PHRI = cultural value)

Recommended General Treatments:

FDC = Further data collection necessary (detailed recording, surface collection, and limited excavations, and possibly subsequent data recovery/mitigation excavations);
NFW = No further work of any kind necessary, sufficient data collected archaeological clearance recommended, no preservation potential;
PID = Preservation with some level of interpretive development recommended (including appropriate related data recovery work);
PAI = Preservation "as is," with no further work (and possible inclusion into landscaping), or possibly minimal further data collection necessary.

¤ State Inventory of Historic Places (SIHP) numbers. SIHP numbers are five-digit numbers prefixed by 50-10-82 (50 = State of Hawaii; 10 = Island of Hawaii; 82 = USGS 7.5' series quad map ["Pu'u Hinai, Hawaii"]).

ø Provisional assessment; definite assessment pending completion of further data collection.

PHRI's recommended general treatments for the above sites will provide for the necessary mitigation of potential project impacts as well as establish appropriate preservation procedures for significant sites. Thus, the next phase of the archaeological work is the implementation of data recovery and recommended general treatments. This should be undertaken prior to any development on the property and should be coordinated with the SHPD.

Alternatively, State Parks Division will avoid impacts to significant sites by modifying plans during final design so no improvements are located near these culture features. Since all of the sites which have been specifically recommended for interpretative development are located near Kanekanaka Point, an archaeological preserve is proposed for the area. Interpretative signs, a connecting pathway to the different sites, and other provisions will be coordinated with the SHPD.

In a memorandum, dated August 29, 1996, SHPD indicated that it had reviewed the archaeological report prepared by PHRI and that revisions will be required. In a subsequent meeting on January 15, 1998, attended by State Parks Division, SHPD, PHRI, then DLNR-Water and Land Development Division and the project consultant, it was agreed that revisions would indeed be required for the study to meet minimal standards of an acceptable archaeological inventory survey.

In the spirit of moving forward with the project and with the resolution that the revisions will be made, it was agreed that PHRI's archaeological report could be used in a planning or environmental document (EIS or EA), but it would not be represented, at this time, as an acceptable or complete inventory survey report. It is noted that PHRI's present study does include, however, important information on the historic sites in the area and would be useful for planning purposes.

In the future, when specific areas are actually scheduled for development and such development could impact historic sites, the survey study will be upgraded for the relevant area and will address SHPD's previous comments. After the study is upgraded, mitigation measures will be undertaken as approved by SHPD.

Also, as part of the agreement, copies of the survey's field notes, maps, photographs, etc., would be provided to DLNR, and upon SHPD's request, these documents would be given to SHPD for its statewide inventory records. The public, consequently, would have access to these documents through SHPD's resource library.

3.11 SOCIOECONOMIC ENVIRONMENT

3.11.1 Economic Assessment

3.11.1.1 Overview

The South Kohala and North Kona Districts are part of the West Hawaii region that consists of a wide variety of economic activities, including tourism, agriculture, ranching, high technology ventures, support services, retail and wholesale enterprises, shipping, and construction. Of these, tourism is the largest industry in the state and its presence in the region is primarily due to the resort projects that have been developed in South Kohala since the 1960s.

Sugar production has closed down in the region and diversified agriculture, including coffee and macadamia nut production, has increased, as has the production of vegetable crops. Ranching continues to be an important industry, particularly in North and South Kohala, and high technology ventures, including astronomy on Mauna Kea and ocean

science and natural energy research at Keahole Point, are providing new opportunities in the local economy.

Kailua-Kona is the commercial hub of West Hawaii. It is the region's largest population center with a population of more than 9,100 (1990 U.S. Census). Large retailers, business offices, government satellite offices, and numerous support services mixed with resort facilities make this a popular stopping point or destination for residents and visitors alike. Waimea is the second largest town (pop. 5,900) in West Hawaii and is located at the crossroads of the South Kohala, North Kohala, and Hamakua Districts. Originally an old ranching village, it has become a mix of residential and commercial uses, business enterprises, and public facilities.

Kawaihae Harbor is a deep-water port that provides facilities for shipping and cargo transportation. In 1993, Kawaihae Harbor handled more than 655,000 short tons of cargo (Data Book, 1995). The harbor receives and ships general cargo, including lava cinders, petroleum product, and bulk fertilizers.

Tourism has developed into a major industry on the island. Since statehood and the introduction of jet service to Keahole, West Hawaii has hosted an increasing number of visitors. Kailua-Kona and its neighboring North Kona District have especially responded by accelerating growth in visitor accommodations and facilities. This growth has fueled a building boom that spread to South Kohala in the late 1970s. Today, Kailua-Kona, as a visitor destination area, is joined by Keauhou, Hualalai, and Kaupulehu in North Kona, and Mauna Kea Resort, Mauna Lani Resort, and Waikoloa Beach Resort in South Kohala.

Each of these resorts have or will have hotels, resort residential homes, golf courses, and shopping villages.

3.11.1.2 Existing Conditions

Employment

Hapuna Beach State Recreation Area currently employs a staff of seven workers, including three caretakers, two lifeguards, and two concessionaire attendants. The three park caretaker positions are full-time State positions of which one is currently vacant. The lifeguards and concessionaire attendants are on contract with the State.

Revenues

An economic and financial analysis was conducted on the park existing users as well as for the proposed action by Pedersen Planning Consultants in April 1995 (see Appendix A). It notes that existing cabin or shelter user fees are $15 per night. These fees have been increased recently to $20 per night. Assuming an average occupancy rate of three cabins per night, the park would generate about $21,900 in annual revenue.

From an economic perspective, there would be a direct benefit gained from the public's enjoyment of accessible shoreline and ocean recreation. Pedersen's analysis attached a

dollar value to this benefit and combined it with revenues generated by user fees to arrive at a total direct annual benefit of $3.3 million.

Indirect economic benefits to the local economy, however, are more significant via consumer expenditures in the local and state economies. Almost every resident and visitor arriving at Hapuna Beach spends money for the purchase of gasoline, convenience food items or other prepared food brought to the beach. They may have also purchased recreational equipment for their outings. Overall, these purchases are estimated to generate currently about $10.3 million annually in the statewide economy.

3.11.1.3 Potential Impacts

The proposed project is expected to have little impact on the growth of visitor arrivals to West Hawaii or the growth of the regional economy, but would provide residents and visitors alike with a much needed recreational amenity. Through its indirect impacts, the proposed project would contribute more to the diversification of the local economy as well as enhance South Kohala and North Kona as a support area for regional population growth and visitor industry development.

Future Employment and Income

The proposed project will generate both short-term and long-term impacts in the community. Short-term impacts would include temporary employment in the construction industry, increased personal income, and increased tax revenues for the local government. Long-term impacts would include permanent employment for the park and golf course staff, increased personal income, and increased tax revenues.

Construction and operation of the proposed project will provide direct, indirect, and induced employment. During construction, direct employment would include the construction workers, while indirect employment would include jobs in companies supplying materials and services needed to construct the project. Induced employment would include the additional jobs created throughout the economy when construction employees and proprietors of supply companies spend their wages and salaries in the community. When indirect and induced employment are added to direct employment, the effect on the economy is magnified—for each job created or mobilized at the project site, one or more jobs are created elsewhere.

It is anticipated that the proposed park improvements would require mobilization of approximately 25 to 28 jobs in the construction industry. Additionally, as indicated above, the multiplier effect would generate or impact about 40 to 44 other jobs in the local economy.

Labor income in the form of wages and salaries received by those filling the construction jobs represents personal income of up to approximately $18 to $20 million.

Long-term employment is expected to be generated during the operational stage of the park. The staff positions that are recommended by the planning consultants for the park

expansion include park managers, administration staff, and maintenance personnel, some of whom would be part-time. There would also be concessionaire attendants.

At the proposed golf course, the clubhouse will be staffed by a golf pro, pro shop personnel, restaurant employees, golf course grounds crew, and golf cart and golf bag handlers. A breakdown of the recommended park employees is provided in Table 3-9.

Table 3-9 Recommended Employment at Hapuna Beach State Recreation Area

BEACH PARK	NUMBER OF POSITIONS
Program Management:	
Park Superintendent	1
Park Manager	3
Resources and Security Personnel*	8
Clerk	2
Water Safety Director	1
Lifeguard	3
Maintenance:	
Park Maintenance Supervisor	1
Mechanic**	1
Carpenter**	1
Plumber**	1
Equipment Operator	1
Caretaker	8
GOLF COURSE	**NUMBER OF POSITIONS**
Management:	
Golf Pro***	1
Assistant Golf Pro***	1
Office Administration***	3
Mechanic***	2
Cart Assistant***	2
Restaurant Staff***	10
Maintenance:	
Golf Course Superintendent***	1
Assistant Superintendent***	1
Mechanic***	2
Groundskeepers***	16

* These positions are filled by park technicians and Division of Conservation and Resources Enforcement (DOCARE) personnel.
** These positions are filled by regional workers who will have responsibility for neighboring parks.
*** These positions may be filled by a private contractor under an agreement with the State.

The total income generated by employees of the Hapuna Beach State Recreational Area Expansion would be approximately $2.0 million annually by 2015 (Table 3-10).

Table 3-10 Annual Income of Expansion Park Employees by Year 2015

Expansion	Annual Income
Park Expansion	
Program Management	$617,000
Maintenance Staff	375,000
Golf Course	
Pro Shop Management	455,000
Maintenance Staff	599,000
TOTAL	$2,046,000

Future Tax Revenues

Based on Tax Foundation of Hawaii data, it is estimated that about 13 percent of personal income is paid by Hawaii households to both State and County governments for general excise taxes on retail sales, fuel taxes, property taxes, and income taxes. Applying this percentage factor to the personal income generated by the project construction ($18 to $20 million), the result is about $2.3 to $2.6 million in tax revenues.

For income generated by long-term employment, the total personal income taxes paid to State and County governments is about $266,000.

Future Park Revenues

In Pedersen's economic and financial analysis, a summary of the direct and indirect economic benefits to the Big Island economy is discussed and provided below (see also Table 3-11).

Table 3-11 Summary of Direct and Indirect Economic Benefits to the Big Island by Year 2015

Park Expansion Activity	Direct Benefits	Indirect Benefits	Total
Camping	$356,000	$1,771,000	$2,127,000
Beach Activities	4,393,000	13,881,000	18,274,000
Golf Activities	4,948,000	2,246,000	7,194,000
Hiking	251,000	—	251,000
TOTAL	$9,948,000	$17,898,000	$27,846,000

Expanded camping opportunities available by the end of 2005 will generate about $286,000 in annual direct economic benefits to the Big Island economy. By 2015, camping benefits will increase to about $356,000. These benefits will result from tent camping user fees generated from beginning in 2005. Indirect benefits from the purchase of food, fuel, and equipment are expected to be greater than the direct benefits. Approximately $1.8 million by 2015 are expected to enter the Big Island economy from these indirect purchases.

Direct economic benefits from the golf course will be derived from green fees, golf cart rentals, driving range user fees, as well as food and beverage and golf supply purchases at the clubhouse. The cumulative direct benefits of these sales will represent about $4.9 million per year by the year 2015. Indirect economic benefits will include local retail sales for various types of golf equipment such as golf clubs, accessories, and clothing. Employment at the new golf course, which is a cost of the project, would also generate other retail and service expenditures within the Big Island economy. No local data are available to assess the significance of these secondary expenditures.

Present State law requires that 20 percent of direct revenues generated on ceded land be conveyed to and for use by the Office of Hawaiian Affairs. Tent or cabin user fees, concession revenues, golf course green fees, golf cart rentals, driving range user fees, as well as pro shop and restaurant sales, will be subject to the 20 percent take. This revenue was not included in the overall benefit and cost analysis of the project, which includes a number of direct and indirect economic benefits, as well as shadow pricing for non-user fee type activities.

Another direct economic benefit of the proposed project will be the enjoyed experience of scenic walks along the coastline. This benefit is assigned an economic value, or shadow price, of $2 per hiker. Based upon the anticipated number of users, hiking opportunities will provide direct benefits valued at about $250,000 in the year 2015.

Project Cost

Based on the construction schedule established in the 1996 DEIS for this project, the overall expansion of the Hapuna Beach State Recreation Area will require the expenditure of almost $40 million in capital expenditures ($16.6 million of which will be privately financed) over a 12- to 13-year construction period or an average of about $3.0 million per year. This expenditure includes the cost of funding the park improvements and golf course construction. Upon completion of all improvements, operations and maintenance expenditures will approximate $4.3 million per year by 2010 and $5.1 million by 2015. Approximately 53 percent of these expenditures would be for the golf course operations and maintenance which may be financed by a private operator. From 1998 through 2015, cumulative capital and operations/maintenance expenditures will be an estimated $77 million (Table 3-12).

The acquisition of private Wailea properties is not being considered at this time, and to date, no specific land acquisition cost has been determined for the properties. Should the Department of Land and Natural Resources consider purchase of the private properties in the future, an estimate of property value would be more appropriate at that time.

Table 3-12 Estimated Capital and Operations/Maintenance Costs Hapuna Beach Park Expansion 1993-2015

Year	Capital Costs	Operations/ Maintenance Golf Course	Operations/ Maintenance Park Area	O/M Total	Total
1993	$ 0	$ 0	$ 0	$ 0	$ 0
1994	0	0	0	0	0
1995	0	0	0	0	0
1996	0	0	0	0	0
1997	0	0	0	0	0
1998	606,414	0	0	0	606,414
1999	627,638	0	0	0	627,638
2000	649,605	0	0	0	649,605
2001	2,309,913	0	0	0	2,309,913
2002	2,390,760	0	0	0	2,390,760
2003	2,474,437	0	0	0	2,474,437
2004	2,561,042	0	0	0	2,561,042
2005	5,015,464	0	1,680,079	1,680,079	6,695,542
2006	5,191,005	0	1,738,881	1,738,881	6,929,886
2007	5,372,690	0	1,799,742	1,799,742	7,172,432
2008	5,560,734	0	1,862,733	1,862,733	7,423,467
2009	5,755,360	0	1,927,929	1,927,929	7,683,289
2010	1,371,132	2,258,204	1,995,406	4,253,611	5,624,743
2011	0	2,337,242	2,065,246	4,402,487	4,402,487
2012	0	2,419,045	2,137,529	4,556,574	4,556,574
2013	0	2,503,712	2,212,343	4,716,054	4,716,054
2014	0	2,591,341	2,289,775	4,881,116	4,881,116
2015	0	2,682,038	2,369,917	5,051,955	5,051,955
	$ 39,886,194*	**$ 14,791,582****	**$ 22,079,580**	**$ 36,871,161**	**$ 76,757,354**

Note: 1993 dollars have been inflated at the rate of 3.5 percent/annum. The total cost indicated by the asterisk includes approximately $16.6 million that would be financed by a private interest(s). The total expenditure indicated by the double asterisk may be financed by a private operator.

Source: Pedersen Planning Consultants, 1995.

As a general indication of land cost, research was conducted on property values at the County Real Property Tax Office. The total value for the 19 properties behind Wailea amounted to about $14 to $16 million. Property improvement costs varied considerably but totaled approximately $3.0 to $3.5 million. These figures were based on assessments made in early 1996.

Net Value of Proposed Project

The cumulative net present value of the project offers a significant positive generation of direct and indirect benefits to the local economy. Overall capital expenditures represent an expense of about $40 million. However, these expenditures will generate direct and indirect retail sales and service fees of about $22.8 million annually by 2015. Using shadow price assignments, it is believed that resident and visitor enjoyment has an additional value of almost $3.8 million per year.

Through the discounting of future benefits and operations/maintenance costs to 1993 dollars, the overall project will generate a positive contribution of about $221 million in cumulative project benefits during the 2001—2015 period (Table 3-13).

3.11.2 Community Attitudes and Concerns

3.11.2.1 Existing Conditions

The Hawaii Island community generally considers Hapuna Beach State Recreation Area as a valuable natural resource and recreation area. Its appreciation for this area was demonstrated in the late 1980s, when a controversial County ballot initiative asked voters whether or not a proposed resort should be built north of the park. Special interest groups on the Island of Hawaii continue to maintain and encourage greater public access to the shoreline. The concerns of these organizations have repeatedly been reflected in testimonies before the Hawaii County Planning Commission and the State Board of Land and Natural Resources (BLNR) on various development applications.

Within the expansion area behind Wailea Beach are homes occupied by part-time and full-time residents. Informal discussions and correspondences with these residents during preparation of the master plan and EIS indicate that the owners are concerned with the potential loss of their lots from future condemnation. They are also concerned about public safety, flooding, over use and maintenance of the area.

On November 20, 1987, the State BLNR authorized the DLNR to acquire all remaining private parcels at Wailea and to incorporate them into the expanded Hapuna Beach State Recreation Area (Figure 3-8). No timetable was set for this acquisition; the Division of State Parks indicated that acquisition would take place as funding becomes available. To date, DLNR has acquired two shoreline parcels for about $1.5 million.

On June 5, 1998 in response to the private landowners' concern and petition, the BLNR rescinded its Order of November 20, 1987 subject to conditions as described in the Preface of this document.

Table 3-13 Net Present Value Analysis Hapuna Beach Park Expansion 1993-2015

Year	Total Direct Benefits	Total Indirect Benefits	Total Benefits	Total Costs	Present Value of Annual Net Benefits	Accumulated Present Value of Annual Net Benefits
1993	$ 3,092,535	$ 9,772,411	$ 12,864,946	$ 0	$ 12,864,946	$ 12,864,946
1994	$ 3,137,345	$ 9,914,010	$ 13,051,355	$ 0	$ 13,051,355	$ 25,916,301
1995	$ 3,181,370	$ 10,053,129	$ 13,234,499	$ 0	$ 13,234,499	$ 39,150,800
1996	$ 3,249,120	$ 10,267,219	$ 13,516,339	$ 0	$ 13,516,339	$ 52,667,139
1997	$ 3,318,695	$ 10,487,076	$ 13,805,771	$ 0	$ 13,805,771	$ 66,472,910
1998	$ 3,389,310	$ 10,710,220	$ 14,099,530	$ 606,414	$ 13,493,116	$ 79,966,026
1999	$ 3,463,055	$ 10,943,254	$ 14,406,309	$ 627,638	$ 13,778,671	$ 93,744,697
2000	$ 3,536,015	$ 11,173,807	$ 14,709,822	$ 649,605	$ 14,060,217	$ 107,804,914
2001	$ 3,587,075	$ 11,335,157	$ 14,922,232	$ 2,309,913	$ 12,612,319	$ 120,417,233
2002	$ 3,638,655	$ 11,498,150	$ 15,136,805	$ 2,390,760	$ 12,746,044	$ 133,163,277
2003	$ 3,690,755	$ 11,662,786	$ 15,353,541	$ 2,474,437	$ 12,879,104	$ 146,042,381
2004	$ 3,742,855	$ 11,827,422	$ 15,570,277	$ 2,561,042	$ 13,009,234	$ 159,051,615
2005	$ 4,306,936	$ 13,444,951	$ 17,751,887	$ 6,695,542	$ 11,056,345	$ 170,107,960
2006	$ 4,372,366	$ 13,656,557	$ 18,028,923	$ 6,929,886	$ 11,099,037	$ 181,206,997
2007	$ 4,435,553	$ 13,852,253	$ 18,287,806	$ 7,172,432	$ 11,116,374	$ 192,322,371
2008	$ 4,501,870	$ 14,066,673	$ 18,568,543	$ 7,423,467	$ 11,145,075	$ 203,467,447
2009	$ 4,569,229	$ 14,282,736	$ 18,851,965	$ 7,683,289	$ 11,168,676	$ 214,636,123
2010	$7,179,425	$ 16,384,559	$ 23,563,984	$ 5,624,743	$ 17,939,241	$ 232,575,363
2011	$ 7,860,013	$ 16,675,854	$ 24,535,867	$ 4,402,487	$ 20,133,380	$ 252,708,743
2012	$ 8,594,522	$ 16,973,226	$ 25,567,748	$ 4,556,574	$ 21,011,173	$ 273,719,917
2013	$ 9,303,501	$ 17,269,928	$ 26,573,429	$ 4,716,054	$ 21,857,375	$ 295,577,292
2014	$ 9,873,244	$ 17,583,712	$ 27,456,955	$ 4,881,116	$ 22,575,839	$ 318,153,131
2015	$ 9,947,212	$ 17,897,583	$ 27,844,794	$ 5,051,955	$ 22,792,839	$ 340,945,970

Note: All annual benefits and costs include a 3.5% annual discount rate.

Source: Pedersen Planning Consultants, 1995.

In recent years, squatting has occurred in the north section of Wailea Beach, and considerable consumption of alcoholic beverages and possible illegal drug use have taken place in the existing parking area. Loud beach parties have been common during nighttime hours.

A number of Wailea residents feel threatened or intimidated by transient users. Associated with these activities have been sanitation problems. There have been cases of people entering unoccupied vacation homes without authorization. The lack of paved access to Wailea Beach has limited County police surveillance in the area; no police vehicles could safely and regularly access the existing dirt trail. In response, Wailea residents purchased and donated a 4-wheel drive vehicle to the County Police Department to facilitate access and surveillance of the beach.

A court decision relating to unencumbered State lands encouraged the Division of Conservation and Resource Enforcement (DOCARE) of DLNR to issue written notices and a related grace period to unauthorized transient beach users in November 1993. The County Police Department indicated that transient beach users have, for the most part, left the beach.

An issue that has been raised by a few members of the community is the use of ceded land for the proposed park expansion. The DLNR has confirmed that the State-owned portion of the park expansion area is ceded land. The State has taken the position that ceded land will not be sold or traded in exchange for other land. Any exception to this policy must be approved by the Chairperson of the Board of Land and Natural Resources. Furthermore, 20 percent of all revenues received from the use of State ceded land must be remitted to the Office of Hawaiian Affairs.

The DLNR has also determined that individuals residing on State land during and prior to development and who have developed a water collection infrastructure on the property have rights to the water. This issue of "gathering rights" is usually treated on a case by case basis.

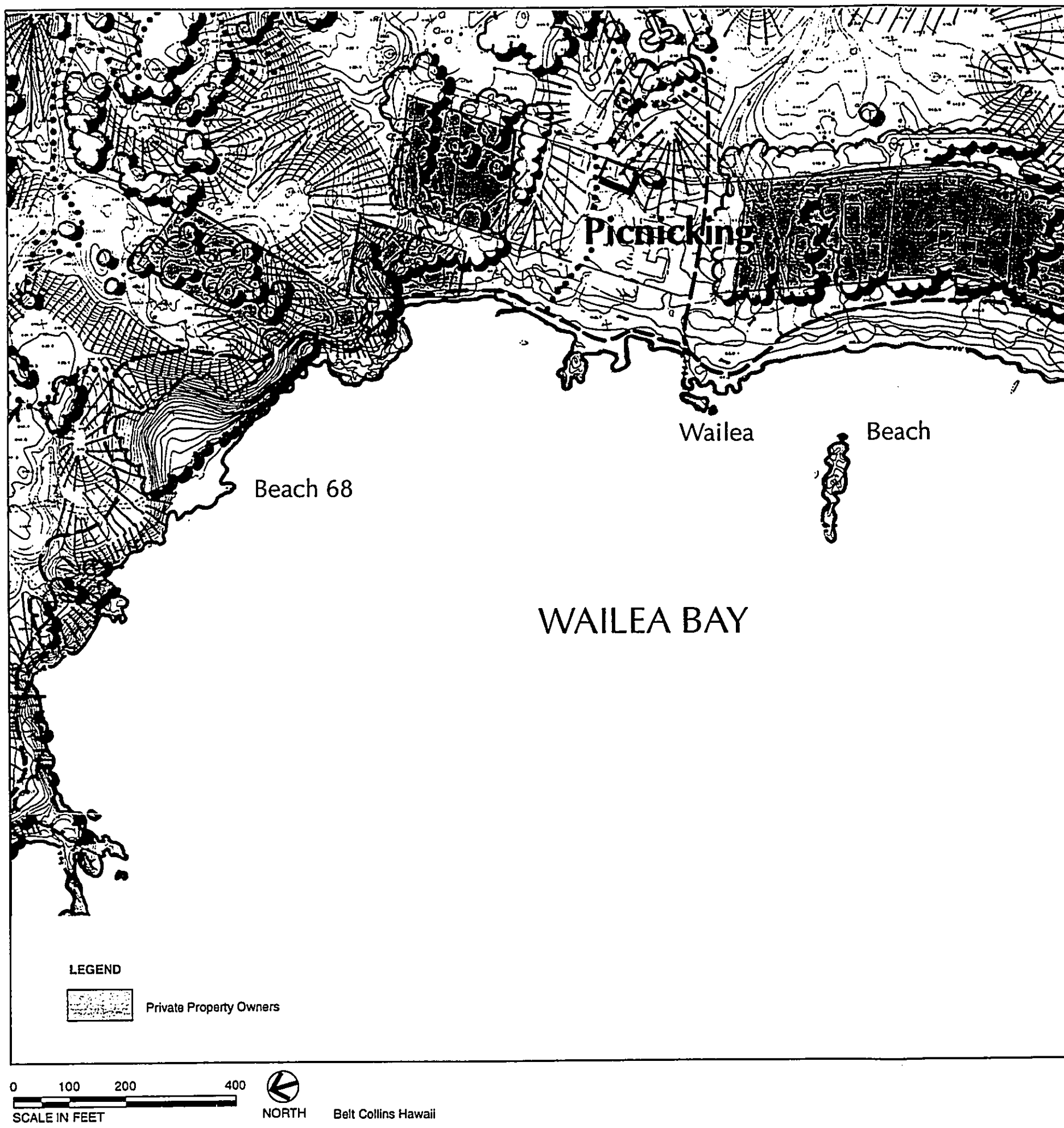
3.11.2.2 Potential Impacts and Proposed Mitigation

Potential Impacts

Project informational meetings held in Waimea on August 4, 1992 and August 22, 1996, informal discussions with area property owners, and comment letters on the EIS Preparation Notice and Draft EIS indicate that residents are concerned about Wailea Beach's capacity to accommodate increased use after the park expansion occurs.

Moreover, the residents anticipate increased litter and the need for increased beach maintenance.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

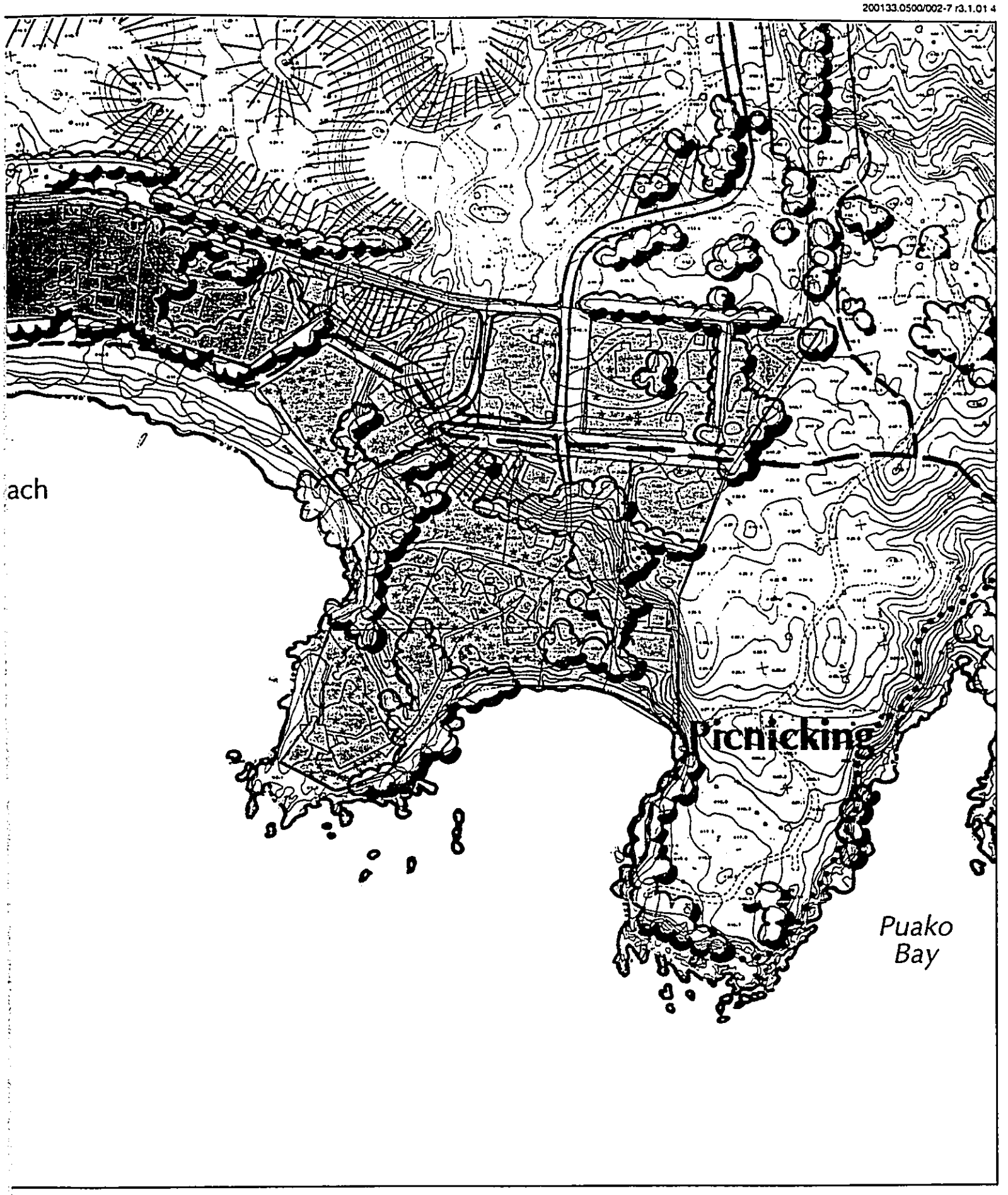


Figure 3-8
Hapuna Beach State Recreation Area Expansion
PRIVATELY-OWNED PARCELS

Public concerns regarding illegal activities and transient use of Wailea Bay have been raised by residents in the community and have been recently addressed by DLNR and the Hawaii County Police Department. If Wailea residents observe a noticeable improvement in behavior at Wailea Beach, it is believed their concerns for public safety will diminish significantly.

Some residents have expressed concerns about potential fire hazards as a result of negligent camp fires. The area above the beach is relatively dry and susceptible to brush fire. There have been at least three in the last ten years. Fire protection measures and County services are discussed in Section 3.13.3.

It has also been pointed out that flooding occurs, although not often, and that further development might aggravate the condition. Existing runoff patterns, potential flood conditions, and proposed drainage improvements are discussed in Section 3.5.

A number of the Wailea property owners have expressed the long-term desire to co-exist with the park expansion. These owners feel their presence behind Wailea Bay would be compatible with park use. For the reasons provided in Chapter 2 of this EIS, the State has indicated, however, that the land is ultimately needed for the expansion of the park facilities.

Other Wailea Bay residents have indicated that there should be a "right to first refusal" in the acquisition process. Under this arrangement, any private properties offered for sale would be offered to the State first. In effect, it would allow the owners to continue to live on the property as long as they do not try to transfer their property to someone else. This would be a disadvantage, however, to the State. It would keep the State's hands tied and deny it the possibility of developing the site in the future when the land is needed. In some cases, the owners may not sell at all. This option would not give the State control over the park implementation process.

The uncertainty concerning the State's acquisition of private properties proved stressful to some community residents, and, consequently, community members filed a petition for deletion of BLNR's Order of November 1987. The petitioners based their request for a declaratory ruling on the grounds that: 1) the 1987 Order was nearly ten years old and the State had not acted on the Order, 2) the 1987 Order was in furtherance of appropriations which had lapsed, and no new funds had been appropriated, 3) BLNR had completed neither the planning nor the EIS and, as such, the 1987 Order was premature, 4) the 1987 Order was inconsistent with the State Recreation Functional Plan which calls for acquisition of undeveloped lands, and 5) the existence of the 1987 Order damages the petitioners by clouding title to and blighting the value of their properties.

The uncertainty was alleviated by the BLNR on June 5, 1998, when BLNR chose to rescind its November 1987 Order. At the time the Order was rescinded, an understanding was reached between BLNR and the landowners. The landowners understood that BLNR's rescission did not preclude a future condemnation if funds become available, and that any future action to acquire by condemnation would include the preparation and processing of an EIS to fully describe the impacts of condemnation. In addition, the landowners requested, and BLNR agreed to, the removal of all references to, and/or

clarification of, the acquisition of private property in the pending Final EIS for expansion of the Hapuna Beach State Recreation Area.

In addition, BLNR desired to maintain the status quo of private property land use at Wailea Bay, meaning that landowners should not be allowed to upzone their property so as to increase its value. To guarantee that this would not occur, BLNR asked for, and the landowners agreed to, the imposition of a 15-year covenant on their parcels that: 1) restricts development to conform to what is currently allowed today, and 2) prohibits zoning change for a period of 15 years. A Unilateral Agreement and Declaration was prepared and executed and recorded as a property covenant document.

Proposed Mitigation

Various management and onsite park staffing arrangements could be developed to ensure public safety, continued and improved maintenance, and conservation of natural resources. Specific recommendations that may be important to Wailea Bay include:

- Monitoring of beach activities by lifeguards (daytime only);
- Using DOCARE personnel to periodically patrol the park during daytime hours, monitoring user activities, advising park users, enforcing park rules, as well as coordinating emergency responses with the park's water safety director and County Fire and Police Departments;
- Preparing interpretative education materials on water safety, fire hazard precautions, and potential coastal and surface runoff flood conditions for park users; and
- Scheduling and performing regular preventative maintenance for all park facilities.

It is believed that implementation of these recommendations will significantly address Wailea residents' concerns for public safety, maintenance, and resource conservation. Night security may need to be provided if adverse night activities become evident in the park. Such security may involve periodic low-profile night patrols by park security personnel or the use of security lights and emergency telephones.

The uncertainty of the acquisition of the Wailea Bay private properties was alleviated by BLNR's action to rescind its 1987 Order. In the future, however, should funds for acquisition become available, BLNR will prepare and process an EIS to address the impact of acquisition of the private properties. Thus, the community will be apprised of any pending State action to acquire the properties.

During any future acquisition process, the State Parks Division will comply with Chapter 111, HRS, to assist persons who are displaced by the government's planned actions. Benefits provided by this program include, among others, relocation payment, replacement housing payment, and relocation assistance services. These payments and services are designed to assure that the relocation process offers needed assistance and reduce hardship to those affected as well as to reduce delays in the proposed project.

Details on the relocation plan will be provided by the State Parks Division during the first stages of project implementation.

3.12 INFRASTRUCTURE AND PUBLIC SERVICES/FACILITIES

3.12.1 Roads and Traffic

3.12.1.1 Existing Conditions

Access to the Hapuna Beach State Recreation Area is provided by Queen Ka'ahumanu Highway, Hapuna Beach Road, and Puako Spur Road. The old Kawaihae-Puako Road traverses the interior of the property and connects Hapuna Beach Road and Puako Spur Road.

Queen Ka'ahumanu Highway stretches approximately 33 miles across the South Kohala and North Kona Districts of West Hawaii and connects with the harbor community of Kawaihae and the major coastal town of Kailua-Kona. From Palani Street in Kailua-Kona, Queen Ka'ahumanu Highway continues south another 2-1/2 miles until it merges with Kuakini Highway, a secondary regional right-of-way that leads to Keauhou and Honalo.

Queen Ka'ahumanu Highway carries traffic that have direct origins and/or destinations at Keahole International Airport, Honokohau Small Boat Harbor, Kawaihae Harbor, Kailua-Kona, Mauna Kea Beach Resort, Mauna Lani Resort, Waikoloa Beach Resort, Waikoloa Village, Kona Village Resort, Kona Industrial Center, and Kaloko Industrial Center, among others. The two-lane, two-way State highway has a right-of-way width of approximately 350 feet. This wide dimension, especially at the park site and on points south, is intended to accommodate future widening. Each travel lane measures 12 feet across, and is accompanied by ten-foot-wide stabilized shoulders. The posted speed limit varies between 35 mph and 55 mph.

The State Department of Transportation (DOT) has been requiring new major developments to provide channelized intersections at access points along the highway.

The Hapuna Beach Road which was the original connector between the first completed segment of the Queen Ka'ahumanu Highway and the old Kawaihae-Puako Road is now the permanent access to the existing Hapuna Beach State Recreation Area. It is a State road that has a 24-foot-wide, two-lane pavement within a 80-foot-wide right-of-way. The surface of the pavement is extensively worn.

The two-lane Puako Spur Road originates at the Queen Ka'ahumanu Highway and extends southwest approximately three miles to the northern border of the Mauna Lani Resort. It converts from a State right-of-way to a Country right-of-way at the old Kawaihae-Puako Road intersection. The County segment of the road, which has an 18-foot width, is known as the Puako Beach Road. Approximately 170 residential lots abut this road, about half of which are oceanfront. The residences of this area comprise the Puako Beach Lots residential community.

The old Kawaihae-Puako Road extends laterally across the project site at approximately the 80-foot elevation and is the original coastal road that provided access from Kawaihae to the Puako Beach Lots. Its pavement width varies from 10 to 16 feet. The Queen Ka'ahumanu Highway and Puako Spur Road now provide access to the Puako area. As a result, the old Kawaihae-Puako Road is seldomly used and currently serves as access to the Wailea Beach residential lots, Wailea Beach, and Beach 68. Its condition is poor and requires resurfacing. The alignment is typical of old roads that were designed before the use of modern County standards.

A 20-foot-wide existing easement provides access over State land from the Kawaihae-Puako Road to the residential lots at Wailea Bay. A second easement is being established by the State to provide property owners access to the residential lots on the northern side of the bay.

3.12.1.2 Existing Traffic

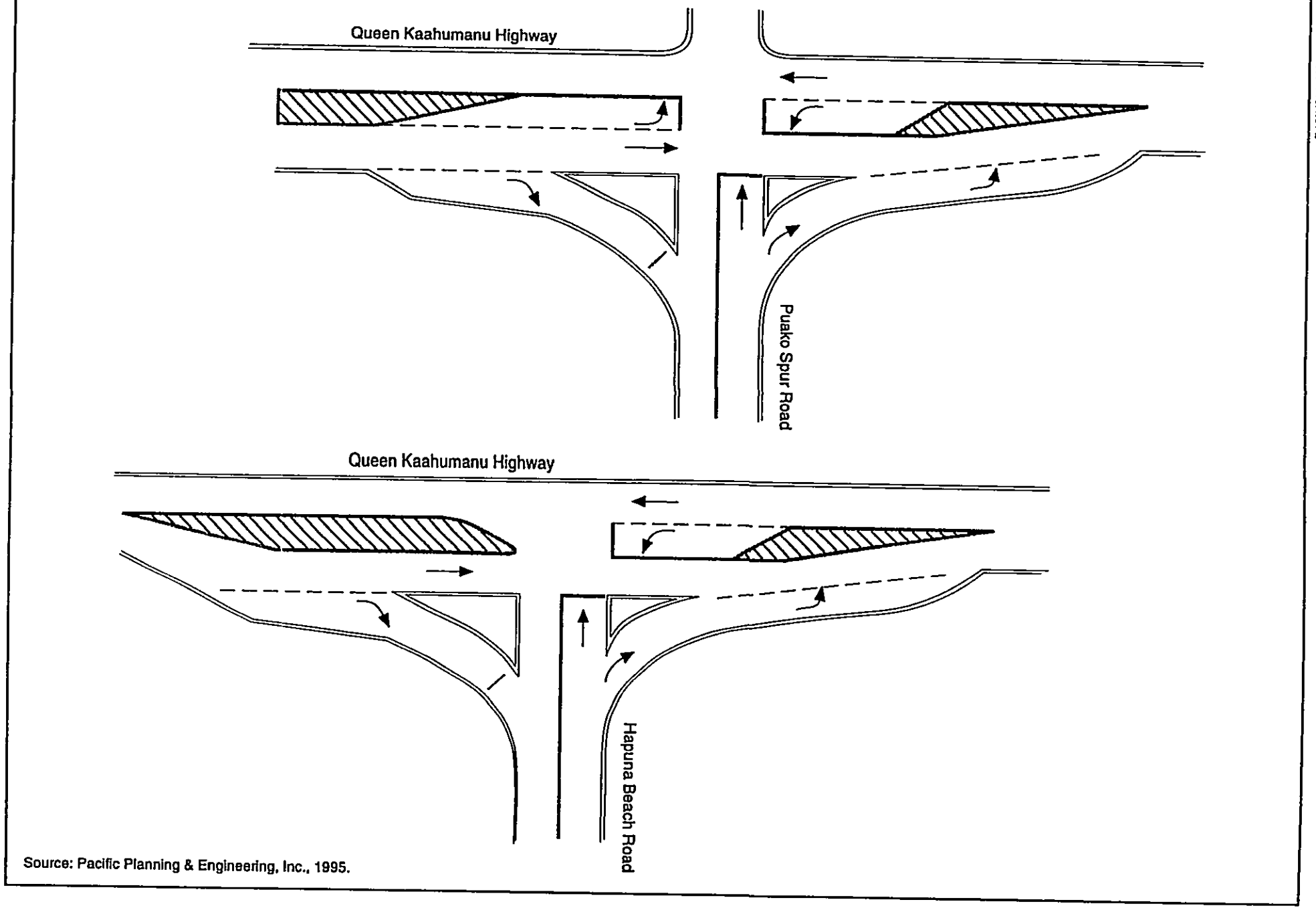
Traffic counts on Queen Ka'ahumanu Highway-Hapuna Beach Road and Queen Ka'ahumanu Highway-Puako Spur Road intersections were taken by Pacific Planning & Engineering, Inc. (Appendix H) from 2:30 to 5:00 pm on January 25, 1994, and from 6:00 to 8:30 am on January 26, 1994 (Figure 3-9 shows the configuration of the laneage at the two intersections). These surveys coincide with the peak traffic volume periods that are available from the State DOT traffic data. The two intersections were analyzed because they represent critical legs of the roadway system and can indicate available roadway capacity to meet future demand. Figure 3-10 shows the traffic count results. Additionally, during the 1994 survey, the following traffic observations were made:

- Average speed on Queen Ka'ahumanu Highway around the project area ranged from 55 mph to 65 mph.
- Slow-moving heavy vehicles traveling along Queen Ka'ahumanu Highway used the shoulder to allow faster vehicles to pass.
- Vehicles along Queen Ka'ahumanu Highway usually arrive in platoons of three to seven vehicles.
- Mid-day observations of the Hapuna Beach park showed the parking lot to be approximately 75 percent full.

3.12.1.3 Projected Traffic Without the Proposed Project

Traffic projections without the proposed project were based on the following:

- Year 2020 land use data for the current update study of the *Island of Hawaii Long-Range Highway Plan* conducted by the State Department of Transportation. The forecasts from the study were not yet available at the time Pacific Planning & Engineering prepared its study, but land use data was made available for analytical purposes.

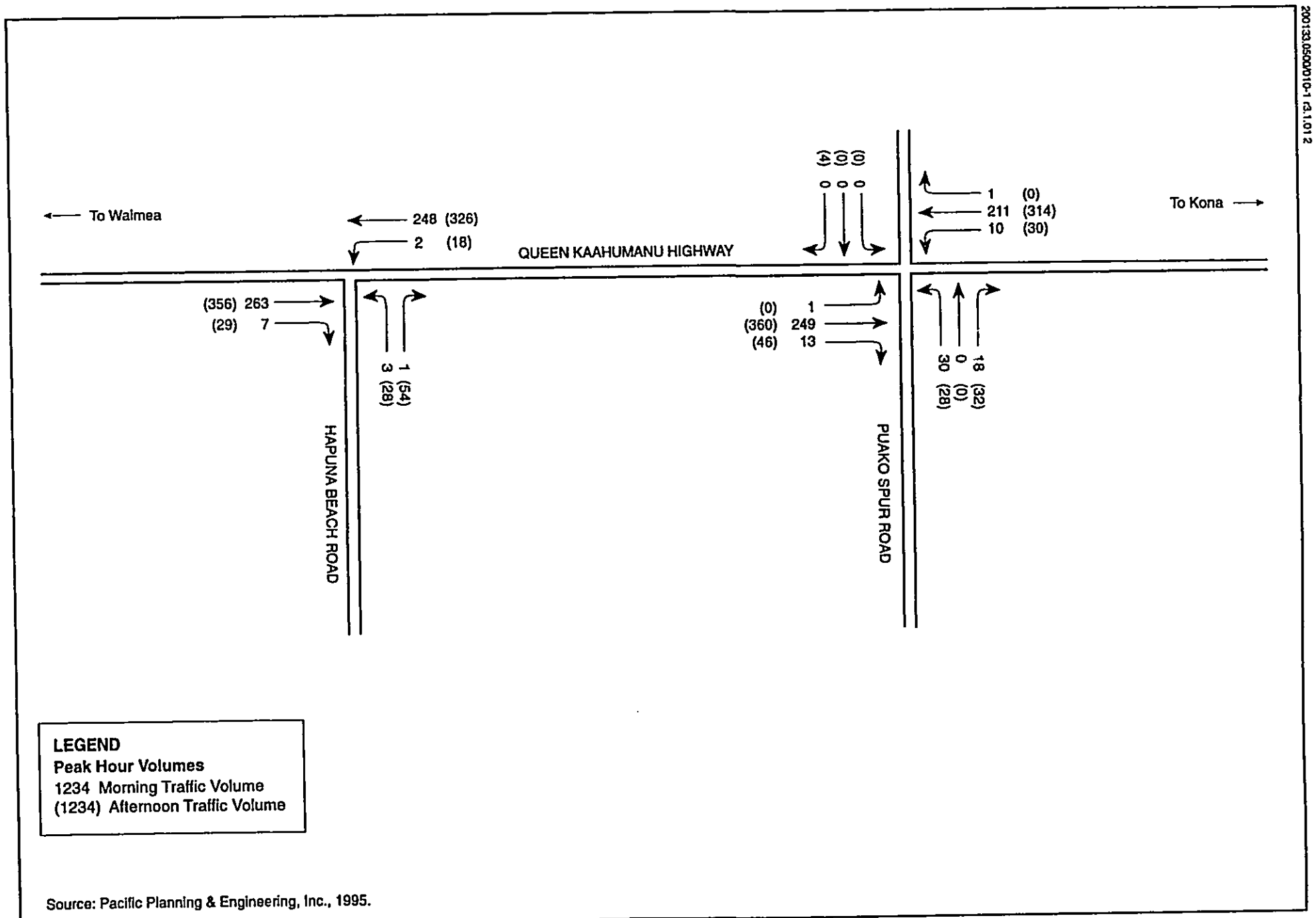


200133.0500/009-1 r3.1.01 2

Belt Collins Hawaii

Figure 3-9
Hapuna Beach State Recreation Area Expansion
EXISTING ROADWAY INTERSECTION LANEAGE

20013.0500/010-1 r3.1.01 2



Source: Pacific Planning & Engineering, Inc., 1995.

NORTH Belt Collins Hawaii

Figure 3-10
Hapuna Beach State Recreation Area Expansion
EXISTING PEAK HOUR TRAFFIC VOLUMES (1994)

- Year 2010 land use data from the original *Island of Hawaii Long-Range Highway Plan* completed in 1991.

- Year 2010 average daily traffic forecasts from the original *Island of Hawaii Long-Range Highway Plan* completed in 1991 for Queen Ka'ahumanu Highway on sections adjacent to the project access points.

- 1994 State DOT traffic counts for Queen Ka'ahumanu Highway. (Traffic counts are updated every two years; 1996 counts are to be taken later this year.)

- Directional and peak hour traffic factors derived from 1994 State DOT traffic counts.

- Trend analysis of State DOT counts on Queen Ka'ahumanu Highway since 1976.

Traffic entering the Hapuna Beach Road intersection, without the proposed project, is expected to increase by 793 vehicles by 2010 and by 795 vehicles at the Puako Spur Road intersection by the same year. These figures represent an increase of approximately 98 percent over 15 years. Results of the projection are shown on Figure 3-11.

3.12.1.4 Projected Traffic With Project

Traffic projections with the proposed project were performed by adding the traffic associated with the planned Hapuna Beach State Recreation Area to the traffic projections without the project. The number of trips generated by the proposed project was based on:

- Rates from the ITE Trip Generation Report on golf courses,

- Trip rates derived from manual traffic counts on the recreational traffic in the area,

- Increased facility capacity of the proposed park expansion, and

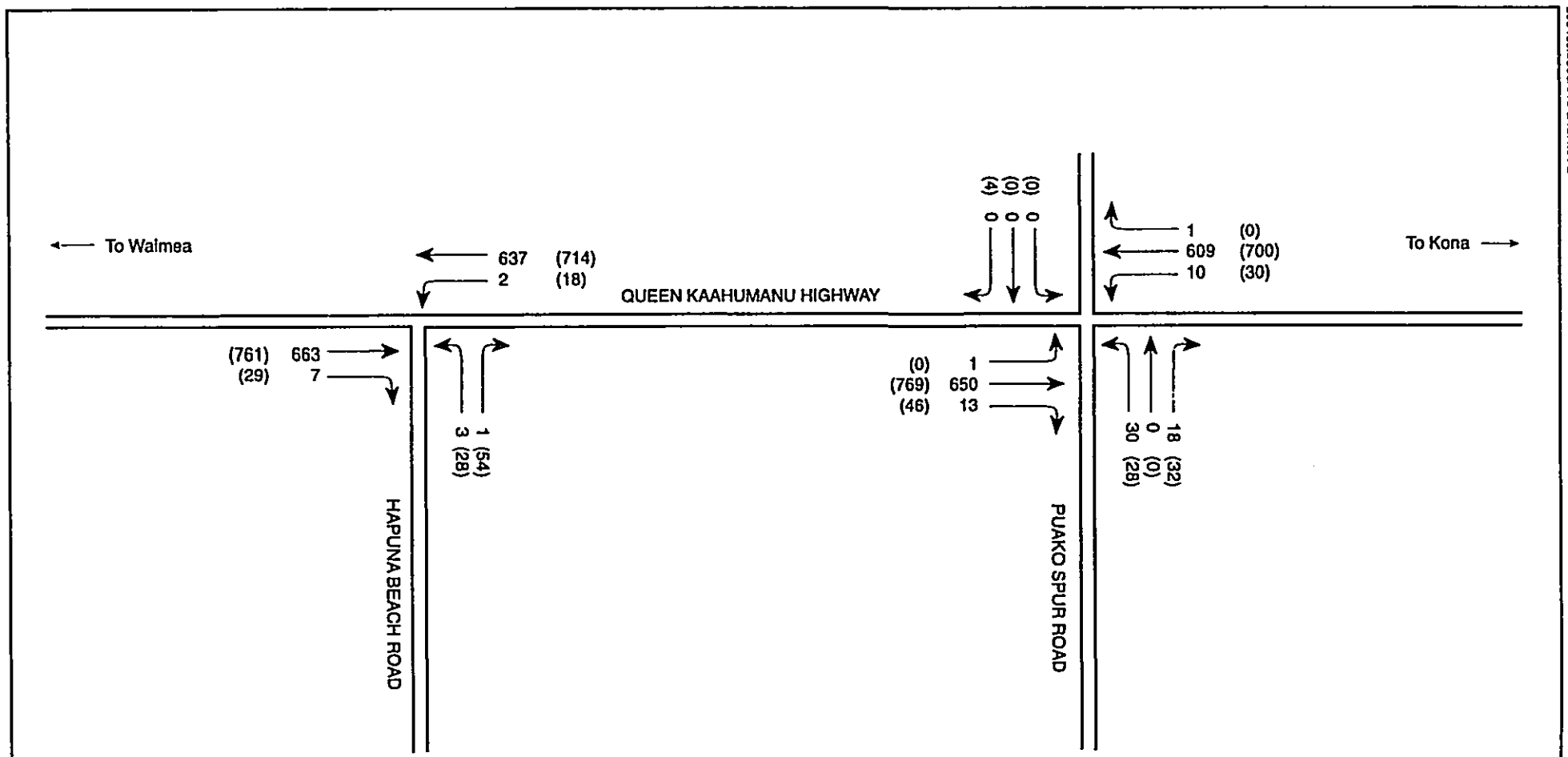
- Total number of employees who would be working at the park headquarters.

The proposed project is estimated to contribute 161 vehicles during peak hour period at the Hapuna Beach Road intersection by 2010 and 151 vehicles at the Puako Spur Road intersection by the same year. This will increase the total traffic count entering the Hapuna Beach Road intersection to 1,765 vehicles and Puako Spur Road intersection to 1,764 vehicles by 2010. These increases represent a small gain (approximately 9 percent) over the projected traffic without the project. Figure 3-12 shows the projected traffic at the two intersections.

3.12.1.5 Traffic Analysis

Level of Service (LOS) traffic analyses were conducted for the Queen Ka'ahumanu Highway—Hapuna Beach Road intersection, and the Queen Ka'ahumanu Highway — Puako Spur Road intersection. The analyses were based on existing roadway geometrics and methods outlined in the *Highway Capacity Manual* (Special Report 209, 1985) for unsignalized intersections. The LOS for unsignalized intersections is determined by the

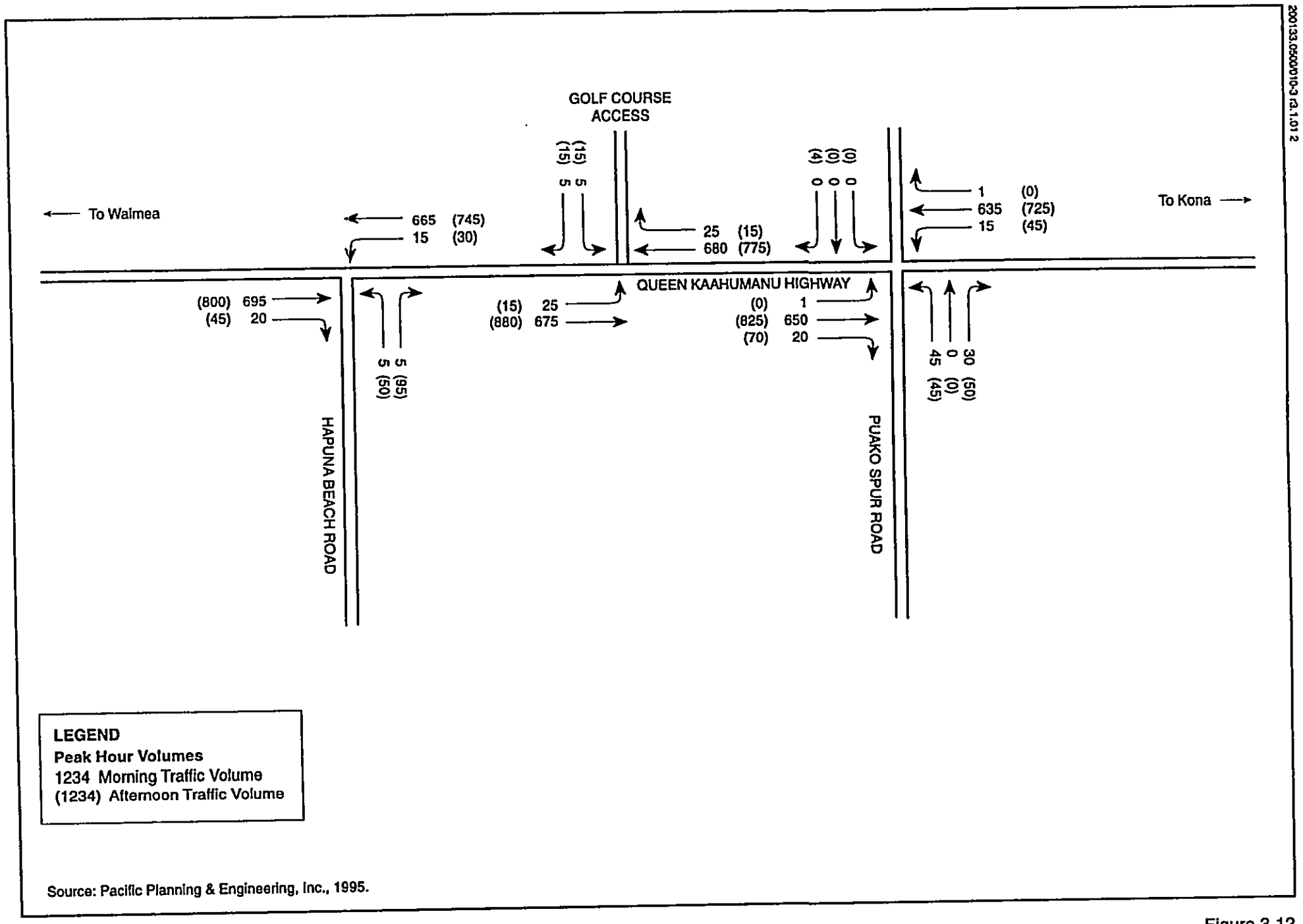
200133.05000102.r3.1.012



Source: Pacific Planning & Engineering, Inc., 1995.

NORTH Belt Collins Hawaii

Figure 3-11
Hapuna Beach State Recreation Area Expansion
YEAR 2010 WITHOUT PROJECT - PEAK HOUR TRAFFIC VOLUMES



Source: Pacific Planning & Engineering, Inc., 1995.

200133.0500010-3 r3.1.01 2

Figure 3-12
Hapuna Beach State Recreation Area Expansion
YEAR 2010 WITH PROJECT - PEAK HOUR TRAFFIC VOLUMES

NORTH Belt Collins Hawaii

amount of reserve capacity for each turning movement. The reserve capacity is the number of vehicles that could proceed through a conflicting traffic stream. The LOS for unsignalized intersections is classified into six categories ranging from little or no delays (LOS A) to extreme delays (LOS F). Table 3-14 describes each LOS in detail.

Table 3-15 presents the results of the traffic analyses in terms of LOS. In summary, traffic without the project by the year 2010 at the Hapuna Beach Road intersection is expected to operate with long delays or at LOS E. At the Puako Spur Road intersection, movements are expected to operate similarly with long delays (LOS E). The LOS for the two intersections is currently at D or better.

With the project, vehicular counts will be slightly greater than without the proposed project at the two intersections. Motorists exiting the planned golf course are expected to experience long delays (LOS E). Further analyses of the two intersections were undertaken to identify improvements to mitigate adverse traffic impacts. The first analysis assumed the State Department of Transportation would implement its plan to widened Queen Ka'ahumanu Highway from two lanes to four lanes, with an interim program to provide passing lanes in each direction by 2004. Results of the analysis showed that the LOS for the intersection with and without the project would be the same as the LOS for the intersection without the highway widening improvements (Table 3-16).

The second analysis incorporated signalization with the four-lane Queen Ka'ahumanu Highway at the two intersections. Results of this analysis, as provided in Table 3-17, showed that the LOS for the two intersections would improve to C or better from E or F, with or without the project by the Year 2004. Thus, signalization would significantly improve the flow of traffic through the intersections.

3.12.1.6 Study Conclusions

Based on findings in the 2010 *Traffic Impact Assessment Report for Hapuna Beach State Recreation Area Expansion* (Pacific Planning & Engineering, February 1995), the proposed project will not have a significant impact on roadway systems in the area. By 2010, when the proposed Hapuna Beach State Recreation Area Expansion is completed, traffic flow on Queen Ka'ahumanu Highway and the two intersections will be at levels that may warrant improvements, with or without the project. In other words, the proposed project will only slightly increase the number of vehicles on the roadways and thus, is not the major reason for the growth in traffic in the area.

The planned expansion of Queen Ka'ahumanu Highway from two to four lanes, as set forth by the State Department of Transportation (DOT), is not expected to significantly mitigate projected traffic impacts. With signalization at the Queen Ka'ahumanu Highway-Puako Spur Road and Queen Ka'ahumanu Highway-Hapuna Beach Road, a significant improvement in the flow of traffic is expected. Additionally, full channelization with exclusive left-turn lanes and acceleration and deceleration lanes at the proposed golf course access road/Queen Ka'ahumanu Highway intersection would further improve traffic flow. These alternatives, however, are not in the State DOT's plans and implementation of these alternatives would require DOT approval.

Table 3-14 Descriptions of Levels of Service (LOS) for Unsignalized Intersections

LOS A	Free flow conditions
LOS B	Stable flow; presence of other users in the traffic stream begins to be noticeable
LOS C	Stable flow; operation of individual users becomes significantly affected by interaction with others in the traffic stream
LOS D	High density but stable flow
LOS E	Operating conditions at or near capacity
LOS F	Forced or breakdown flow; amount of traffic approaching a point exceeds the amount which can traverse the point

Table 3-15 Unsignalized Intersection Analysis of Two Intersections

		1994 Existing	2010 Without Project	2010 With Project
Roadway and Turn Movements		AM (PM)	AM (PM)	AM (PM)
Intersection of Queen Ka'ahumanu Hi8ghway and Hapuna Beach Road				
Hapuna Beach Road				
Eastbound	LT	B (D)	E (E)	E (F)
	RT	A (A)	B (C)	B (C)
Queen Ka'ahumanu Highway				
Northbound	LT	A (A)	A (A)	A (B)
Intersection of Queen Ka'ahumanu Highway and Puako Spur Road				
Puako Spur Road				
Eastbound	LT/TH	B (D)	E (E)	E (F)
	RT	A (A)	B (C)	B (C)
Westbound	LT/TH/RT	A (A)	E (E)	E (E)
Queen Ka'ahumanu Highway				
Northbound	LT	A (A)	A (A)	A (A)
Southbound	LT	A (A)	A (A)	A (B)
Intersection of Queen Ka'ahumanu Highway and Golf Course Access Road				
Golf Course Access Road				
Westbound	LT/RT	n/a	n/a	E (E)
Queen Ka'ahumanu Highway				
Southbound	LT	n/a	n/a	A (A)

Notes:

AM - Morning Peak Period
(PM) - Afternoon Peak Period
LT - Left Turn
RT - Right Turn
TH - Through

Table 3-16 Unsignalized Intersection Analysis with 4-Lane Queen Ka'ahumanu Highway

		2004 Without Project	2004 With Project
Roadway and Turn Movements		AM (PM)	AM (PM)
Intersection of Queen Ka'ahumanu Highway and Hapuna Beach Road			
Hapuna Beach Road Eastbound	LT RT	E (F) A (D)	E (F) B (D)
Queen Ka'ahumanu Highway Northbound	LT	D (E)	D (E)
Intersection of Queen Ka'ahumanu Highway and Puako Spur Road			
Puako Spur Road Eastbound Westbound	LT/TH/ RT LT/TH/RT	F (F) B (D) E (B)	F (F) B (D) E (B)
Queen Ka'ahumanu Highway Northbound Southbound	LT LT	D (E) D (D)	D (E) D (D)
Intersection of Queen Ka'ahumanu Highway and Golf Course Access Road			
Golf Course Access Road Westbound	LT/RT	n/a	E (E)
Queen Ka'ahumanu Highway Southbound	LT	n/a	E (E)

Notes:

AM - Morning Peak Period
(PM) - Afternoon Peak Period
LT - Left Turn
RT - Right Turn
TH - Through

Table 3-17 Signalized Intersection Analysis

Project	2010 With Project
Intersection and Approach	AM(PM)
Queen Ka'ahumanu Highway with Puako Spur Road	
Queen Ka'ahumanu Highway	
Northbound Approach	B (B)
Southbound Approach	A (B)
Puako Road	
Eastbound Approach	C (C)
Westbound Approach	C (C)
Overall Intersection	B (B)
Ave. Delay per Vehicle (seconds)	5.72 (8.35)
Volume/Capacity	0.50 (0.56)
Queen Ka'ahumanu Highway with Hapuna Beach Road	
Queen Ka'ahumanu Highway	
Northbound Approach	A (A)
Southbound Approach	B (B)
Hapuna Beach Road	
Eastbound	C (C)
Overall Intersection	B (B)
Ave. Delay per Vehicle (seconds)	9.32 (9.57)
Volume/Capacity	0.47 (0.52)

Since the State's planned expansion of Queen Ka'ahumanu Highway is part of a long-range plan, possible short-term traffic mitigation measures may be considered and are identified below:

- Full shuttle service between the resorts in South Kohala and the airport;
- Coordination of opening hours amongst the different South Kohala-North Kona businesses and public facilities; and
- Carpooling or ridesharing for employees.

These measures are designed to be coordinated with other development projects in the region to produce an effective solution. Implementation of these measures would be a relatively inexpensive way of reducing traffic impact on roadways until permanent improvements are implemented.

3.12.1.7 Summary

In summary, traffic without the project by the year 2010 at the Hapuna Beach Road intersection is expected to flow quite smoothly except for one turning movement. This movement, which consists of the Hapuna Beach Road traffic turning left onto Queen Ka'ahumanu Highway, will experience long delays or LOS E during the peak hour of the

day. This peak period generally occurs from 2:00 pm to 4:30 pm. Similarly, at the Puako Spur Road intersection, traffic on Queen Ka'ahumanu Highway will flow with few delays, but left turn movements from the Puako Spur Road onto the highway and through movements across the highway will experience long delays or LOS E during peak periods. The LOS for the two intersections is currently at "A," with left turn movements onto the highway at "D".

Traffic with the project at the two intersections will be slightly higher than the traffic without the project by 2010. Overall, traffic flows will have few delays, as LOS A or B is projected. However, the left turn movements from the Hapuna Beach Road and Puako Spur Road onto Queen Ka'ahumanu Highway will experience very long delays (LOS F). Exiting traffic from the new golf course access road also will experience long delays (LOS E) during the peak period.

Improvement Analysis

While the number of vehicles generated by the proposed project is relatively small, the future traffic conditions on Queen Ka'ahumanu Highway, which takes into account regional growth, will be such that the turning movements out of the project roadways will incur delays, particularly during the afternoon peak period. A major issue in previous forecasting studies was the potential need to widen Queen Ka'ahumanu Highway. While the results of these studies indicate that future widening of the highway will be needed, widening was not projected to be necessary before or during the year 2010.

Based on the *Highway Capacity Manual* Special Report 209 (Transportation Research Board National Research Council, 1985) and the assumption of an ideal capacity of 2,800 vehicles per hour (vph), the two-lane Queen Ka'ahumanu Highway (at a projected future volume of 1,625 vph) will operate at LOS D during the afternoon peak period with the project. The only movement that would deteriorate below LOS D and would require mitigation is the left turn movement out of the project area. With signalization, the intersection traffic flow would improve dramatically; all movements would operate at LOS C or better (see Table 3-20).

Conclusions and Recommendations

The proposed Hapuna Beach State Recreation Area Expansion project will not have a significant impact on traffic in the project area. Traffic on Queen Ka'ahumanu Highway will continue to increase as a result of population growth in the region. The proposed project will generate approximately 316 vehicles through the two park access roads during the afternoon peak-hour period. This addition represents less than ten percent of the total traffic in the area for the year 2010. By that year, Queen Ka'ahumanu Highway is expected to operate at LOS D. Motorists entering and exiting the project access roads will experience long to very long delays (LOS E to F). Similar traffic conditions are expected to be experienced at other intersections along the highway.

The traffic forecasts are based on future land uses as provided in the year 2020 update study to the State Department of Transportation's Island of Hawaii Long Range Highway Plan. The original study called for the expansion of Queen Ka'ahumanu Highway to a

four-lane divided highway with possible frontage roads. Updated traffic projections, however, show a reduction in traffic volumes. This may be a reflection of less anticipated development in the region and the current sluggish economic situation on the island. Additionally, some major projects are now excluded in the 2020 update study. Thus, the forecast for 2010 is much lower than previous traffic forecasts and highway improvements hence would be less urgently needed.

To improve access to and from the proposed park expansion area, the following have been recommended by the traffic consultant. These improvements should be considered in light of the growth in the region and its contribution to the overall traffic increase on the local highways.

- Signalize the intersections of Hapuna Beach Road and Puako Spur Road with Queen Ka'ahumanu Highway at a time when traffic controls are warranted. This would not necessarily be tied to the improvements in the park expansion but to the growth in traffic generated by the regional population. If signalized, the intersections will operate at LOS B during the afternoon peak period, and even better during lower traffic volume hours.

- For the intersection at Queen Ka'ahumanu Highway and the golf course access road, provide a fully channelized intersection with exclusive left turn lanes and acceleration and deceleration lanes.

3.12.2 Utilities

3.12.2.1 Water

Existing Conditions

A 12-inch water transmission line is located along Queen Ka'ahumanu Highway and Puako Spur Road. The transmission line along Puako Spur road is available to serve the Hapuna Beach State Recreation Area. The source of this water is the County's Lalamilo water system that consists of four wells (total 3.9 million gallons per day (mgd) maximum day capacity), four storage tanks (0.1 mg, 0.5 mg, 1.0 mg, and 1.0 mg), and a 17,000-foot transmission line (12-inch diameter and 18-inch diameter) that connects the wells at the 1,100 to 1,200-foot elevation in the Lalamilo Land Tract to the transmission line along the Queen Ka'ahumanu Highway (Figure 3-13).

The Hapuna Beach State Recreation Area is serviced by the County system at the property's north entrance road. A pressure reducing valve is located along Queen Ka'ahumanu Highway, and a meter box is located at the entrance to the parking area along the old Kawaihae-Puako Road. Lateral lines from the system connect with the existing caretaker's residence, overnight cabin facilities, comfort stations, and food concession building. In 1996, potable water demand at the State park was 15,000 gallons per day (gpd) on weekdays and 57,000 gpd on weekends.

A brackish well located above the beach park and in the proposed golf course site, currently provides irrigation water to the park facilities via a distribution line across Queen Ka'ahumanu Highway. The Division of State Parks drilled and developed the well in 1970, and its water, which has a chloride content of 420 to 430 parts per million, is good only for irrigation. Current usage is about 5,000 gpd which is limited by the size of its connecting water tank.

Potential Impacts and Proposed Mitigation

The proposed park improvements will generate an average daily water demand of approximately 28,800 gpd on weekdays and 52,650 gpd on weekends. The demand will be generated from the proposed golf clubhouse, beach park area, camping sites, picnic areas, and park support facilities. Beach and camping activities would be the largest users, accounting for a combined 75 percent of the water demand.

The Lalamilo water system presently cannot accommodate the proposed park expansion.[3] The County's allocation from this system is currently fully utilized. The other allocations are to the Mauna Kea Resort and Mauna Lani Resort, which shared in the financing of the system's initial development. Thus, the proposed park expansion will require development of a new well in the existing Lalamilo well field with a connection to the County system at one of the existing wells. The water quality of this source does not require a water treatment facility.

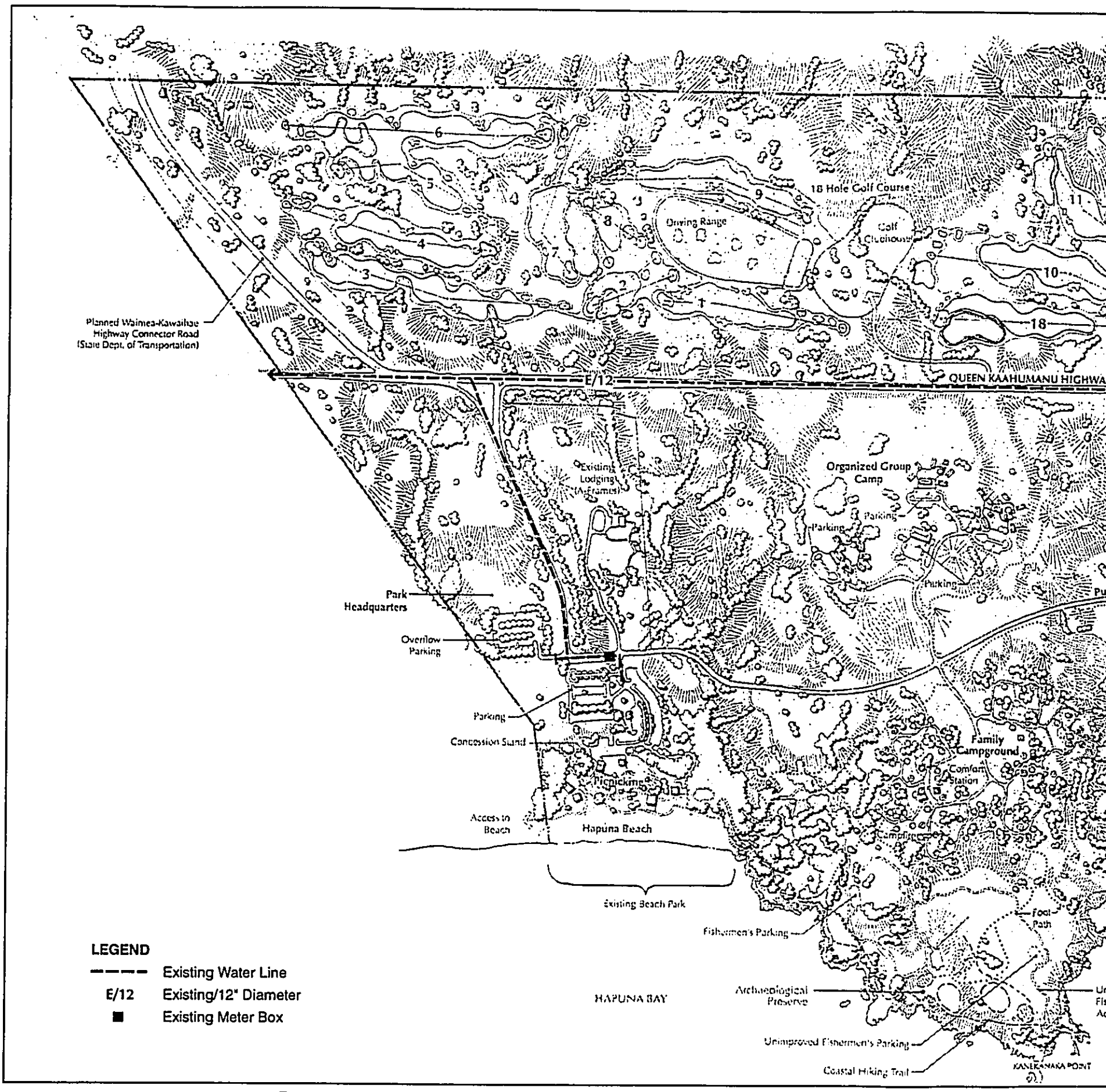
In the park area, a new 6-inch water line will be required along the proposed old Kawaihae–Puako Road realignment to connect the two existing 12-inch transmission mains along the park's north entrance road and Puako Spur Road. The approximately 7,000-foot line would be an extension of the Lalamilo water system (Figure 3-14).

There is a perception in the community of insufficient water in the South Kohala region. The County has often notified Waimea residents of drought conditions and requested them to undertake water conservation practices. Notably, Waimea is served by a surface water system that is more susceptible to variations in the region's weather, compared to the steady, reliable, long-term recharging conditions of the area's groundwater network. Waimea depends on the surface water system because wells are more difficult to develop at high elevations. Wells are much easier to develop at Lalamilo, which has a lower elevation of 1,200 feet.

Information on groundwater in South Kohala is generally scarce and not precise. There is one study, however, that provides an overview of existing hydrological conditions in the region. In a December 1991 draft of the Hawaii County Water Use and Development Plan prepared for the Department of Water Supply, it was estimated that the South Kohala groundwater aquifer, which comprises the Waimea and 'Anaeho'omalu hydrological sectors, has a sustainable yield of 54 mgd. This aquifer includes the areas of Waimea, Kawaihae, Waikoloa, Puako, the South Kohala resorts, and the west slopes of Mauna Kea

[3] The Lalamilo water system was developed jointly by the State of Hawaii, Mauna Kea Properties, Inc., and Mauna Loa Land, Inc. (predecessor to Mauna Lani Resort, Inc.) to accommodate future water needs of the two South Kohala Resorts and adjacent lands.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

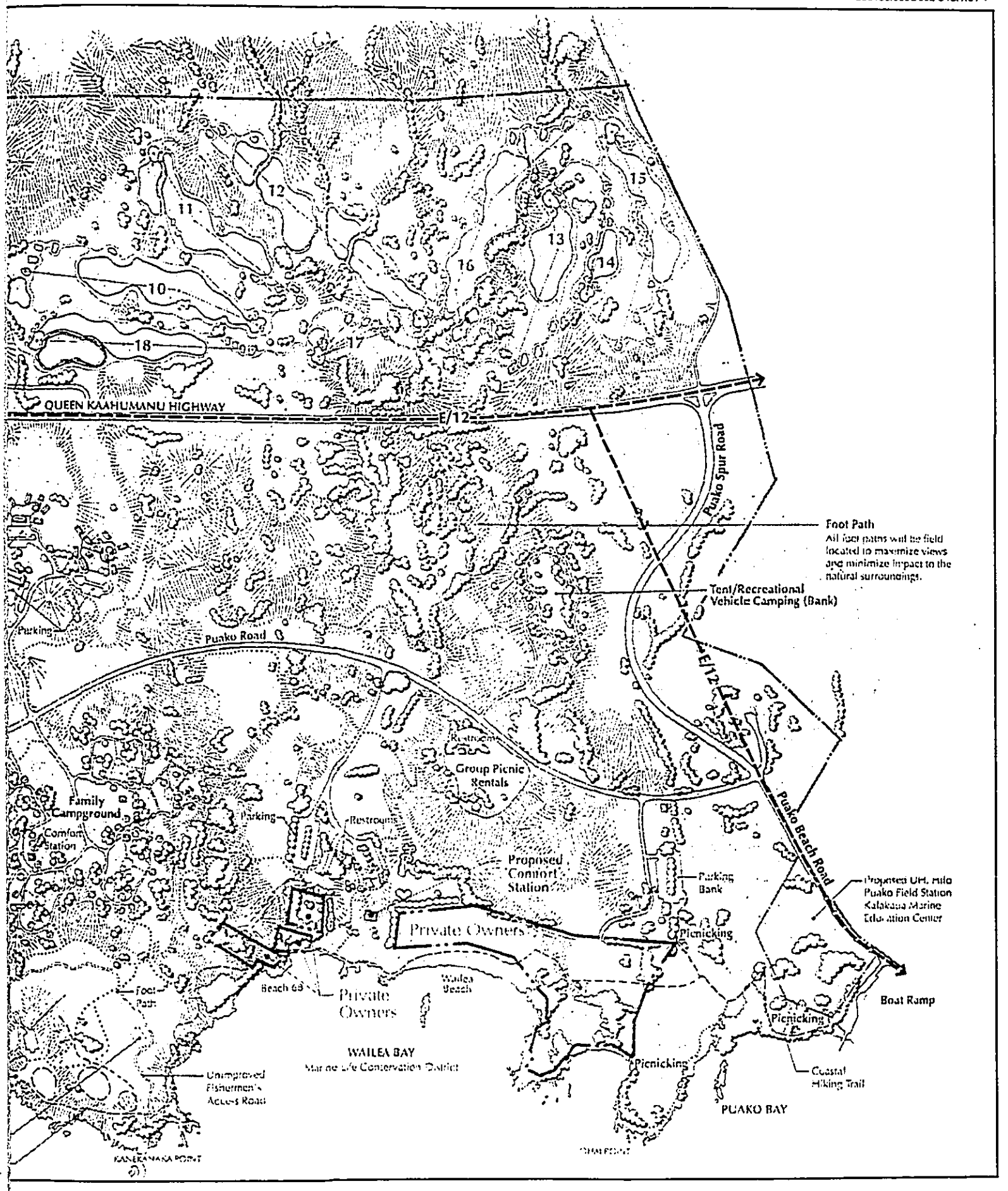


Figure 3-13
Hapuna Beach State Recreation Area Expansion
EXISTING WATER SYSTEM

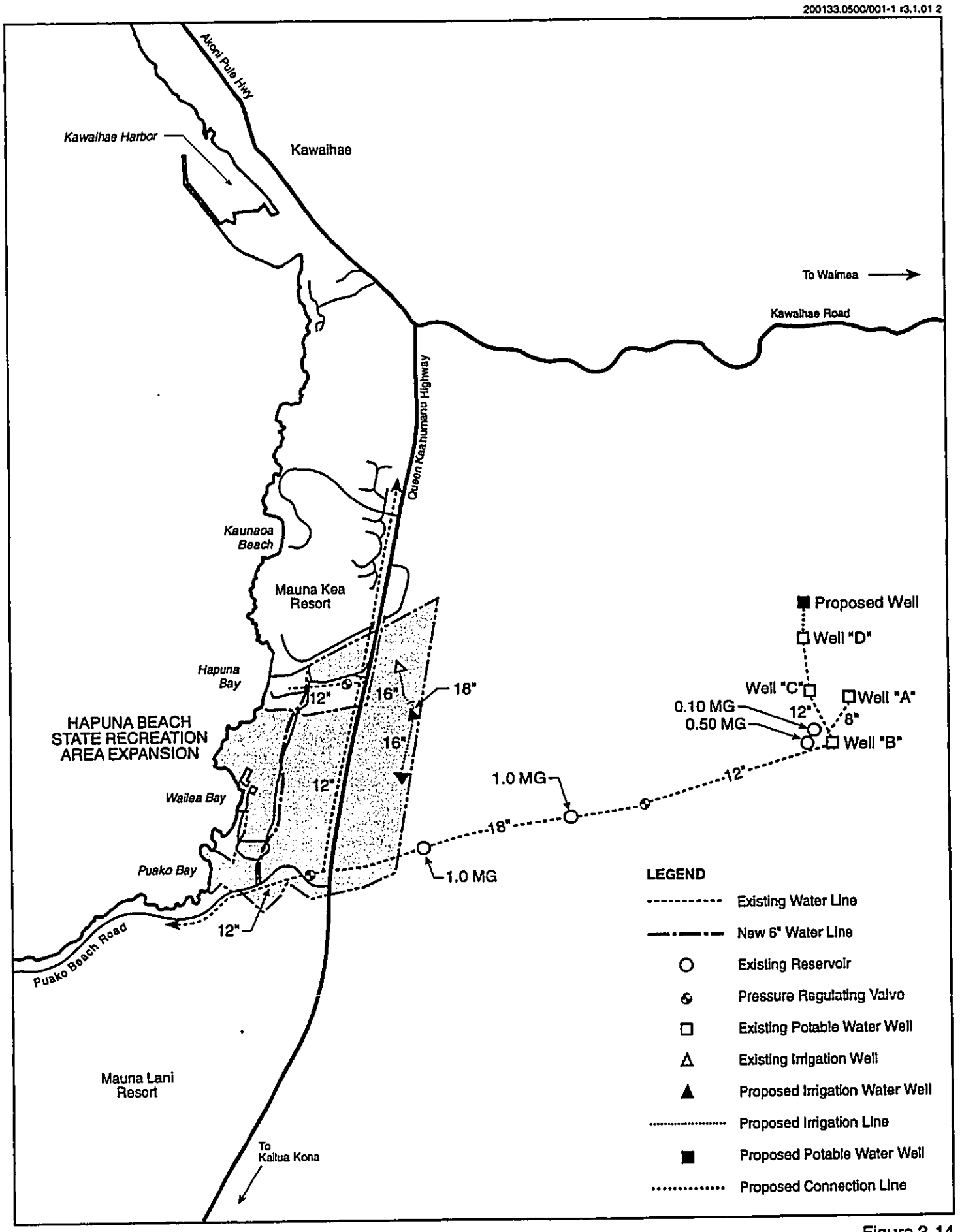


Figure 3-14
Hapuna Beach State Recreation Area Expansion
PLANNED OFF-SITE WATER SYSTEM

and northwest slopes of Mauna Loa. Since this sustainable yield is an estimate, its reliability is subject to further data support and documentation.

From 1995 records compiled by the State Commission on Water Resource Management, the current usage in the region is about 6.3 mgd. This amount is well within the limits of the region's sustainable yield.

Still, the best available hydrological information for the project area is the data records from the existing potable wells at the 1,200-foot elevation of the Lalamilo land tract. These wells have been the most successful and have provided the best feasible option for additional source development in South Kohala. Each of the three largest wells in this field is capable of producing approximately 1.4 mgd.

Even better hydrological information would come from the results of test drilling for the potable water. Test drilling, however, is usually done when a project is in the latter stages of planning and in the project design phase. It would be premature to incur the high cost of test drilling a well during the present stage in the absence of entitlements for the park improvements.

In addition to the potable water that will be required for domestic use, irrigation water will be required for the landscaping in the expanded park grounds and golf course fairways. The irrigation requirements are estimated to be 650,000 gpd. Ninety-two percent of this demand, or approximately 600,000 gpd, would be for the fairway links.

To meet this demand, a rehabilitation of the existing brackish well (elevation 224') and development of two new wells within the golf course will be undertaken. It is anticipated that additional wells at this elevation would produce similar results. Open reservoirs, which also will be located within the golf course and designed as part of the landscape features, will serve as storage for the irrigation water. The irrigation system will be maintained by the golf course operator.

Operating additional irrigation wells in this area would create a drawdown in the groundwater that could affect the production of the other wells in the immediate vicinity. The risk of this occurring, however, may be minimized if the new well is developed more than 1,000 feet from the existing wells. The current concept plan shows the new wells with at least that distance. Irrigation wells of other property owners in the vicinity are located more than 1,000 feet from the project well (the nearest is Mauna Kea Resort's well, which is more than 4,000 feet from Hapuna's well).

Furthermore, there is a potential for drawdowns to pull saltwater into the pumping site and affect the quality of irrigation water. If the salinity level is too high, there may be an adverse effect on the park's proposed landscaped areas. As provided in the Murdoch and Green study (Appendix E), control of water use rate according to climatic elements (solar irradiation, temperature, relative humidity and wind speed) and the use of an appropriate type of soil and grass are some of the measures that could be used to reduce the impact of salt content in irrigation water. Periodic site flushing with potable water would also be beneficial.

As an alternative, better quality water could be obtained at higher elevations within the same State land tract; however transmission of the water to the project site would then be a consideration.

3.12.2.2 Sewer

Existing Conditions

There is no public sewage collection system in the South Kohala District. Existing sewer systems consist of cesspools, septic tanks, and private collection and treatment facilities. At the existing park site, septic tanks or cesspools accommodate the present concession, comfort stations, and caretaker's residence. Drainage from the outdoor showers flow onto grass and beach areas.

Potential Impacts and Proposed Mitigation

The proposed park expansion and golf clubhouse are expected to generate approximately 18,000 gpd of wastewater flow on weekdays and 33,250 gpd on weekends. Approximately 45 percent of this flow will be generated by beachgoers.

The majority of the wastewater flow from the park expansion will be disposed primarily into individual wastewater disposal units such as septic tanks.

Existing disposal units will be upgraded to current Department of Health standards. When a public sewer collection system becomes available in the area, the park wastewater disposal system will be redesigned to connect with the new County system.

Individual disposal units will be installed away from the shoreline, most of them 1,000 feet or more from the ocean and on high ground, where percolation to ground water would occur over a longer period of time. The golf clubhouse wastewater disposal unit will be located more than 3,000 feet from the shoreline. Adverse impact to the marine waters is not anticipated.

Additionally, a preliminary agreement has been made with the adjacent Mauna Kea Resort that will allow the State to convey up to 8,000 gpd of wastewater to the resort's wastewater treatment facility (WWTF). The flow will be transported to the WWTF via a new 6-inch line developed by the park (Figure 3-15).

3.12.2.3 Solid Waste Collection

Existing Conditions

Refuse is collected daily by State employees and deposited at the Puako transfer station on the southern boundary of the Hapuna Beach State Recreation Area Expansion site. County trucks then haul the garbage to the Pu'uanahulu landfill which replaced the Kealakehe landfill in October 1993. The 300-acre County site, which contains 150 acres for landfill purposes, currently serves 12 transfer stations and an area that extends from Laupahoehoe on the north coast to Kapa'au in North Kohala and Waiohinu at South Point.

Potential Impacts and Proposed Mitigation

It is estimated that park users will generate approximately 2,500 pounds of garbage per day, and the golf course and clubhouse facilities will generate approximately 900 pounds per day. All solid waste from the proposed Hapuna Beach State Recreation Area Expansion will be taken to the Pu'uanahulu landfill which initially was projected to have a life of about 150 years if it served only West Hawaii. If Hilo's landfill operation is transferred to West Hawaii, the life of the Pu'uanahulu facility would be reduced to approximately 70 years.

In conformance with the State goals for recycling solid waste under the general provisions of Chapter 342G, HRS, State Parks will establish for Hapuna Beach State Recreation Area a recycling program involving separate receptacles or collection bins for cans and bottles. The contents of these bins will be delivered to a recycling contractor. The rest of the trash will be taken to the nearest County landfill at Pu'uanahulu. Grass and other landscape cuttings, particularly from the golf course, will be collected, composted, and then recycled as a soil conditioner.

3.12.2.4 Electrical Service

Existing Conditions

Hawaii Electric Light Co. Inc.'s (HELCO) electrical transmission system on the Big Island consists primarily of 69 kilovolt (KV) lines, but two areas—Puna and North Kohala—are served by lines with 34.5 KV capacity. Most areas on the island have a looped system that allows an alternate feed to the user when storms or accidents damage a section of a transmission line.

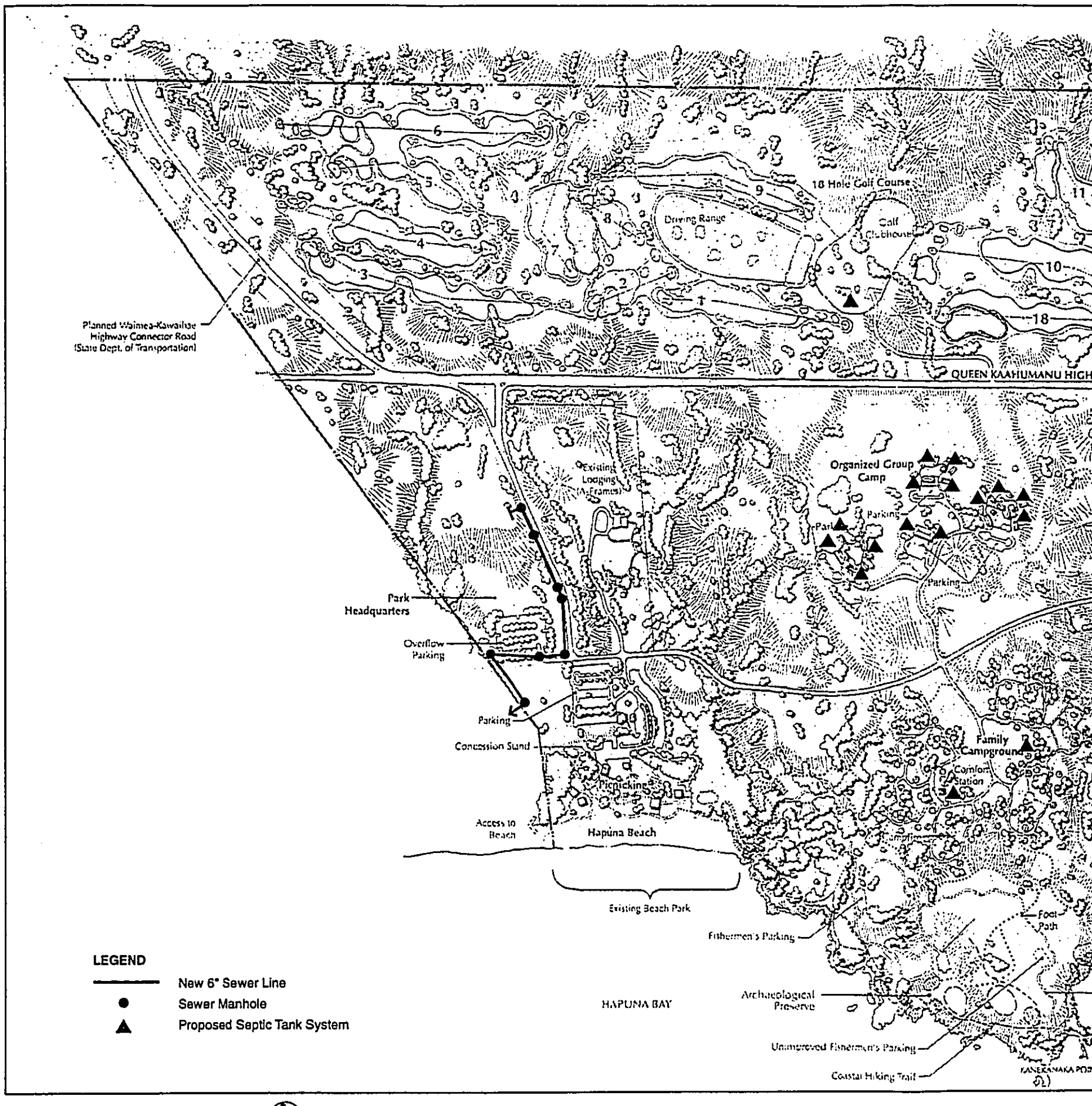
With a 69-KV line connecting the Waikoloa substation with the Waimea-Kawaihae line, a looped service is provided to the South Kohala District. This significantly increases the reliability of service to the coastal areas. Since the proposed Hapuna Beach State Recreation Area lies adjacent to this looped service, power outages are expected to be rare.

An overhead 12.47 KV, 3-phase transmission line runs along the Queen Ka'ahumanu Highway, Hapuna Beach State Recreation Area north entrance road, and old Kawaihae–Puako Road (Figure 3-16). A substation in Kawaihae and above the Puako Spur Road (Mauna Lani Substation) connects into this loop system. Service lines from the transmission line hook up with facilities within the park, including the caretaker's residence, park maintenance building, and A-frame cabin facilities. A service line is available at the concession, but no connection has been made.

Several power plants across the island feed into this utility system; the nearest are the Waimea and Keahole plants. Both plants presently use diesel fuel for power generation.

To accommodate increased demands in the region, HELCO is planning to expand its Keahole plant from 30 megawatts to 88 megawatts.

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

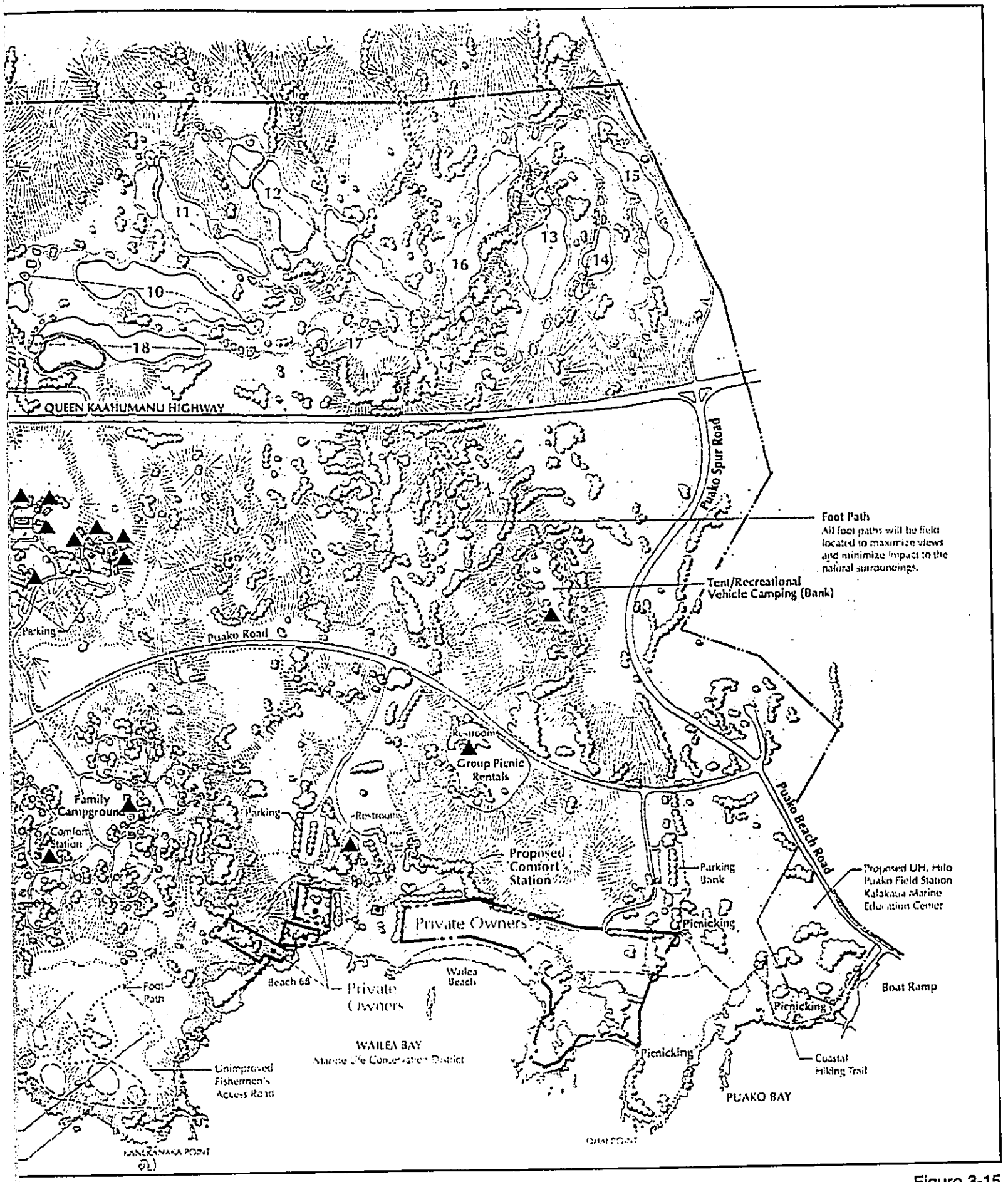
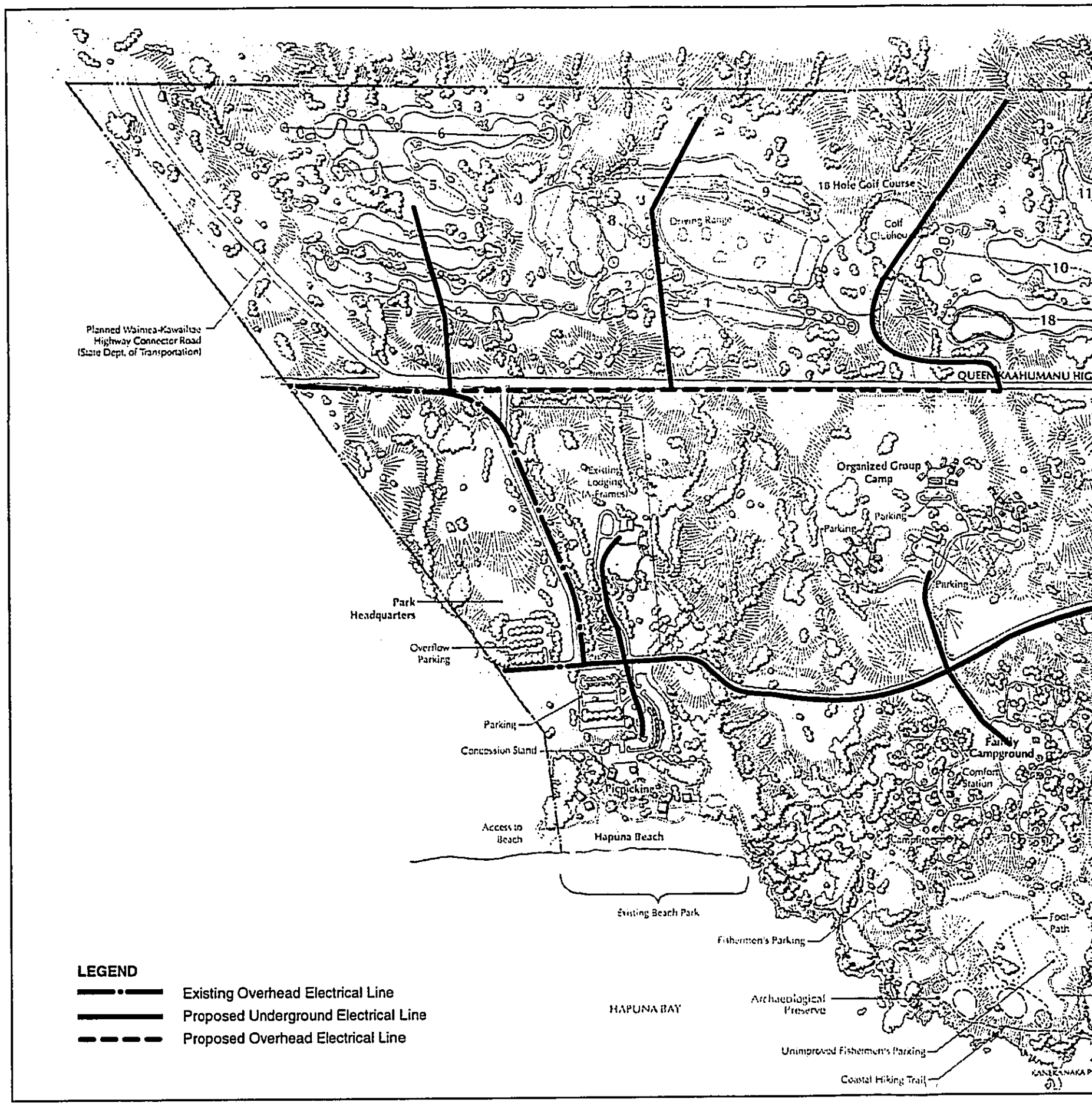


Figure 3-15
Hapuna Beach State Recreation Area Expansion
PLANNED WASTEWATER DISPOSAL SYSTEM

DOCUMENT CAPTURED AS RECEIVED



DOCUMENT CAPTURED AS RECEIVED

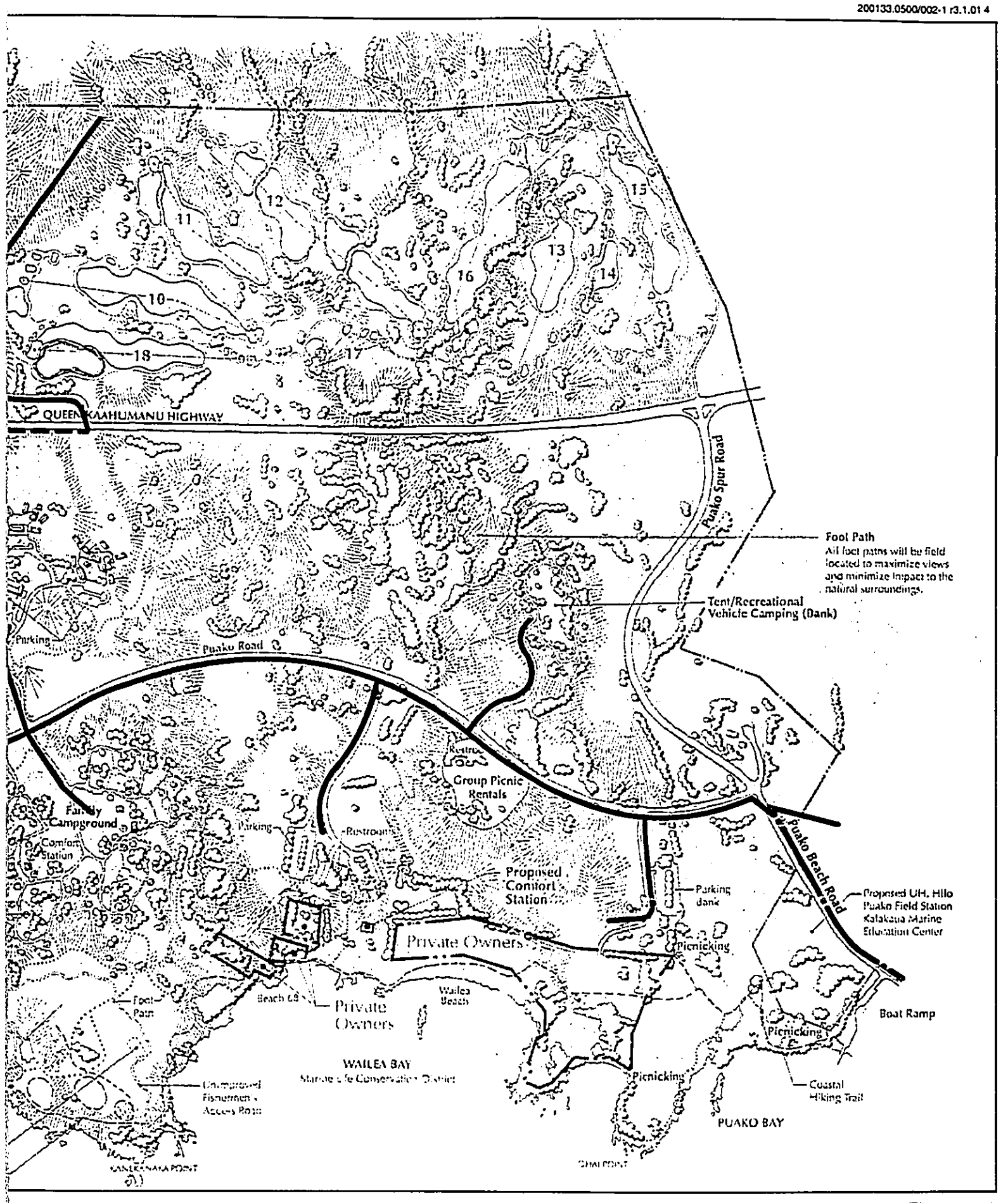


Figure 3-16
Hapuna Beach State Recreation Area Expansion
EXISTING & PLANNED ELECTRICAL POWER DISTRIBUTION SYSTEM

Plans are also being proposed by a private enterprise to construct a power and desalination plant in Kawaihae. The proposed 58-megawatt plant would provide the needed electrical power to serve the Department of Hawaiian Home Lands' planned residential community above Kawaihae.

Potential Impacts and Proposed Mitigation

The estimated power requirement for the proposed park expansion is 495 kilowatts (KW) per day. Electrical service will be required for buildings and limited outdoor lighting in the park area and parking lot.

Overhead utility lines will be installed to service the beach and park recreational areas, and underground lines will be provided to service the golf course and golf clubhouse.

The projected electrical power consumption for the project is based on current usage. It does not take into account energy conserving design features that could be incorporated into the project, such as waste heat recovery from air conditioning and refrigeration, solar water heating, natural ventilation and lighting, wind-powered generators for deep water supply wells, or on-site photo-voltaic systems. The feasibility of these and other methods may be considered at the time the new park facilities are in the design phase.

3.12.2.5 Telephone

Existing Conditions

Verizon Hawaii currently provides telephone service to the project site from the Queen Ka'ahumanu Highway and Hapuna Beach State Recreation Area north entrance road. The telephone line extends along the old Kawaihae–Puako Road and Puako Beach Road to serve the Wailua Beach house lots and Puako Beach Lots. A telephone substation along Queen Ka'ahumanu Highway near Waiaulaula Gulch connects the telephone system with the other regions of the island.

Telephone service in the existing park currently serves the caretaker's residence, park concession, and two public booths in the parking lot.

Potential Impacts and Proposed Mitigation

The proposed expansion will require new lines in the makai section of the park to serve the park headquarters and other new facilities. They will be installed on poles along the makai side of Queen Ka'ahumanu Highway and underground within the park site itself. The golf clubhouse and maintenance facilities will be connected with the Queen Ka'ahumanu Highway telephone line by a new underground service line.

A request for the expanded service will be made to the telephone company during the project design stage.

3.13 PUBLIC SERVICES AND FACILITIES

3.13.1 Health Care

3.13.1.1 Existing Conditions

West Hawaii has four health care and emergency facilities which provide a range of medical services. Two State-operated hospitals serve the Kohala area—the Kohala Hospital in Kapa'au and the Honoka'a Hospital in Honoka'a. The Kohala Hospital is primarily a long-term care institution which also offers 24-hour emergency care service. Staffed by five physicians, the facility has 8 acute-care beds and 18 long-term care beds. To accommodate increased demand for additional beds, Kohala Hospital is planning to add a new 20-bed wing to its facility. Financing has been obtained for planning, and construction will begin when funding becomes available.

There are 30 beds in the Honoka'a Hospital, 22 for acute-care patients and 8 for long-term care. The hospital is staffed by 11 physicians and is equipped with laboratories, x-ray facilities, and ambulance service. Neither the Kohala Hospital nor the Honoka'a Hospital is equipped to provide full patient services, and Honoka'a is considered primarily an acute-care facility.

The State-operated Kona Hospital is a full-service health care center located in Kealakekua, about 41 miles south from Hapuna Bay. It has 53 acute-care beds, 22 beds for long-term care, and an active staff of 55 physicians. The hospital is currently in an expansion program that will provide additional beds, new medical equipment and renovation of existing facilities to meet the growing demand for medical services in the region. Funding has already been appropriated for this expansion program.

In Waimea, the private Lucy Henriques Medical Center provides outpatient health care, including emergency room, laboratory, and radiology services. Currently, seven physicians staff the 24-hour emergency care facility. The North Hawaii Community Hospital opened a few years ago on the grounds of the Lucy Henriques site. The new 50-bed complex provides in-patient acute health care services.

3.13.1.2 Potential Impacts and Proposed Mitigation

There is a diversity of medical facilities in the region. Most of the medical centers are undergoing expansion and/or renovation to improve their quality and increase their capability to accommodate medical service demand in the area.

Hapuna Beach State Recreation Area visitors will be able to seek medical care at the Lucy Henriques Medical Center and new North Hawaii Community Hospital in Waimea, which are about 13 miles from the project site, or at any of the other hospitals in the Kohala and North Kona Districts.

3.13.2 Police Protection

3.13.2.1 Existing Conditions

Police service for the South Kohala District, which includes Waimea, Kawaihae, South Kohala coast and Waikoloa Village, is headquartered in Waimea. A staff of 23 officers and 4 administrative personnel operate from the 24-hour station.

Other stations are at Kapa'au in North Kohala and Kealakehe near Kailua-Kona. Both the Waimea and Kapa'au police stations are of relatively recent construction, and both have room for additional staff.

Office space is also located in the Kohala Coast Fire Station for police use. On-duty officers generally use the satellite office, which is located on Queen Ka'ahumanu Highway, to write reports, make bookings, and conduct interviews. They can remain on their beats longer without needing to return to headquarters. No permanent staff occupies the satellite office.

3.13.2.2 Potential Impacts and Proposed Mitigation

The proposed park expansion will generate a need for increased police service coverage in the Hapuna Bay and Wailea Bay areas. Routine patrols within the park, however, are not planned at this time. It is anticipated that County police services will be provided on an emergency or on-call basis.

During weekends and holidays, vehicular traffic in and out of the Hapuna Beach State Recreation Area will reach higher levels. With the increase in traffic along Queen Ka'ahumanu Highway, additional police service may be required for traffic-related matters.

Demands on County police services will be partially offset by on-site services provided by the park and golf course security personnel. Park managers and/or DOCARE security personnel, in addition to enforcing park rules, would be available to render emergency help or to call park headquarters for police assistance.

3.13.3 Fire Protection and Emergency Services

3.13.3.1 Existing Conditions

The South Kohala Fire Station on Queen Ka'ahumanu Highway currently serves the Kawaihae-South Kohala coastal area. The station is equipped with a fire engine, tanker truck and medic unit, and is staffed by a 24-hour crew of six firefighters and a paramedic who is qualified to provide advance life support service. Located 2-1/4 miles from the project site, the station can immediately respond to emergency calls at Hapuna.

Others stations in the region include the Waimea station, which has a full crew on duty 24 hours a day, and the Waikoloa Village Fire and Emergency Medical Interim Facility, which provides fire protection and basic life support emergency aid. Although the Waimea

station is located the farthest, it can respond to calls along the Kohala coast in about 20 to 25 minutes. Additional engines can be dispatched from North Kohala, if needed.

3.13.3.2 Potential Impacts and Proposed Mitigation

The proposed park expansion will result in a need for increased fire protection in the Hapuna-Wailea area of South Kohala. Increased overnight camping and camp fires, as well as daytime outdoor barbecues, may increase the potential for brush fires.

The Hapuna Beach State Recreation Area could institute park rules for camp fires and outdoor barbecues to encourage safe practice and make people mindful of potential hazards. The South Kohala Fire Station can respond to park area calls within a five-minute period. Roads and driveways within the park will be improved with the park expansion program; thus, the interior sections of the park will be more accessible to firefighting equipment. Improved areas of the park that contain large grass lawns will also act as possible fire breaks.

Hapuna beach also has an emergency phone with a direct 911 line to the police dispatch in Hilo. If needed, additional emergency phones could be installed within the park. All fire/emergency-related calls are routed also to the Hilo dispatcher who dispatches the distress call to the nearest fire station.

3.13.4 Harbors and Boat Ramps

3.13.4.1 Existing Conditions

Kawaihae Harbor, the only deep-water harbor in West Hawaii, is primarily used by interisland barges. It serves also as a recreational harbor. There are over 50 small boat moorings adjacent to the deep draft section of the port. Notably, the State and Corps of Engineers have plans to enlarge the moorings section to accommodate another 320 boats.

Honokohau Small Boat Harbor near Kailua-Kona serves commercial, charter, and recreational fishing and sail boats. There are currently over 250 small boat moorings at the facility and one small-boat launch ramp..

At Puako Bay, the State provides for public use a boat ramp, parking, and boat washdown area. Another boat ramp operated by the State is located in Mahukona.

3.13.4.2 Potential Impacts and Proposed Mitigation

Increased use of the expanded Hapuna Beach State Recreation Area would not increase the use of the Puako boat ramp. The activities in the park will be tied to the use of campgrounds, beach facilities, and a golf course. If the park expansion plan generates greater interest in boating and water sports, additional parking could be provided at the boat ramp site.

3.13.5 Parks and Recreation

Unless otherwise noted, the data presented in this section have been provided by Pedersen Planning Consultants in its *Economic and Financial Analyses Hapuna Beach State Recreation Area Expansion*, dated April 1995 (Appendix A).

3.13.5.1 Existing Conditions

County Beach Parks

There are 10 County of Hawaii beach parks in West Hawaii. According to the County of Hawaii, Department of Parks and Recreation, Kahaluu, White (Magic) Sands, and Spencer Beach Parks served almost 3,000 people per day in fiscal year 1992. Sunbathing was the predominant activity.

Hale Halawai Beach Park and Pahoehoe Beach Park are located in Kailua-Kona and are popular with residents and visitors alike.

Significantly less activity occurs at Hookena Beach Park and Miloli'i Beach Park in South Kona. Use of Ho'okena Beach Park is increasing as a growing number of West Hawaii residents continue to seek less-crowded environments. Miloli'i is almost exclusively used by residents of Miloli'i village.

Spencer Beach Park in Kawaihae allows overnight tent camping and can accommodate approximately 68 persons. In addition, campsites are available at County beach parks at Mahukona, Kapa'a, Keokea, and Ho'okena, which on a combined basis can provide camping for 79 persons.

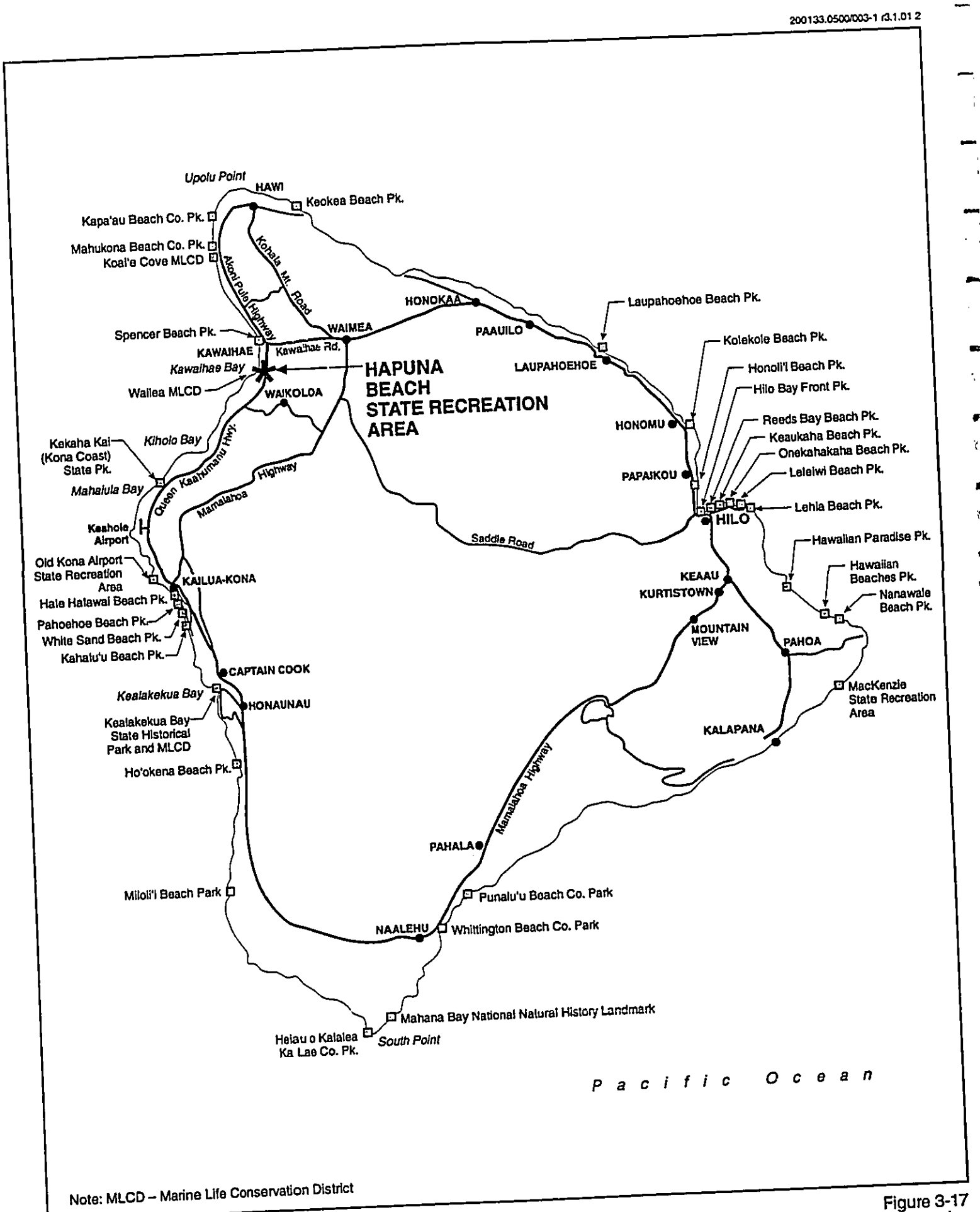
State Parks

Aside from Hapuna Beach, there are three other state beach parks in West Hawaii—Old Kona Airport, Kekaha Kai (Kona Coast), and Kealakekua Bay (Figure 3-17). The first two state beaches serve more than 1,900 people per day. A limited number of visitors and residents use Kealakekua Bay, which has also been designated as a State Marine Life Conservation District.

Old Kona Airport State Recreation Area

The 104-acre Old Kona Airport State Recreation Area includes a large community pavilion, two small picnic complexes, two restroom facilities, 15 picnic sites, and portions of the former airport runway that provides vehicular access and parking. Some 34 acres on the south end of the Old Kona Airport site are leased by the State to the County of Hawaii for its Kailua Park facilities.

Approximately 384,000 persons visit the park annually. Deducting the roughly 80,000 people who participated in County sports and cultural programs and informal activities over the year, the Old Kona Airport conceivably attracts as many as 304,000 persons per year or 833 people per day.



Note: MLCD – Marine Life Conservation District

Figure 3-17
Hapuna Beach State Recreation Area Expansion
COASTAL RECREATIONAL OPPORTUNITIES, COUNTY OF HAWAII

0 6 12
Scale in Miles

NORTH

Belt Collins Hawaii

The actual number of persons visiting the shoreline areas of the park are expected to be less than those visiting the park. Visual observations at the less-developed beach and shoreline areas suggest a limited use—less than 100 persons per day. Snorkeling and diving are popular at Pawai Bay, at the north end of the State Recreation Area. Limited shoreline fishing, picnicking, and sunbathing occur on the remainder of the Old Kona Airport's 1.5-mile shoreline. Local park caretakers say that the new Kekaha Kai (Kona Coast) State Park has caused a noticeable decline in the use of the Old Kona Airport.

Kekaha Kai (Kona Coast) State Park

Ka'elehuluhulu Beach is located approximately ten miles north of Kailua-Kona. The shoreline extends approximately 1,000 feet immediately south of Mahai'ula Bay. Facilities consist of 22 picnic tables, 10 portable toilets, and parking for about 70 vehicles.

The primary activity at Ka'elehuluhulu Beach appears to be sunbathing. The presence of an extensive white sand beach relatively close to Kailua-Kona is believed to be the reason for its significant use. The State Park caretaker reports that park users are probably 50 percent visitors and 50 percent residents. Other activities include some shoreline fishing, skimboarding, and bodyboarding.

Public response to the opening of this park to vehicular traffic in April 1992 was enormous. According to the State Park caretaker, peak usage has been over 1,000 vehicles per day. Sporadic vehicular counts conducted from May 7 through June 15, 1992, revealed that weekday attendance is more typically 150 to 350 cars, while weekend attendance ranges from 300 to 725 vehicles per day. Assuming that each car carries an average of two persons, Ka'elehuluhulu Beach is already attracting approximately 700 people on weekdays and 1,450 people on weekend days.

3.13.5.2 Potential Impacts and Proposed Mitigation

The anticipated trends clearly indicate that an expanded Hapuna Beach State Recreation Area will continue to be a primary recreational attraction for both residents and visitors. West Hawaii has four State Recreation Areas (including Hapuna) and three of them are popular beach parks. If Hapuna is expanded, none of these parks will match the diversity of available recreational opportunities. With expanded recreational opportunities at Hapuna, crowding would be minimized at nearby beach parks.

3.14 AIR QUALITY

3.14.1 Existing Conditions

Air quality is measured or characterized by comparing ambient air concentrations of specific pollutants (carbon monoxide, nitrogen dioxide, sulfur dioxide, particulates, lead, and ozone) to state and national ambient air quality standards (AAQS). In Hawaii, national AAQS are generally met. The state is therefore in "attainment" with national standards. For local compliance, State AAQS have also been met, with only some pollutant concentrations exceeding the carbon monoxide standard. This is primarily the result of

heavy traffic volumes on major roadways which occur in Honolulu but generally not on the Island of Hawaii.

On the Big Island, the worst air pollution episodes have been due to the infrequent and unpredictable volcanic eruptions. While volcanic emissions are somewhat variable and have not been fully characterized, visibility is affected by the presence of fine particulates generated directly from volcanic activity as well as secondarily from forest or brush fires caused by lava flows. Substantial increases in the ambient concentrations of mercury and sulfur dioxide also have occurred as a result of volcanic eruptions.

3.14.2 Potential Impacts and Proposed Mitigation

In the short term, the only direct adverse air quality impact that would result from the proposed park expansion would be the emission of fugitive dust during site preparation and construction.

Construction activity involving heavy earthmoving equipment traversing unpaved surfaces will generate fugitive dust. State of Hawaii regulations stipulate that control measures should be employed to reduce fugitive dust emission. The effective wetting down of exposed soil areas is a measure that can reduce particulate emission levels from construction sites by as much as 50 percent. Other control measures that could be implemented include good housekeeping on the job site and paving or landscaping of bare soil areas as quickly as possible. This is especially advantageous for the project area which can easily generate dust under windy conditions.

Heavy construction equipment via engine exhaust will also emit air pollutants. However, the number and use of equipment will be minimal and short-term and will result in little impact to the existing air quality.

The project's long-term impacts on air quality are also expected to be minimal. No large stationary sources, such as manufacturing/industrial activities, County public works, or large agricultural burning operations, are associated with the project. Emissions from automotive traffic will be minimal[4] and are not expected to exceed State or national ambient air quality standards. During the weekends and special events or holidays, traffic levels will be elevated in the parking areas for short periods of time. Generation of pollutant levels greater than the State carbon monoxide standard is possible under certain stagnant atmospheric conditions but is not likely.

Camp fires and open pit barbecues will emit particulate matter into the atmosphere but will not have a significant effect on the overall air quality of the area. In summary, no significant short-term or long-term adverse effects on air quality are expected as a result of the proposed action. During construction, fugitive dust will be generated but should be controlled as required by State regulations.

[4] Less than ten percent of the vehicles projected at the intersections of Puako Spur Road-Queen Ka'ahumanu Highway and Hapuna Beach Road-Queen Ka'ahumanu are projected to be due to park use.

3.15 NOISE

3.15.1 Overview

The Federal Highways Administration (FHWA) has developed noise abatement criteria for various areas of activity. For recreational areas, such as Hapuna Beach State Recreation Area, FHWA's criteria includes a maximum hourly sound equivalent (Leq) of 67 decibels (db) and a maximum sound level of 70 db that can be exceeded ten percent of the time (L_{10}) (either Leq or L_{10} can be use on a project, but not both).

Another unit of measure, the Day-Night Sound Level (Ldn), is commonly used for measuring environmental noise and for relating the acceptability of the noise environment for various land uses. It represents the 24-hour average sound level for an average day, with nighttime noise levels (10:00 pm to 7:00 am) increased by 10 db prior to computation of the 24-hour average. Federal agencies such as Housing and Urban Development (HUD), Department of Transportation, and EPA consider 65 db Ldn to be an acceptable exterior noise level in residential areas. The 65 db Ldn level is used as a federal regulatory threshold for determining the necessity for special noise abatement measures when federal funding is requested. A future goal of 55 db Ldn is recognized by these agencies, however, this lower level has not been adopted for regulatory purposes due to economic and technical feasibility considerations. In Hawaii, no state or local standard for a 24-hour averaged noise level has been established.

3.15.2 Existing Conditions

Ambient noises in the Hapuna Beach State Recreation Area are generated by vehicular traffic, park users, surf breaking on the shoreline, and foliage rustling in the wind. The nearest off-site populations subject to any one of these noises include the private residences located within the park (along Wailea Bay), Puako Bay residences located approximately 500 feet to the south, and residences located in the adjacent Mauna Kea Resort, approximately 1,300 feet to the north.

The greatest noise levels in the Hapuna Beach State Recreation Area occur from traffic along Queen Ka'ahumanu Highway. Based on the *Updated Acoustic Study of The Proposed South Kohala Resort* (Y. Ebisu & Associates, June 1987) for the *Draft Environmental Impact Statement South Kohala Resort* (Belt Collins & Associates, September 1987),[5] noise levels along the highway are less than 72 db Ldn.[6] With increasing distance from the highway, traffic noise significantly decreases. At a distance of approximately 200 feet from Queen Ka'ahumanu Highway, noise levels are estimated to be less than 60 db Ldn.

---

[5] The South Kohala Resort has been integrated with the Mauna Kea Beach Hotel Resort and is now referred to as the Mauna Kea Resort.

[6] A noise level of 72 db Ldn was projected at the edge of the highway for the 1998 year. This noise level was based upon noise measurements obtained in 1984 and natural growth projections established in 1987. Because natural growth projections in 1987 were greater than those today, the 72 db Ldn predicted for 1998 should overestimate existing 1995 noise levels.

Other man-made sources of noise include the vehicles entering and leaving the park and the activities of park users. Noises created by these sources have not been quantified; however, they have not been identified as being noticeable to on-site park users, especially during weekends and holidays when park use is heaviest.

3.15.3 Potential Impacts and Proposed Mitigation

The potential noises associated with the proposed park expansion will vary between the construction and operational phases. In either phase, the extent of potential noise impacts is expected to be minimal because of the lack of occupational and limited residential populations in close proximity to the proposed expansion activities. However, because some of the Wailea beachfront residents are concerned over possible negative effects of increased traffic and noise created by the increased use of Wailea Beach, potential noise impacts have been evaluated.

Construction Noise

Construction noise will be generated primarily by heavy earth-moving equipment, including bulldozers, dump trucks, scrapers, and back hoes. Installation of utilities and landscaping will produce lower noise levels. No significant noise-generating activities such as blasting are planned.

Depending upon the type and quantity of equipment used, construction noise levels of approximately 90 to 70 db are expected to occur approximately 50 to 500 feet, respectively, from the source. These noise levels will decrease significantly with increasing distance from the source—a 6 db decrease is generally exhibited with each doubling of the distance between the source and the location at which the noise is audible. The relationship between noise levels and distance is mathematically described in the following "inverse square law" equation.

$L_2 = L_1 - 10\log (r_2/r_1)^2$, where
L_1 = sound pressure level (db) at a distance r_1, and
L_2 = sound pressure level at distance r_2.

The greatest noise is expected to occur during golf course construction. However, this noise will not create adverse impacts because adjoining lands are uninhabited. The nearest residential community is approximately 1,300 feet from the golf course site, well outside of the 500-foot radius where construction noises of approximately 70 dBA would be audible. Applying the general relationship between noise levels and distance (the inverse square law) at 1,300 feet from the site, construction would generate a noise level of 62 db.[7] Because construction would occur only in the daytime, the federally-accepted exterior noise level of 65 db Ldn for residential areas is not expected to be exceeded.

While construction noises are not expected to exceed established noise criteria, mitigation measures will be taken, nonetheless, to lessen the potential of noise impacts to the

[7] L_1 = 70 db; L_2 = sound pressure level at R_2; R_1 = 500 feet; R_2 = 1,300 feet. Therefore, L_2 = 70 db - 10log $(1,300/500)^2$ = 62 db.

adjacent sparsely populated communities. Such mitigation measures will include: (1) use of properly muffled equipment on the job site; and (2) compliance with the State of Hawaii Department of Health construction noise regulations, curfews, and permit procedures.

Noise During Park and Golf Course Operations

Noise will be generated by golf course maintenance activities (e.g., lawn mowers, sprinklers), vehicular traffic within the park, and park users (beach users, campers, picnickers, and fisherman). Because of the nature of these sources and the lack of nearby populations, noise levels are expected to be minimal and their impacts negligible. Noise during night hours carries over a longer distance and may impact adjacent residences. Camping and picnicking areas are planned in clusters and are separated by large open spaces. None of the overnight or group picnic facilities are planned nearer than 700 feet from any residences. Potentially significant noise will result from the increase in vehicular traffic on Queen Ka'ahumanu Highway and is, therefore, further discussed herein.

Potential noise levels associated with vehicular traffic have been evaluated with the use of the *Updated Acoustic Study of The Proposed South Kohala Resort* (Y. Ebisu & Associates, June 1987) and the *2010 Traffic Impact Assessment Report for Hapuna Beach State Recreation Area Expansion* (Pacific Planning & Engineering, Inc., February 1995) (Appendix H). The September 1987 study indicated that a noise level of 72 Ldn would be expected along Queen Ka'ahumanu Highway in 1998, after full development of the adjacent Mauna Kea Resort. The 72 db Ldn noise level projection was based upon the presence of 23,110 vehicles per day (vpd) along the segment of highway between Mauna Kea Beach Hotel and Hapuna Beach Prince Hotel entrance roads, approximately 3,200 feet north of the Hapuna Beach Road intersection.

The more recent February 1995 traffic projections indicate that the total number of vehicles projected along the highway in 2010 will be less than the projected traffic that resulted in the 72 db Ldn noise level estimate.[8] Both the September 1987 and February 1995 figures reflect their own project projections along with regional growth projections established at the time the respective studies were performed. The decrease in vpd from the September 1987 study to the February 1995 study is believed to be due to the slowdown in actual growth and growth projections for the West Hawaii region. Based on these projections, noise levels along the highway in 2010 are expected to be less than 72 db Ldn.

Audible highway noise will be even less than 72 db Ldn because populations, e.g., park users and residences, will be located away from the highway. As demonstrated in the September 1987 study, noise levels of 72 db Ldn alongside the highway would be perceived as 60 db Ldn approximately 200 feet from the highway. With obstructions, such as elevated terrain, noise levels will be further attenuated.

[8] The February 1995 traffic study indicated that 18,120 vpd, excluding vehicles associated with the proposed park expansion, would be expected during the 2010 year. With the addition of project related vehicular traffic, 21,006 vpd are projected upon completion of the Hapuna Beach State Recreation Area expansion activities in the year 2010. Vehicles associated with the proposed park expansion were estimated by assuming that the peak hour vehicle counts, obtained from the February 1995 traffic study, occur for a period of four hours per day and that the remaining hours are characterized by 50% of the peak hour vehicle count: 2,886 vpd = (222 vph x 4 h/day) + 222 vph x 0.50 x 18 h/day).

Planned park uses will occur no closer than 350 feet from the highway and outside the range where noise levels may be greater than 60 db Ldn. Existing residences within the adjacent Mauna Kea Resort are located approximately 120 feet from the highway and outside the 100-foot range where noise levels could exceed 65 db Ldn.[9] For Wailea beachfront residences, located more than 2,500 feet from the highway, noise levels will be significantly less than 65 db Ldn. Therefore, vehicular traffic noise resulting from the proposed park expansion will not exceed the federally-accepted level of 65 Ldn for exterior residential areas or FHWA's hourly Leq of 67 db or the L10 of 70 db. Besides providing a 350-foot buffer zone between the highway and noise sensitive park developments such as camping sites, no other noise mitigation measures are planned.

3.16 VIEWS

3.16.1 Existing Conditions

The primary views from the Queen Ka'ahumanu Highway are of the Kohala coast, South Kohala District plains, Kohala Mountains, Mauna Kea, and Hualalai. The sheer size of these views dwarf the significance of any other view in the region.

From the central portion in the makai section of the property, the highway and mauka land are visible, and from the uppermost portion of the property looking makai, almost the entire project site can be seen. The most aesthetically pleasing view of the project site is the lateral shoreline vistas.

3.16.2 Potential Impacts and Proposed Mitigation

When the proposed project is completed, the appearance of the area will be changed. What was once a brownish barren landscape with sparse vegetation in the central and mauka lands and dense green vegetation near the shoreline, will be a slightly altered landform with green lawns and landscaped trees and shrubs in the mauka area above the highway, and pockets of regenerated vegetation and landscaped areas in the makai area where the proposed campgrounds, picnic areas, and beach park facilities will be located.

The change in the makai land will be subtle because the improvements are intended to blend with the surrounding environment. It should be noted the majority of the makai property will not be altered and thus remain in its natural state.

The proposed improvements will consist primarily of landscape lawns and plant areas, park furnitures, and a few small structures that are designed to fit into the low-profile character of the land. The park headquarters, overnight cabins, campground amenities, and picnic shelters will be conducive of a park setting and no buildings will be higher than one story. The park improvements will not interfere with any viewplanes from the highway to the ocean, nor with views from the shoreline to the highway and upland plains.

---

[9] Based on projections provided in the *Updated Acoustic Study of The Proposed South Kohala Resort* (Y. Ebisu & Associates, June 1987) for 23,110 vpd. In this case, attenuation of noise due to elevated terrain is reflected in the noise projections.

CHAPTER 4
CONSISTENCY WITH LAND USE PLANS, POLICIES, AND CONTROLS

4.1 HAWAII STATE PLAN

The Hawaii State Plan (Chapter 226, HRS, 1995) consists of a series of broad goals, objectives, and policies that serve as guidelines for the growth and development of the State. In general, the expansion of the Hapuna Beach State Recreation Area is consistent with the intent of the Hawaii State Plan. Below is a discussion of the project's relationship to the State Plan's specific goals, objectives, policies, and implementing actions.

4.1.1 Overall Themes, Goals, Objectives, and Policies

Section 226-4—State Goal

In order to guarantee, for present and future generations, those elements of choice and mobility that insure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve:

(2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

The proposed project is consistent with the goals of the State Plan. It will provide a much-needed public recreational facility that combines active recreational opportunities with passive leisure amenities. To a large extent, it will allow patrons and visitors alike to appreciate the natural resources of the area. Moreover, it will assure the long-term protection of special natural features and sensitive coastal resources. The intrinsic beauty of the site and surrounding areas will be preserved by the permanent designation of the property in open space.

Section 226-11—Objectives and Policies for the Physical Environment—Land-Based, Shoreline, and Marine Resources

(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:

- *Prudent use of Hawaii's land-based, shoreline, and marine resources.*
- *Effective protection of Hawaii's unique and fragile environmental resources.*

(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:

- *Exercise an overall conservation ethic in the use of Hawaii's natural resources.*
- *Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.*
- *Take into account the physical attributes of areas when planning and designing activities and facilities.*
- *Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.*
- *Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.*
- *Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.*
- *Pursue compatible relationships among activities, facilities, and natural resources.*
- *Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.*

The preparation of this FEIS is part of a review process mandated by State law. It provides a vehicle for the community to obtain information and offer input on the proposed project. The FEIS discloses information on soils, drainage, plants, animals, agricultural potential, historic sites, natural hazards, noise, air quality, traffic, utilities, and socio-economic conditions, and provides descriptions of anticipated impacts. The FEIS also provides possible mitigation measures to reduce or remove any negative project impacts that may be generated.

Overall, the project minimizes the impact on the area's natural resources by appropriate management practices. Park facilities will be selectively sited to avoid or minimize environmental effects on sensitive coastal areas. The park enables residents and visitors to appreciate the natural outdoor setting. The park's design philosophy, notably, preserves as much of the existing natural landscape as possible for public enjoyment.

Section 226-12—Objective and Policies for the Physical Environment—Scenic, Natural Beauty, and Historic Resources

(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.

(b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

- *Promote the preservation and restoration of significant natural and historic resources.*
- *Provide incentives to maintain and enhance historic, cultural, and scenic amenities.*
- *Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.*
- *Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.*
- *Encourage the design of developments and activities that complement the natural beauty of the islands.*

The preservation of the site's natural beauty and inherent cultural/historic value was considered in the planning process. There will be only minimal alteration to land near the shoreline and in culturally rich areas, and development within the expansion area will be low-key. Coastal views will be preserved.

The fairways of the golf course will be integrated with the existing topography. Earthwork will be minimized and many "rough" or border areas abutting the fairways will be left natural and unaltered.

Significant cultural resources will be identified and appropriate mitigation will be carried out in consultation with the State Historic Preservation Division.

Section 226-13—Objectives and Policies for the Physical Environment—Land, Air, and Water Quality

(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:

- *Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.*
- *Greater public awareness and appreciation of Hawaii's environmental resources.*

(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:

- *Promote the proper management of Hawaii's land and water resources.*

- *Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.*
- *Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaii's people.*
- *Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.*
- *Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.*
- *Foster recognition of the importance and value of the land, air, and water resources to Hawaii's people, their cultures, and visitors.*

The proposed project will not have significant adverse impacts on air and water quality. Activities will not generate significant amounts of air pollutants. Construction-related dust and emissions will be short-term and mitigation measures would minimize potential impacts.

Surface and marine waters would not be significantly impacted as a result of the proposed improvements. The components of fertilizer and pesticides on the new golf course would remain near the surface of the ground and would not penetrate to groundwater and subsequently drift to marine waters. Furthermore, the golf course is located more than 2,800 feet from the shoreline.

Brackish water from on-site wells will be used for irrigation of the park landscaping and golf course fairways. Potable water will be conserved and used only at visitor facilities within the park and at the golf course clubhouse and maintenance facility.

The proposed project is subject to natural hazards such as flooding, tsunami inundation, hurricanes and earthquakes, but property damage would be minimal because most of the site will remain in open space.

The proposed landscape treatment in the park and golf course and the new drainage system are expected to result in no more than a zero net gain in runoff from the property. The use of swales and on-site drainage basins or dry wells would control surface runoff and reduce the dangers of flooding downstream of the project site.

Section 226-14—Objective and Policies for Facility Systems—In General

(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.

(b) To achieve the general facility systems objective, it shall be the policy of this State to:

- *Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.*
- *Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.*
- *Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.*
- *Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.*

The proposed project is part of the State's long-range plan for the Island of Hawaii's park system. Expansion would meet growing recreational needs in the region over the next 10 to 15 years. Improvements will be developed in phases to accommodate the incremental growth in user demand as well as to phase the cost of construction to match the availability of funds. Incremental development also provides opportunities to be flexible and to make plan revisions and updates as needed.

Section 226-23—Objective and Policies for Socio-Cultural Advancement—Leisure

(a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

(b) To achieve the leisure objective, it shall be the policy of this State to:

- *Foster and preserve Hawaii's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.*
- *Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently.*
- *Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.*
- *Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.*
- *Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.*

- *Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.*
- *Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawaii's people.*
- *Assure adequate access to significant natural and cultural resources in public ownership.*

The Hapuna Beach State Recreation Area Expansion will provide for the increased recreational needs of the community. It will improve access to significant natural and cultural resources and increases the diversity of recreational opportunities in the area. The expansion is intended to enhance the enjoyment of recreational experiences through new and improved facilities, educational programs, stronger safety measures, tighter security provisions and upgraded maintenance operations.

4.2 STATE FUNCTIONAL PLANS

The State Functional Plans are intended to provide more detail to the Hawaii State Plan in fourteen specific areas of concern—agriculture, conservation lands, education, higher education, employment, energy, health, historic preservation, housing, human services, recreation, tourism, transportation, and water resource development. As defined in Chapter 226, Hawaii Revised Statutes, a functional plan sets forth "the policies, programs and projects designed to implement the objectives of a specific field of activity when such activity or program is proposed, administered, or funded by an agency of the State." These plans have been reviewed to determine their relationship to the proposed Hapuna Beach State Recreation Area project, and a discussion summarizing their relationship is provided below.

4.2.1 State Agriculture Functional Plan

The State Agriculture Functional Plan sets forth the policies, programs, and measures for implementing the agricultural and agricultural-related objectives, policies and priority guidelines contained in the Hawaii State Plan.

Policy H(2) of the State Agriculture Functional Plan states "conserve and protect important agricultural lands in accordance with the Hawaii State Constitution". The project site consists of sparse vegetation on rocky soil unsuitable for cultivation. The area below the highway is designated primarily in the Conservation District and is not classified as Prime, Unique or Other Important Agricultural Land according to the Agricultural Lands of Importance to the State of Hawaii (ALISH) Map No. H-15. Although, the area above the highway is designated in the Agricultural District by the State Land Use Commission, it is not classified on the ALISH map as important agricultural land.

4.2.2 State Conservation Lands Functional Plan

Completed in 1991, the State Conservation Lands Functional Plan provides a management program that allows judicious use of the State's natural resources. It provides a framework

for the protection and preservation of the state's pristine lands and shorelines. The following objectives, policies and implementing actions of the functional plan are directly relevant to the proposed park expansion. Although they are directed to State and County agencies, private industries can offer cooperation and compliance in specific policy areas.

Objective IIC: *Enhancement of natural resources.*

Policy IIC(2): *Expand and enhance outdoor recreation opportunities and other resource uses.*

Implementing Action: *Upgrade and enhance the State's outdoor recreational infrastructure of roads, trails, and shelters.*

Implementing Action: *Expand nature trail system.*

The proposed project will provide a diversity of recreational opportunities including swimming, camping, picnicking, hiking, fishing and sunbathing. A natural trail system will be an integral part of the proposed park improvements.

Objective IID: *Appropriate development of natural resources.*

Policy IID(1): *Develop and expand resources to protect natural shorelines and wilderness recreational areas.*

Implementing Action: *Acquire undeveloped shoreline properties.*

Acquisition of private residential lots behind Wailea Beach will not be undertaken at this time. Although most of these lots are developed, their future acquisition would be key to providing additional open space adjacent to the beach.

Objective IIIA: *Expansion and promotion of a public conservation ethic through education.*

Policy IIIA(1): *Develop and implement conservation education programs for the general public and visitors.*

Implementing Action: *Develop and implement ongoing environmental education and information programs to address subjects such as litter, vandalism, poaching, anchor damage of coral, depletion of recreational fisheries, and destruction of native upland ecosystems.*

Information will be available at park headquarters on operating hours, recreational opportunities and facilities, park rules and regulations, safety provisions, and resource conservation.

Policy IIIA(2): *Develop and implement information and educational programs directed toward specific areas and users of lands and natural resources.*

Implementing Action: *Develop a public education program on beach park use for users of limited ocean and shoreline recreation resources and facilities.*

As described above, the Hapuna Beach State Recreation Area Expansion will provide information on park use as well as information on the need to preserve environmentally sensitive areas.

4.2.3 State Education Functional Plan

The State Education Functional Plan contains policies and strategies of the Department of Education (DOE). It is not applicable to the Hapuna Beach State Recreation Area Expansion.

4.2.4 State Employment Functional Plan

The intent of this plan is to "guide employment, training, and human resources services in Hawaii". Its major focus is on education and preparation for employment, followed by recommendations for meeting current and anticipated labor shortages as well as improving the quality of the workplace for workers. It does not directly relate to the proposed park expansion.

4.2.5 State Energy Functional Plan

The objectives of the State Energy Functional Plan are to achieve dependable, efficient and economical statewide energy systems capable of supporting the needs of the people, and achieve increased energy self-sufficiency. These relate both to overall land use planning and to specific building design and equipment selection decisions. While specific building designs have not been completed for the proposed project, final design will adhere to energy conservation standards, wherever practicable.

4.2.6 State Higher Education Functional Plan

There are no policies or implementing actions in this functional plan that directly relate to the proposed project.

4.2.7 State Health Functional Plan

The State Health Functional Plan focuses primarily on changing the State's role in public health from that of individual health care provider to one of advocacy and a catalyst for public and private sector efforts. Several of the plan's implementing actions relate to the Department of Health permit/approval processes which the proposed project is subject to. These include the review of private wastewater treatment systems; discharges to air and surface water/ground water; treatment and disposal of solid wastes; new sources of

drinking water; and air conditioning and mechanical ventilation systems for buildings that are used by the public. These topics and their relationship to the proposed project are discussed in various sections of this EIS.

4.2.8 State Historic Preservation Functional Plan

The State Historic Preservation Functional Plan endorses enhanced public support of historic preservation, creates preservation priorities and parameters, evaluates the relationship of development to the preservation of history, explores community interest and involvement with the remnants of its past, and determines the outcome of developing a Statewide History Center. The proposed park expansion will be developed to conform with these objectives.

4.2.9 State Housing Functional Plan

The objectives, policies and implementing actions of this functional plan do not directly relate to the proposed Hapuna Beach State Recreation Area Expansion project.

4.2.10 State Human Services Functional Plan

These State objectives and policies do not relate directly to the proposed Hapuna Beach State Recreation Area project.

4.2.11 State Recreation Functional Plan

The State Recreation Functional Plan (SRFP) calls for acquiring or preserving lands of recreational value, providing adequate recreation facilities and programs, and assuring public access to recreation areas. The State Comprehensive Outdoor Recreation Plan (SCORP), completed in 1990, provides the technical basis and planning assumptions used to develop the SRFP.

The SRFP identifies six issue areas and proposes strategies for addressing those issue areas. Below are relevant policies and implementing actions of the SRFP which are directly related to the proposed Hapuna Beach State Recreation Area Expansion.

Objective I-A: *Address the problem of saturation of the capacity of beach parks and nearshore waters.*

Policy I-A(1): *Acquire additional beach parkland and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreational use.*

Implementing Action: *Acquire beaches in the following areas: (For Hawaii Island) Wailea Bay, 'Anaeho'omalu Bay to Ka'upulehu, and Kua Bay.*

The SRFP indicated that beachfront properties suitable for park use need to be acquired before they are developed or become unavailable due to high land costs. The SRFP specifically identifies Wailea Bay.

Objective I-B: *Reduce the incidence of ocean recreation accidents.*

Policy I-B(1): *Increase support for water safety programs.*

Implementing Action: *Provide lifeguard services at State beach parks, with top priority given to heavily used areas with hazardous conditions.*

Two lifeguards are stationed at Hapuna Beach. Additional safety programs are being planned as part of the proposed expansion.

Objective II-A(1): *Plan, develop, and promote recreational activities and facilities in mauka and other areas to provide a wide range of alternatives.*

Policy II-A (3): *Proceed with planning, acquisition, and development of trails.*

Implementing Action: *Plan and develop the following demonstration and priority trails identified by the Na Ala Hele Program: (On the Island of Hawaii) Kohala Ditch Trail, Humuula Trail via Ookala, and Ala Kahakai (Kawaihae to Kailua-Kona)*

The Ala Kahakai will be incorporated with other trails in the expanded Hapuna Beach State Recreation Area.

Objective II-C: *Improve and expand the provision of recreation facilities in urban areas and local communities.*

Policy II-C(1): *Meet the demand for recreational opportunities in local communities.*

Implementing Action: *Provide opportunities for golf at reasonable cost by planning new municipal courses and by assuring that privately developed courses have provision for play by residents at "kamaaina rates."*

The proposed public golf course is intended to achieve the above objective, policy and implementing action.

Objective III-D: *Acquire, develop, and manage additional public accessways.*

Policy III-D(1): *Give priority to acquiring public access to selected shoreline and mauka recreation areas.*

Implementing Action: *Identify top priority lands that should be acquired and provide means of funding for acquisition (e.g., Land Bank).*

The proposed project is in compliance with the intent of the above policy by its proposed preservation in perpetuity of designated open space and public accesses to the shoreline.

Policy III-D(2): *Provide adequate improvements at public accessways.*

Implementing Action: *Construct secondary roads, vehicular parking, comfort stations, and signs at selected public accessways, as appropriate.*

The proposed expansion of the Hapuna Beach State Recreation Area and its proposed improvements achieve this policy and implementing action.

Objective IV-A: *Promote a conservation ethic in the use of Hawaii's recreational resources.*

Policy IV-A(1): *Emphasize an educational approach, in coordination with enforcement efforts, to promote environmental awareness.*

Implementing Action: *Promote and coordinate the development and implementation of environmental education and information programs to address subjects such as litter, vandalism, poaching, anchor damage of coral, depletion of recreational fisheries, and destruction of native ecosystems.*

Park personnel in the expanded facility will not only enforce rules and regulations but promote conservation of park resources.

Objective IV-B: *Prevent degradation of the marine environment.*

Policy IV-B(1): *Enhance water quality to provide high-quality ocean recreation opportunities.*

Implementing Action: *Regularly monitor the water quality at key ocean recreation sites.*

In 1991, consultants Charles Murdoch and Richard Green assessed the potential environmental effects of fertilizers and pesticides on surface and shoreline waters of the project site, as well as on the area's groundwater. The study concluded that the proposed expansion is not expected to adversely impact nearshore water quality.

Objective V-A: *Properly maintain existing parks and recreation areas.*

Policy V-A(1): *Improve the maintenance of existing parks.*

Implementing Action: *Establish preventive maintenance programs in the State and County recreation agencies.*

Implementing Action: *Increase funding and staffing for maintenance of State and County parks and recreation facilities.*

Operations and maintenance resources, including preventive maintenance programs, will be included with the proposed expansion.

4.2.12 State Tourism Functional Plan

The State Tourism Functional Plan serves as a guide in helping organize the various sectors of government and private industry toward achieving statewide objectives on tourism development.

One of the relevant objectives of the tourism functional plan with respect to the proposed project is Objective IIA: Development and maintenance of well-designed visitor facilities and related developments which are sensitive to the environment, sensitive to neighboring communities and activities, and adequately serviced by infrastructure and support services.

The proposed project is intended to provide expanded recreational opportunities to both residents and visitors in an environmentally compatible way. Adequate infrastructure and support services will be provided to serve the expanded park.

4.2.13 State Transportation Functional Plan

The overall objective of the plan is to provide for the efficient, safe, and convenient movement of people and goods. Transportation issues are addressed in the traffic analysis section of this document. The project is consistent with State transportation goals.

4.2.14 State Water Resources Development Functional Plan

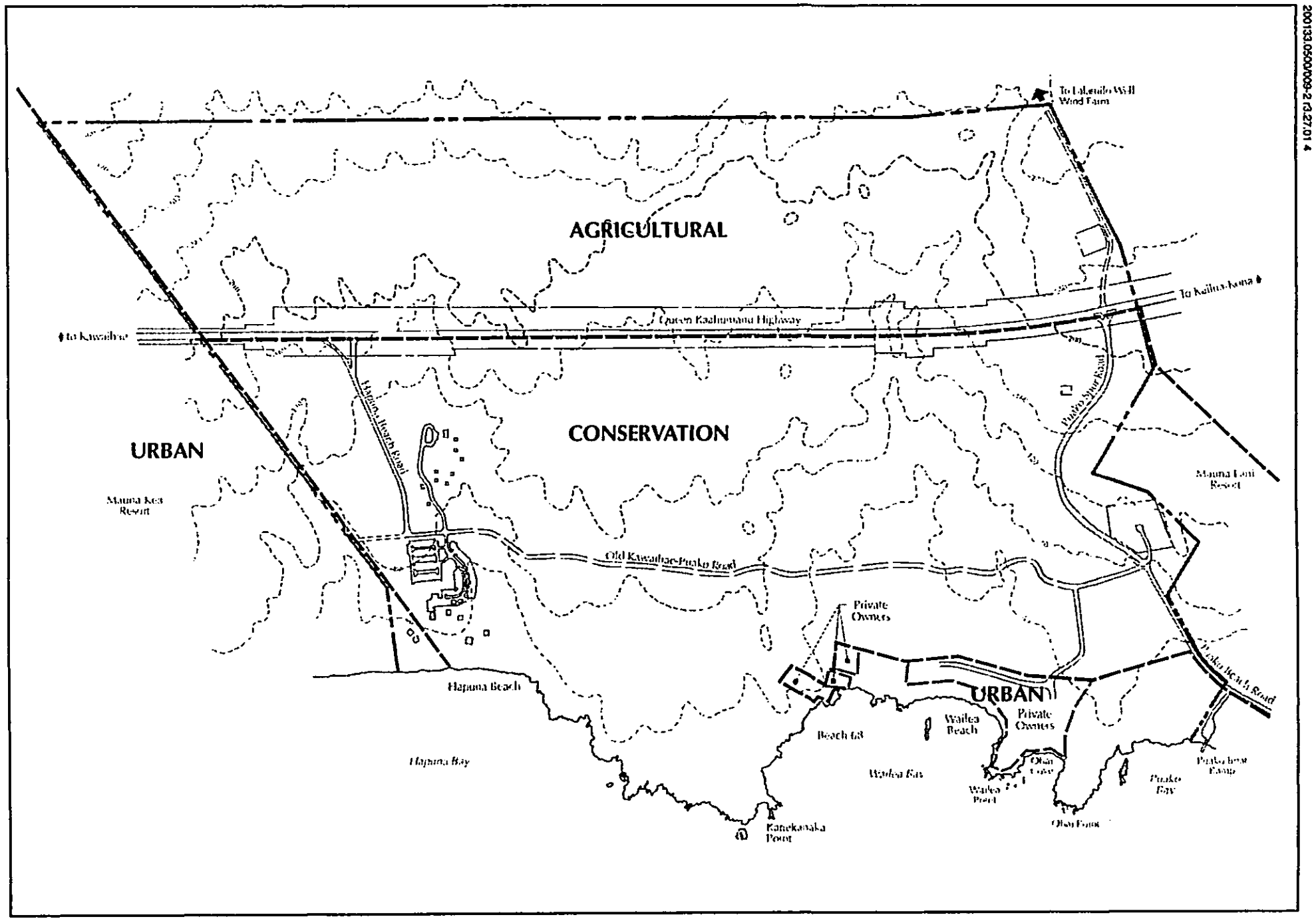
This functional plan is directed primarily at State operations and, to some extent, to private industry. The plan presents general objectives and policies for the management of potable water supply, floodplains, agricultural water, and estuarine environments that could be considered relevant to this project. The project is consistent with this functional plan.

4.3 STATE LAND USE LAW

The lands encompassed in the project area are classified by the State Land Use District Boundaries Map, No. H-15, as Conservation, Agricultural and Urban. Most of the land makai of the Queen Ka'ahumanu Highway is in the Conservation District. The Wailea Beach Lots, Puako boat ramp, and a small area on the northern boundary of Hapuna Beach are in the Urban District. The undeveloped land above the highway is classified as Agricultural (see Figure 4-1).

In the most recent State Land Use District Five-Year Boundary Review, which began in 1990 and concluded in 1992, the Office of State Planning (OSP) recommended three areas within the project site for land use district reclassification. The first consisted of an Urban to Conservation District reclassification of a 6.3-acre strip of land behind Wailea and Puako Bays. This strip would provide an area needed for beach and shoreline recreation.

200133.0500/009-2 (3.27.01) 4



0 700 1400
SCALE IN FEET

NORTH

Belt Collins Hawaii

Figure 4-1
Hapuna Beach State Recreation Area Expansion
STATE LAND USE DISTRICT MAP

On the northern boundary of the project site, a 5.69-acre parcel was proposed for reclassification from Urban to Conservation. According to the OSP report, in 1951, when the Territory of Hawaii first set aside land at Hapuna Bay for park purposes, it did not have title to the 5-acre property (this land belonged to the Parker Ranch estate). The State land use district boundaries were not drawn until 1964, and since that land belonged to the ranch, it was left in the Urban District. Shortly after the boundary was drawn, the ranch donated the 5-acre parcel to the County. In 1966, the County then dedicated the land to the State. Unfortunately, the district boundary line was not amended at the same time to include the 5-acre site within the Conservation District.

The third area recommended for reclassification (Agricultural to Conservation) was a 9.61-acre parcel located on the eastern boundary of the existing park along the Queen Ka'ahumanu Highway. The Agricultural classification was established prior to the construction of the highway and is now a remnant piece makai of the right-of-way in the Conservation District.

Notably, the current State Land Use District Boundaries Map, No. H-15, shows the third area as already being in the Conservation District. In a confirmation by the State Land Use Commission, the district boundary was corrected on May 24, 1985 to abut the makai side of the highway.

The portion of the park expansion which is located in the Conservation District is consistent with the objectives of the State designated area. The district is further divided into subzones including a Protective Subzone, Limited Subzone, Resource Subzone, General Subzone and Special Subzone. The project site is located primarily within the Resource Subzone. There is also a small area near the southern boundary of the property which is located in the General Subzone.

The objective of the Resource Subzone is to develop, with proper management, areas to ensure sustained use of their natural resources. These areas include lands necessary for providing future parkland and lands presently used for national, state, country and private parks. They also include lands suitable for outdoor recreational uses such as hunting, fishing, hiking, camping, and picnicking. The General Subzone has a similar but broader objective than the Resource Zone.

Mauka of the highway, the proposed golf course will be located in the Agricultural District which permits such recreation facilities, provided the land is not classified with an "A" or "B" soil rating by the Land Study Bureau (LSB). Review of current LSB soil maps shows that the soil in this area is classified "E".

4.4 WEST HAWAII REGIONAL PLAN

In 1989, the Office of State Planning prepared the West Hawaii Regional Plan. In the plan, four "Resort Destination Nodes" where resort development should be confined were identified.

- Mauna Kea Resort Node
- Mauna Lani/Waikoloa Resort Node
- Kaupulehu/Kona Village /Kukio Resort Node
- Keahole-Keauhou Resort Node

The Hapuna Beach State Recreation Area Expansion is located between the Mauna Kea Resort and Mauna Lani/Waikoloa Resort Nodes. The following strategies and actions recommended in the West Hawaii Regional Plan relate directly to the proposed project:

- *Recognize and protect scenic areas, natural landmarks, open space, and viewsheds as amenities that: improve the quality of life for Hawaii's residents, support the visitor industry and influence land use patterns.*

- *Identify and protect scenic areas and open space areas that enhance the present or potential value of abutting or surrounding communities, or would maintain or enhance the conservation of natural or scenic resources.*

- *Implement recommendations from government agencies that high value coastal recreation sites be protected from conflicting uses.*

- *Evaluate the potential impact of land use proposals on the visual quality of the landscape, including view plane and open space considerations.*

- *Protect the views afforded from the Queen Ka'ahumanu Highway and from the shoreline.*

- *Protect the open space in West Hawaii through a variety of mechanisms, including the use of land use designations and conservation easements.*

4.5 HAWAII COUNTY GENERAL PLAN

The Hawaii County General Plan (as amended in November 1989) contains statements of development objectives, standards, and principles of the most desirable land uses within the county; the most desirable densities of population; a system of principal rights-of-way; and general locations of public facilities, utilities, and public housing projects. These objectives, standards, and principles deal with the long-range comprehensive physical development of the island in 13 component areas.

The Recreation component of the General Plan relates most directly to the proposed improvements at Hapuna Beach State Recreation Area. The facilities and programs being planned for the park expansion are intended to meet the growing recreational needs of the island residents.

Another component of the County General Plan is the Land Use Pattern Allocation Guide (LUPAG) Map. This plan element, which indicates the general location and size of desired land uses, seeks to attain a well-balanced land use pattern on the island that is capable of meeting the various future needs of the county.

The LUPAG Map for South Kohala designates the project site as Open Area. The County recognizes Hapuna as a major water-oriented recreation area for the island and sees the site being used for park or open space use. Other much smaller LUPAG classifications are designated on the property including Low Density Urban Development, Medium Density Urban Development, and Resort. These designations comprise less than five percent of the park expansion site and are intended to reflect existing as well as potential uses given the available resources of the area.

4.6 HAWAII COUNTY ZONING

Unplanned and Open are the predominant zoning districts in the park site. Other zoning districts (comprising less than ten percent of the site) reflect existing or County General Plan LUPAG land uses. In particular, there are CV-10 Village Commercial, RS-15 Single Family Residential, V-1.25 Resort-Hotel, and A-1a Agricultural. Given the minor size of these districts, especially the V-1.25 and CV-10 zones, it is believed they are intended for very small or modest vacation facilities.

The County zoning districts are underlain by State Conservation and Urban District designations. Thus, the major portion of the park site, which is in the Conservation District, is subject to the Conservation District Rules and Regulations as administered by the State Board of Land and Natural Resources. The portion of the park that is in the Urban District is subject to County zoning regulations. Park use is a permitted use in the Open and A-1a zones but is subject to a County Use Permit for improvements in the RS-15, V-1.25 and CV-10 zones.

The proposed golf course is located entirely within the County Unplanned zone, which is underlain by the State Agricultural District. A golf course is a permitted use in the State Agricultural District but is subject to a Use Permit that is issued by the County Planning Commission.

4.7 HAWAII COASTAL ZONE MANAGEMENT PROGRAM

The Hawaii Coastal Zone Management (CZM) Act 188, SLH 1977, which became Chapter 205A, Hawaii Revised Statutes, establishes specific objectives and policies in seven broad categories, discussed below.

4.7.1 Recreational Resources

The proposed State park improvements will offer a diversity of recreational activities, which are consistent with the policies and objectives of the CZM. Expansion of the park is part of a master planned statewide park system to serve the growing recreational needs of the people of Hawaii.

4.7.2 Historic Resources

Based on archaeological surveys conducted by Paul H. Rosendahl, Ph.D., Inc., the State will undertake data recovery, establish archaeological preserves, and provide interpretative programs, as required. These actions are consistent with CZM policies and objectives.

4.7.3 Scenic and Open Space Resources

The proposed project will involve primarily land improvements that do not consist of significant structural features. There will be areas of lush lawns above the highway and clusters of rejuvenated vegetation in the makai area below the highway. Structures will be one-story in height and conducive of a park setting. The proposed golf course will have a one- or two-story clubhouse and a one-story golf maintenance building. These structures will be designed to integrate with the terrain.

The proposed structures within the park area will be well spaced and surrounded by open land. View corridors through the park land will be preserved. Motorists on Queen Ka'ahumanu Highway will continue to have unobstructed views of the ocean, shoreline, Kohala uplands and distant Kohala, Mauna Kea and Hualalai mountains. The proposed expansion will maintain scenic and open space resources in compliance with CZM policies and objectives.

4.7.4 Coastal Ecosystems

No buildings or structural improvements will be located on the shoreline or beach section of the project site. These areas will be kept in their natural condition. Mauka-makai accesses to the beaches and portions of some lateral accesses or trails in the shoreline area, however, will be upgraded.

4.7.5 Economic Uses

The provision of park amenities to visitors is expected to enhance their stay on the island and strengthen South Kohala's appeal as a visitor destination area.

4.7.6 Coastal Hazards

The proposed improvements will be located primarily inland of the shoreline and in the open mauka area of the property. Coastal hazards, such as tsunami inundation and storm waves, would not significantly impact planned park facilities.

Also, the proposed project is being designed to assure there will be no overall net gain in surface runoff from the site. A system of drywells and/or sedimentation basins are planned to be installed.

4.7.7 Managing Development

This Environmental Impact Statement is a tool for communicating to the public during the early planning stage the potential impacts of the proposed project. It is intended to facilitate public participation in the project's planning and review process.

4.7.8 Public Participation

The objective and corresponding policies of "Public Participation" relate to stimulating public awareness, education, and participation in coastal management. Part of the

function of the proposed park headquarters is to provide information on the park's natural resources. Other information would include proper treatment of environmentally sensitive areas as well as public safety measures.

In addition, the EIS provides for public notification, public comments, and community input in the decision process regarding the proposed activities and associated impacts.

4.7.9 Beach Protection

The policies of this objective relate to the protection of beaches for public use and recreation. The proposed park expansion will include physical improvements that are located essentially away from the shoreline where no coastal and offshore waters would be directly impacted.

4.7.10 Marine Resources

The objective and corresponding policies of "Marine Resources" relate to implementing the State's ocean resources management plan. The proposed project is a land-based development that will not directly affect the ocean resources. Its improvements, however, will provide greater access to the shoreline which is viewed as a positive public benefit.

Materials that would be available at the park headquarters would include information on Hapuna's ocean and shoreline resources and on proper resource management.

4.8 COUNTY SPECIAL MANAGEMENT AREA GUIDELINES

The portion of the project site located makai of the Queen Ka'ahumanu Highway is situated in the Special Management Area (SMA), and therefore is subject to the SMA Rules and Regulations of the County of Hawaii. The relationship of the proposed project to the SMA Guidelines, as provided in the Hawaii County Planning Commission's Rules of Practice and Procedures, Rule No. 9 is addressed below. Providing the general framework for the County's SMA guidelines are the objectives and policies of the State's Coastal Zone Management Program.

SMA Guideline A.1. This guideline seeks to minimize dredging, filling or alteration to any body of water.

No surface or marine waters will be directly affected by the proposed improvements.

SMA Guidelines A.2 & A.3. These guidelines seek to minimize the reduction in size of any beaches and of the availability of access to the shoreline and other recreational areas due to development.

The proposed project is designed to improve access to beaches and recreational areas. It will not reduce the size of Hapuna and Wailea beaches.

SMA Guideline A.4. This guideline seeks to minimize any development that would substantially interface with or detract from the line of sight toward the sea from the State highway nearest to the coast.

The proposed park expansion will involve primarily ground improvements; structural improvements will be minimal and unobstructive to existing lines of sight.

SMA Guideline A.5. This guideline seeks to minimize any development that would adversely affect the quality of existing water features, wildlife habitats and existing/potential agricultural lands.

Groundwater and marine waters will not be impacted by the proposed project. Unique wildlife habitats and existing/potential agricultural lands do not occupy the property.

SMA Guidelines B.1, B.2 & B.3. These guidelines state that no development shall be approved unless it demonstrates no potential significant adverse environmental effects, except that such adverse effects are minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interest, and are found consistent with Chapter 205A, HRS, the Hawaii County General Plan, the Hawaii County Zoning and Subdivision Codes, and other applicable ordinances.

The proposed project will meet an increasing recreational need in the region and will not have a significant adverse effect on the environment. It will be consistent with the public policies, laws, rules, and regulations of the State of Hawaii and County of Hawaii.

SMA Guidelines C.1 & C.2. These guidelines seek to ensure access to beaches, recreation areas, and natural reserves, and to ensure that adequate recreation and wildlife preserves are maintained.

Expansion of the park is consistent with these guidelines.

SMA Guideline C.3. This guideline seeks to minimize the impacts from solid and liquid waste treatment, disposition, and management on the SMA.

The proposed project will dispose of solid and liquid waste at appropriate facilities in accordance with State and County regulations.

SMA Guideline C.4. This guideline seeks to minimize adverse impacts resulting from alterations to existing landforms and vegetation.

The proposed improvements will result in minimal adverse effects on existing landform and vegetation. Mitigation measures will include selective areas of earthwork and grading as well as relandscaping with native or indigenous plants.

SMA Guideline C.5. This guideline seeks to minimize adverse environmental or ecological impacts due to the project.

The proposed project will not result in significant adverse impacts on the environment that cannot be mitigated.

SMA Guideline C.6. This guideline states that the proposed project must be consistent with the General Plan.

As described in Section 4.5 of this Environmental Impact Statement, the proposed project is consistent with the Hawaii County General Plan.

CHAPTER 5
TOPICAL ISSUES

5.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

The Hapuna Beach State Recreation Area Expansion site possesses a number of physical attributes that make it desirable for park development. These attributes include accessible beach and shoreline resources, spectacular ocean and mountain views, relatively flat useable terrain, and warm climate. The special studies performed as part of this EIS have also determined that the proposed project is compatible with the existing natural environment and overall, will enhance the use and appearance, as well, of the Hapuna-Wailea area.

During the site analysis stage of the EIS preparation, it was determined that there would be no short-term exploitation of resources that could generate long-term negative consequences. Overall, the proposed park expansion will have long-term positive effects that would benefit future generations. The principal long-term benefits would include the productive use of land presently not in use, the provision of recreational facilities to serve West Hawaii residents and visitors, and the provision of economic and social benefits.

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Development of the proposed project will result in the irreversible and irretrievable commitment of certain natural, human and fiscal resources. Major resource commitments will include the land on which the project is to be developed, as well as monies for project construction, construction materials, manpower, and energy.

A significant portion of the property will remain as open space, so the commitment of land is partially mitigated.

5.3 PROBABLE ADVERSE EFFECTS THAT CANNOT BE AVOIDED AND OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES

The State Parks Division of the Department of Land and Natural Resources has long envisioned a regional park for the West Hawaii area. The Hapuna Beach State Recreation Area Expansion was planned to serve the anticipated regional resident population and visitor growth over the next 10 to 15 years. Demand studies have shown a 17 percent increase in the use of existing facilities in just five years. This growth is projected to increase by another 17 percent over the next ten years.

The master plan for the Hapuna Beach State Recreation Area Expansion is described in Chapter 2 and the cost of the proposed improvements is estimated to be about $40 million. Approximately 40 percent of this cost would be financed by a private developer. The balance or government cost is expected to be spread over a number of years during the phased construction period of the project. It is far outweighed by the benefit of the park that is intended to serve the public for generations to come.

5.4 UNRESOLVED ISSUES

Various issues have been raised during the preliminary meetings and earlier correspondence with the community. Notably, the outcome to some of these issues cannot be known in detail until final design or development actually occurs. It is expected, however, that all of the issues can be resolved without undue difficulty through mitigation measures.

The following are the primary issues that remain unresolved.

Transportation Improvements

When the park expansion and golf course are completed and in operation, traffic volumes will increase and traffic congestion will occur on Queen Ka'ahumanu Highway around the project site. The need for improvements to the highway and its intersections which serve the Hapuna Beach State Recreation Area Expansion is a function of projected regional growth and not the proposed park expansion. It is expected that the exact design for any improvements to the highway and when they will be necessary is not immediately known. These improvements will be determined by governmental entities with jurisdiction over the right-of-way, which for Queen Ka'ahumanu Highway is the State Department of Transportation.

After reviewing the DEIS for this project, the State DOT indicated in a memorandum to Governor Benjamin Cayetano, dated August 12, 1996, its preference for improvements to the Queen Ka'ahumanu Highway. In its response, the State DLNR offered that it will work with DOT to provide necessary highway improvements at the appropriate time and seek ways to share in the expense of the required improvements.

Availability and Use of Public Funding

The long-term development schedule for this project calls for continued funding from the State to fully complete the proposed expansion. In recent years, State spending has exceeded revenues, resulting in budget cutbacks. Monies for new capital improvement projects will be under close scrutiny to determine if they fit into the State's high priority programs and projects.

The construction of a public golf course has previously raised questions from the community on the appropriateness of public use of state funds. Current plans now call for use of a private-interest sponsorship in developing the golf course (see next section).

Implementation of the master plan for the Hapuna Beach Recreation Area Expansion will be dependent on government priorities and availability of public funds. The master plan will serve as a guide for public officials to improve the Hapuna-Wailea area for recreational use. The needs of the community and the demand for other public improvement projects and programs must be considered in light of available financial resources.

Private Interest Sponsorship of the Proposed Golf Course

Funding for the golf course construction will require approximately 40 percent of the park expansion development budget. Having a private developer sponsor the construction of the golf course will provide a significant savings to the State. As the feasibility study by Pedersen Planning Consultants demonstrates, a golf course developed and operated by a private entity can be a viable venture within four to five years of opening. A joint venture between the State and private interest will require careful negotiations to assure that both parties benefit from the arrangement.

Initiation of a business plan by the State or the private developer would be one of the first steps toward arranging a private interest sponsorship of the golf course development. This process could begin after the project's EIS review and acceptance stage.

Ceded Lands

The lands encompassed by the proposed park expansion (except the private parcels located behind Wailea Bay and the two recently acquired State parcels) are ceded lands. Similar to the discussion above regarding the use of public lands for non-traditional public purpose, such as golf course, the State must be prepared to justify the development of such a facility on ceded land. The Department of Land and Natural Resources has policies that define the use and allowable transactions that can be undertaken on these lands. Although the State will abide by these policies, there will still be questions on whether other uses would be more appropriate.

This FEIS has evaluated alternatives and determined appropriate land uses for the project site. It considered current land use policies for the area, community needs, and suitable development sites. It assessed the sustainability of the site's natural resources in association with the proposed use. The proposed master plan is the result of an extensive land planning process.

Water Supply

Water for domestic and irrigation uses is expected to come from known sources. The potable source has been identified as the ground water that currently feeds the Lalamilo wells at the 1,200-foot elevation above the project site. The irrigation source is the groundwater beneath the lands immediately mauka of Queen Ka'ahumanu Highway which extends north and also serves the irrigation wells for the adjacent Hapuna Beach Prince Hotel Golf Course. Although these sources are proven, they do not guarantee success in new wells that are developed in the area. Until further field investigations and test drillings occur, a final determination on the availability of water will not be known.

Test drilling for these wells is expected to occur after all entitlements are secured for the proposed project. Funding will be immediately sought from the State Legislature, and testing will commence soon thereafter as an initial stage of the project development.

Condemnation of Residential Lots at Wailea Bay

Optimum development of the park expansion may require condemnation of 19 privately owned lots. Owners of these lots question the necessity of this acquisition when abundant land is already incorporated in the park master plan. Additionally, if the State were to pursue this plan, it would require increased public expenditure at a time when funds are scarce.

Fortunately, as a mid-range plan for the development of the area, land acquisition could be delayed until financial conditions improve. Because the acquisition cost would be high, the State will look at alternatives to reduce the cost of acquisition. One option would be to spread the cost over a number of years to make the expense more manageable. Another option would include a lease back program that would enable the State to recover some of the acquisition cost.

CHAPTER 6
CONSULTED PARTIES AND COMMENTS ON THE EIS PREPARATION NOTICE

The notice of availability of the EIS Preparation Notice for the Hapuna Beach State Recreation Area was published in the Office of Environmental Quality Control (OEQC) Bulletin on October 23, 1993. The following agencies, organizations and individuals were sent a copy of the EIS Preparation Notice and Environmental Assessment. These documents described the proposed project and its anticipated impacts. Those who were sent the notice were asked to comment on the project. Everyone believed to have an interest in the project or who requested consulted party status was included in the mailing. Those who responded with comments on the EIS Preparation Notice are indicated by an (x) mark. Those who responded but indicated they had no comments are identified by an (n) mark.

Federal Agencies

U.S. Army Corps of Engineer, Pacific Ocean Division
U.S. Coast Guard, 14th Coast Guard District
U.S. Engineer District, Department of Army (x)
U.S. Department of Interior, Geological Survey (n)
Fish and Wildlife Service, Pacific Islands Office
National Marine Fisheries Service, Pacific Area Office (x)
National Park Service
Soil Conservation Service, Department of Agriculture (x)
Water Resources Division, Department of the Interior

State Agencies

Department of Agriculture
Division of Aquatic Resources, Department of Land and Natural Resources (x)
Department of Budget and Finance
Division of Boating & Ocean Recreation, Department of Land and Natural Resources (n)
Department of Business, Economic Development & Tourism (x)
Department of Education
Department of Hawaiian Home Lands (x)
Environmental Center, University of Hawaii
Department of Health (x)
Division of Conservation & Resource Enforcement, Department of Land and Natural Resources
Division of Forestry and Wildlife, Department of Land and Natural Resources
Land Use Commission (x)
Na Ala Hele Program, Division of Forestry & Wildlife (x)
Office of Hawaiian Affairs
State Historic Preservation Division, Department of Land and Natural Resources (x)
State Public Works Engineer, Department of Accounting and General Services (n)

Office of State Planning (x)
Department of Transportation (x)
Department of Transportation, Hawaii District Office
University of Hawaii at Hilo
Water Resources Research Center, University of Hawaii

County Agencies

Mayor of Hawaii County
Civil Defense Agency (x)
Fire Department
Office of Housing and Community Development
Parks and Recreation Department (x)
Planning Department (x)
Police Department
Public Works Department (x)
Water Supply Department (x)

County Council

Councilman James Y. Arakaki
Councilwoman Keiko Bonk-Abramson
Councilman Keola Childs (x)
Councilman Brian J. De Lima
Councilman Takashi Domingo
Councilwoman Helene H. Hale
Councilman Jim Rath (x)
Councilman Robert F. Rosehill
Councilman Spencer K. Schutte

State Legislators

Senator Andrew Levin
Senator Richard M. Matsuura
Senator Malama Solomon
Representative Jerry L. Chang
Representative Robert N. Herkes
Representative Virginia Isbell
Representative Harvey S. Tajiri
Representative Dwight Y. Takamine
Representative Larry S. Tanimoto

Private Parties

John & Ann Alkire (x)
Tom Beach
Laura C. Beckvold (x)
John Clark

Miss Fantasia Flor
Susan K. Gilbert, M.D.
Ron Gordon
David T. Hosbein (x)
Dr. & Mrs. David J. Hosbein (x)
John Hosbein (x)
Lisa M. Hosbein, MD (x)
Cyndee K. Irvine
Marc Kinoshita
John J. Lowrey (x)
Mike Lowrey (x)
Hugh Montgomery
Benjamin Moore (x)
Patricia S. O'Kieffe (x)
George H. Robertson (x)
Richard R. Schulze, Atty (x)
Charlotte Marjorie Bond Scott
Lynn Sullivan
Richard R. Treadwell (x)
Patricia Tummons (x)
J. Curtis Tyler, III (x)
Roy A. Vitousek III, Atty. (Wailea lot owners rep.) (x)
Al Weinert (x)
Les Wishard
Elizabeth T. Wray (x)
Christopher Yuen

Community Organizations

American Lung Association of Hawaii
Greenpeace Hawaii
Hale Kea Farms (x)
Hapuna Beach Services
Hawaii Island Environmental Council (x)
Hawaii Leeward Planning Conference (x)
Hilton Hawaiian Village
Kohala Coast Resort Association (x)
Kona Family YMCA
Kona Hawaiian Civic Club (x)
Kona-Kohala Chamber of Commerce
Life of the Land, Big Island Chapter
Mauna Lani Resort, Manager of Environmental Affairs
NAOHCC HI District Council
Na Ala Hele Hawaii Island Advisory Council
National Association of Hawaiian Civic Clubs
National Land Committee, Ka Lahui Hawaii (x)
PASH
PBR Hawaii

Puako Community Association (x)
Sea Grant Extension Service
Sierra Club, Moku Loa Group
The West Hawaii Sierra Club
Waimea Community Association (x)
Waimea Hawaiian Civic Club
Waimea-Kawaihae Community Association
West Hawaii Today

Utility Companies

Hawaii Electric Light Company, Inc.

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

REPLY TO ATTENTION OF

Planning Division

November 16, 1993

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice for the Hapuna Beach State Recreation Area Expansion Project, Hawaii. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. The information provided does not identify any specific activities involving work in waters of the U.S.; therefore, a DA permit is not required at this time. However, as specific detailed plans become available, the applicant should continue to consult with our Operations Division at 438-9258 and refer to file number NP94-018.

b. The basic flood and tsunami information provided on pages 6 and 8 is correct; however, a more detailed flood hazard analysis will be required once detailed plans have been completed. Please coordinate with Ms. Jessie Dobinchick of our Planning Division at 438-2883.

Sincerely,

Kisuk Cheung, P.E.
Director of Engineering

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:WL:LK

DEC 4 1995

Mr. Kisuk Cheung, P.E.
Director of Engineering
Department of the Army
U.S. Engineering District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Cheung:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 16, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch at 587-0230.

Aloha,

for MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala MOANA Blvd., Suite 415
Honolulu, Hawaii 96813

RECEIVED
1993 DEC -7 A 11:04
BELT COLLINS HAWAII

December 3, 1993

cc: K. Chung
W Harrison 12/7/93
J. Petersen

Ms. Susan Rutka
Belt Collins & Associates
680 Ala Moana Boulevard
Honolulu, Hawaii 96813

Dear Ms. Rutka:

Subject: Hapuna Beach State Recreation Area Expansion Project, Environmental Impact Statement Preparation Notice (EISPN), South Kohala, Hawaii

We are in receipt of the subject EISPN. We regret that due to prior commitments, we do not have the staff with time to become involved in reviewing the EISPN.

We are returning the EISPN to your office for your future use.

Sincerely,

William Meyer
District Chief

Enclosure

RECEIVED
'93 DEC -2 A 11:47

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213
TEL (310) 980-4000; FAX (310) 980-4018

November 29, 1993 F/SWO33:ETN

cc: K. Chung
W. Harrison
S. Pedersen
12/3/93

Ms. Susan S. Rutka
Belt Collins and Associates
680 Ala Moana Blvd.
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Thank you for your request to review the Hapuna Beach State Recreation Area Expansion Project Environmental Impact Statement (EIS) Preparation Notice. I trust that the draft EIS will include a description of the intertidal and subtidal algal resources within the project area, and if there are any endangered or threatened species found in the adjacent waters. We are especially interested in the presence of threatened green turtles (Chelonia mydas) in this area.

I can be reached at the following address and telephone number:

National Marine Fisheries Service
Pacific Area Office
2570 Dole Street
Honolulu, Hawaii 96822-2396

(808) 955-8831 FAX (808) 949-7400

I look forward to receiving the draft EIS for review.

Sincerely,

Eugene T. Nitta

Eugene T. Nitta
Protected Species Program
Coordinator

NOAA

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

NOV 24 1995

Mr. Eugene T. Nitta
Coordinator
Protected Species Program
National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii 96822-2396

Dear Mr. Nitta:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 29, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

United States Department of Agriculture

Soil Conservation Service

P. O. Box 50004
Honolulu, HI
96850-0001

RECEIVED
'93 DEC 16 P 12:50

December 14, 1993

cc: K. Chung
W. Harrison
J. Pedersen
12/16/93

Ms Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Subject: Hapuna Beach State Recreation Area Expansion Project
Environmental Impact Statement (EIS) Preparation Notice

We have completed our review of the (EIS) Preparation Notice and have the following comments:

Substantial increase in the demand for irrigation water for the landscaping and golf course is obviously expected. This area is very close to exceeding the sustainable yield of the aquifer, the EIS should show a through review of all other groundwater extraction plans.

Irrigation with brackish water is leading to salt accumulation on soil surfaces in some irrigated areas near the proposed project site. This is proving to be a significant challenge to grounds maintenance operations, the EIS should indicate what steps are proposed to mitigate this growing problem.

The existing drainage system is infrequently pressed into service because of the low annual rainfall. This system is however, usually damaged during rain storms which cause severe gully erosion. The development of the drainage areas into impervious structures such as parking lots and buildings will increase the intensity of runoff related gully erosion. The EIS should describe the preventive and mitigative measures proposed in the development.

We appreciate the opportunity to provide comments. Should you have any questions, please contact Mr. Michael C. Tulang at (808) 541-2606.

Sincerely,

NATHANIEL R. CONNER
State Conservationist

cc: Mr. Gary Kam, Team Leader, Kamuela Satellite Office.

"To lead the way in helping our customers conserve, sustain, and enhance Hawaii's natural resources through efficient service of the highest quality."

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

REF:WL.: LK

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

DEC 4 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. Kenneth Kaneshiro
State Conservationist
Natural Resources Conservation Service
United States Department of Agriculture
P.O. Box 50004
Honolulu, Hawaii 96850-0001

Dear Mr. Kaneshiro:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 14, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch at 587-0230.

Aloha,

MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR OF HAWAII

cc: K. Chung
W. Harrison
J. Pedersen
12/3/93

RECEIVED
1993 DEC -2

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

KEITH W. AHUE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER, II
DONA L. HANAIKE

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 1, 1993

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard
Honolulu, HI 96813-5406

Dear Ms. Rutka:

In response to your letter of October 29, 1993 (regarding the Environmental Impact Statement Preparation Notice for the Hapuna Beach State Recreation Area Expansion Project), we appreciate this early opportunity to offer our comments.

We suggest the forthcoming EIS discuss in detail potential short-term impacts related to construction activities (i.e. golf course, erosion, runoff, etc.) and long-term effects that may have direct adverse impact to aquatic resources, especially in the offshore waters of the Wailea Bay Marine Life Conservation District and the Puako Bay/Puako Reef Marine Fisheries Management Area. Any projected activities or park improvements that would occur seaward of the high water line should be described in detail in the Draft EIS (DEIS).

The disposition of sewage and wastewater from the golf course and park facilities with the potential of nutrient loading of nearshore waters, along with associated hazards to human health and safety should be addressed.

Although it may not be possible to identify specific impacts at this time, the DEIS should project impacts, propose specific means for averting or minimizing adverse effects to the aquatic environment, and suggest possible mitigation measures to prevent damage to natural resources. We will provide additional comments when detailed information describing the proposed activities becomes available in the DEIS.

The proposed construction and expansion of the recreational area are expected to improve and enhance public recreational opportunities and enjoyment of the park.

Yours truly,

Henry M. Sakuda

HENRY M. SAKUDA, Administrator

cc: OCEA

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. William Devick, Acting Administrator
Division of Aquatic Resources
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Devick:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 1, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR OF HAWAII

RECEIVED
1993 NOV -5 A 11:42
BELT COLLINS & ASSOCIATES

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF BOATING AND OCEAN RECREATION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813-4695

KEITH W. AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER II
DONA L. HANAIKE

cy DOWALD 11/8/93
Paterson 11/10/93
Harrison 11/12/93

November 3, 1993 BOR-A 0190.94

Ms. Susan Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Subject: Hapuna Beach State Recreation Area
Expansion Project Environmental
Impact Statement Preparation Notice

Thank you for the subject statement that was enclosed with your latter dated October 29, 1993.

We do not wish to be a consulted party during the EIS process.

Very truly yours,

David E. Parsons
Administrator

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 19th Floor, Honolulu, Hawaii
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 Telephone (808) 586-2406

JOHN WAIHEE, Governor
MUFI HANNEMANN, Director
JEANNE K. SCHULTZ, Deputy Director
RICK EGGED, Deputy Director
TAKESHI YOSHIHARA, Deputy Director

DECEIVED

DEC 10 A 11:54

November 8, 1993

cc: K. Chang
W. Harrison
J. Paterson
12/3/93

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

The Department of Business, Economic Development & Tourism is pleased to submit the enclosed comments on the Environmental Impact Statement Preparation Notice for the Hapuna Beach State Recreation Area Expansion Project.

The comments were provided by the Land Use Commission. Questions regarding these comments may be directed to Esther Ueda, LUC Executive Officer, at 587-3826.

Thank you for the opportunity to comment.

Sincerely,

Mufi Hannemann

Enclosure

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:WL:LK

DEC 4 1995

The Honorable Seiji Naya, Ph.D.
Director
Department of Business, Economic
Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Dr. Naya:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 8, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch at 587-0230.

Aloha,

Gilbert S. Coloma-Agaran
MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR
STATE OF HAWAII

RECEIVED
'93 DEC -2 A

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

HOALIKU L. DRAKE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

cc: R. Ming
W. Harrison
J. Paterson
12/3/93

December 1, 1993

Ms. Susan S. Rutka
BELT COLLINS & ASSOCIATES
680 Ala Moana Blvd., First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Subject: Hapuna Beach State Recreation Area Expansion

Thank you for providing a copy of the environmental impact statement (EIS) preparation notice for the subject project.

The Department of Hawiian Home Lands (DHHL) has jurisdiction over Hawaiian home lands at Kawaihae and Waimea in the South Kohala District where the expanded recreation facilities are proposed. Please include the DHHL as a consulted party during the EIS process.

Should you have any questions, please call Ben Henderson of our Planning Office at 586-3837.

Warmest aloha,

Hoaliku L. Drake

Hoaliku L. Drake, Chairman
Hawaiian Homes Commission

HLD:BH:JC:asy/2326L.5

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

REF:WL:LK

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA AGARAN

AGUINALDO RIBE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

DEC 4 1995

The Honorable Kali Watson
Chairperson
Hawaiian Homes Commission
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Watson:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 1, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch at 587-0230.

Aloha,

Gilbert S. Coloma-Agaran
for MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR OF HAWAII

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

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

RECEIVED
1993 NOV 23 A 11:00

In reply, please refer to:
cc: K. Chung
11/24/93 W. Harrison
J Pedersen

November 18, 1993

93-312/epo

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Subject: Environmental Impact Statement Preparation Notice
Hapuna Beach State Recreation Area Expansion Project
South Kohala, Hawaii
TMK: 6-6-01: Por. 2 and 6-9-01: 15

Thank you for allowing us to review and comment on the subject project. We do not have any comments to offer at this time, however, we would like to be a consulted party throughout the remainder of the Environmental Impact Statement process.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURE DEVELOPMENT PROGRAMS
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:WL:LK

DEC 4 1995

The Honorable Lawrence H. Miike, M.D.
Director
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Miike:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 18, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch at 587-0230.

Aloha,

MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3822

November 5, 1993

SUBJECT: Director's Referral No. 93-315-H
Environmental Impact Statement Preparation Notice (EISPN) for the Hapuna Beach State Recreation Area Expansion Project

We have reviewed the EISPN for the subject Hapuna Beach State Recreation Area Expansion project, and have the following comments:

1) We confirm that the proposed 937-acre project area, as shown on Figure 3 of the EISPN, is located within the State Land Use Conservation, Agricultural, and Urban Districts.

2) We suggest that the draft EIS include a map showing the project's boundary in relation to the State Land Use Districts.

We have no further comments to offer at this time.

EU:BS:th

NA ALA HELE
Hawai'i Trail & Access System

RECEIVED
1993 NOV 18 A 11:52
BELT

November 16, 1993

Susan S. Rutka
Belt, Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

RE: EIS Preparation Notice for Hapuna Beach
State Recreation Area Expansion Project

The Division of Forestry and Wildlife (DOFAW), Na Ala Hele Program, has an inherent interest in the Ala Kahakai. Please include us as a party to be consulted in the EIS process.

Very truly yours,

RODNEY T. OSHIRO
Na Ala Hele - Hawaii

Division of Forestry & Wildlife • Dept. of Land & Natural Resources • P.O. Box 4849 • Hilo, Hawaii 96720-0849

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. Rodney T. Oshiro
Na Ala Hele Program
Division of Forestry and Wildlife
Department of Land and Natural Resources
P.O. Box 4849
Hilo, Hawaii 96720-0849

Dear Mr. Oshiro:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 16, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II
DONA L. HANAIKE

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 7,1993

LOG NO: 9926
DOC NO: 9312ks07

cc. Andrew
Warren
J Pederson
12/14/93

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

SUBJECT: **Review of Environmental Impact Statement (EIS) Preparation Notice, Hapuna Beach State Recreation Expansion Project**
Lalamilo (Hapuna), South Kohala

Thank you for submitting (received October 29, 1993) the subject notice for our review. Our office cannot properly comment to the notice until we have reviewed the archeological inventory survey report for the project. To date, our office has not received such a report. We anticipate you will be submitting such a document to us at some future date as part of the EIS. We will provide you with our comments at that time.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KS:amk

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Hibbard:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 7, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project. We apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

An archaeological inventory survey of the project area was conducted by Paul H. Rosendahl, Ph.D., Inc. (PRHRI) a few years ago and a report was completed in February 1994. A copy of the report will be submitted to you for review and will be included also in the Draft EIS.

Thank you for your comment on the Preparation Notice and we look forward to hearing from you on the Draft EIS.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR

RECEIVED
1993 NOV 30 P 12:06

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

ROBERT P. TAKUSHI
COMPTROLLER

LLOYD I. UNEBASAMI
DEPUTY COMPTROLLER

LETTER NO. (P)1816.3

cc: K. Chung
W. Hamada
J. Pedersen
12/1/93

NOV 26 1993

Belt Collins and Associates
680 Ala Moana Boulevard
First Floor
Honolulu, Hawaii 96813-5406

Attention: Ms. Susan Rutka

Gentlemen:

Subject: Hapuna Beach State Recreation Area Expansion
Hapuna-Puako, South Kohala, Hawaii
EIS Preparation Notice

Thank you for the opportunity to review the subject document. We have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 586-0488.

Very truly yours,

GORDON MATSUOKA
State Public Works Engineer

RY:jk

OFFICE OF STATE PLANNING
Office of the Governor

MAILING ADDRESS: P.O. BOX 3540, HONOLULU, HAWAII 96811-3540
STREET ADDRESS: 250 SOUTH HOTEL STREET, 4TH FLOOR
TELEPHONE: (808)587-2846, 587-2800
FAX: Director's Office 587-2848
Planning Division 587-2824

RECEIVED
1993 NOV 22 A 8:14

cc: K. Chang
W. Harrison
S. Pederson

Ref. No. C-355

November 17, 1993

Ms. Susan S. Rutka
Belt Collins and Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Subject: Hapuna Beach State Recreation Area Expansion Project
Environmental Impact Statement (EIS) Preparation Notice

We have reviewed the Environmental Impact Statement Preparation Notice for the Hapuna Beach State Recreation Area Expansion Project and have the following comments.

A relevant Coastal Zone Management policy is to: "Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards."

The project proposes to use herbicides and pesticides in its maintenance program. In addition to runoff, there is a strong potential for leaching and transporting of these substances into the coastal water given the porosity of the soils in West Hawaii. Therefore, we recommend that they not be used or, if so, only sparingly to avoid adverse environmental and ecological impacts. A coordinated plan for pesticide/herbicide application, as well as monitoring any impacts to water quality, should be considered.

We appreciate very much the opportunity to review the document. If you have any questions, please contact Harold Lao at 587-2883.

Sincerely,

Harold S. Masumoto
Director

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:WL:LK

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

DEC 4 1995

The Honorable Gregory Pai
Director
Office of State Planning
P.O. Box 3540
Honolulu, Hawaii 96811-3540

Dear Mr. Pai:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 17, 1993. regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch 587-0230.

Aloha,

MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

RECEIVED
1993 DEC -6 A 7:40

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
KANANI HOLT
JOYCE T. OMINE
AL PANG
CALVIN M. TSUDA

IN REPLY REFER TO:
STP 8.5642

cc: K. Chung
W. Hansen
J. Paterson
12/8/93

December 1, 1993

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Subject: Environmental Impact Statement Preparation Notice (EISPN) - Hapuna Beach State Recreation Area Expansion Project

We have the following comments on the proposed Hapuna Beach State Recreation Area Expansion Project:

1. The future widening of the Queen Kaahumanu Highway will require adequate highway setbacks.

2. The proposed Waimea-Kawaihae Road will tie into Queen Kaahumanu Highway at an interchange. The alignment and location have yet to be determined. Additional highway right-of-way will be required at this interchange location.

3. Interim access to Queen Kaahumanu Highway will require a fully channelized intersection with left-turn storage and acceleration/deceleration lanes. The number of accesses should be kept to a minimum.

4. Required roadway improvements must be provided at no cost to the State Department of Transportation. Plans for construction work within the State highway right-of-way must be submitted for our review and approval.

5. A Traffic Impact Analysis Report should be prepared and submitted for our review.

6. This project should be coordinated with our department as a consulted party and with other adjacent and nearby developers.

We appreciate the opportunity to provide comments.

Sincerely,

Rex D. Johnson
Director of Transportation

JOHN WAIHEE
GOVERNOR

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
KAHANU HOLT
JOYCE T. OMINE
AL PANG
CALVIN M. TSUDA

IN REPLY REFER TO:
STP 8.5704

RECEIVED
94 JAN 14 P 2:27

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

January 11, 1994

cc: K. Chung
Wilkinson
J. Pedersen

Ms. Susan S. Rutka
Belt Collins & Associates,
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

Subject: Hapuna Beach State Recreation Area Expansion Project
Environmental Impact Statement (EIS) Preparation Notice

We have the following comments on the proposed Hapuna Beach State Recreation Area Expansion Project:

1. A Traffic Impact Analysis Report (TIAR) should be submitted for our review and approval.

2. The proposed expansion should provide for the future Waimea-Kawaihae road which will tie into Queen Kaahumanu Highway at an interchange. Additional rights-of-way at the interchange location, and setbacks to allow for future roadway widening may be required. This should be coordinated with our Highways Division.

3. Interim access to Queen Kaahumanu Highway will be allowed at fully channelized intersections with left-turn storage, deceleration and acceleration lanes. Access plans must be coordinated with our Highways Division.

4. Required improvements to our highway system shall be provided at no cost to the State Department of Transportation. Plans for construction work within the State highway right-of-way must be submitted for our review and approval.

We appreciate the opportunity to provide comments.

Sincerely,

Rex D. Johnson
Director of Transportation

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:WL:LK

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

DEC 4 1995

The Honorable Kazu Hayashida, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 1, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch at 587-0230.

Aloha,

MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

Stephen K. Yamashiro
Mayor

RECEIVED
1993 NOV -9 A 11:46
BELT COLLINS & ASSOCIATES

Harry Kim
Administrator
Bruce D. Butts
Assistant Administrator

County of Hawaii
CIVIL DEFENSE AGENCY

920 Ululani Street • Hilo, Hawaii 96720
(808) 935-0031 • Fax (808) 935-6460

DONALD Pedersen Harrison 11/10/93 11/12/93

doc0280P

November 5, 1993

Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813-5406

HAPUNA BEACH STATE RECREATION AREA EXPANSION PROJECT-- EISPN

Thank you for the advance opportunity for input on the proposed project. Listed are areas of interest and concerns for the project area:

Natural Hazards

Hazards that have affected the proposed project area include:

1. Runaway fires
2. Effects of tropical cyclones (surf, wind)
3. Dust storms
4. Winter storms (surf)
5. Tsunamis
6. Pests (rodents, jellyfish, flies)

The present setup of Hapuna beach park has made securing the park during hazard periods so very convenient and easy.

It is hoped that expansion ideas will maintain this type of planning. Thank you.

HARRY KIM, ADMINISTRATOR

dy

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. Harry Kim, Administrator
Civil Defense Agency
County of Hawaii
920 Ululani Street
Hilo, Hawaii 96720

Dear Mr. Kim:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 5, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

Stephen K. Yamashiro
Mayor

George Yoshida
Director

Juliette M. Tulang
Deputy Director

RECEIVED
1993 NOV 30 P 12:55

County of Hawaii
DEPARTMENT OF PARKS AND RECREATION

25 Aupuni Street, Room 210 • Hilo, Hawaii 96720-4252
(808) 961-8311

cc: K. Chung
W. Harrison
J. Pedersen
2/1/93

November 26, 1993

Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813-5406

Subject: Hapuna Beach State Recreation Area Expansion Project
Environmental Impact Statement Preparation Notice

Dear Ms Rutka:

We have no comments to offer on the preparation notice and would like to remain a consulted party during the EIS process.

Thank you.

Sincerely,

George Yoshida
Director

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. George Yoshida, Director
Department of Parks and Recreation
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720-4252

Dear Mr. Yoshida:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 26, 1993 regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Norman Olesen
Deputy Director

RECEIVED
93 DEC -1 P 12:24

cc: K. Chung
W. Harrison
J. Pedersen
12/1/93

County of Hawaii
PLANNING DEPARTMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-9615

November 26, 1993

The Honorable John Waihee
Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, HI 96813

Dear Governor Waihee:

Environmental Impact Statement (EIS) Preparation Notice
Hapuna Beach State Recreation Area Expansion Project

We have reviewed the above-referenced EIS Preparation Notice for the proposed Hapuna Beach State Recreation Area expansion project and provide the following comments:

1. The Draft EIS should discuss any impacts that the project may have on the private properties fronting Wailea Bay.

2. Discussion on acquisition of private properties should be included in the Draft EIS.

3. There are approximately 19 existing and planned golf courses in the South Kohala District. The DEIS should include discussions on these golf courses.

4. The Draft EIS should include a section on the relationship of the project to the state and county policies and plans.

5. Final technical reports such as Archaeological Survey, Botanical Survey, Traffic Impact Analysis and others should be included in the Draft EIS.

6. Figure 3 - Master Plan reflects a site for proposed UH Hilo Puako Field Station Kalakaua Marine Education Center. How is that proposal related to the Hapuna Beach Park Expansion project?

Thank you for the opportunity to provide comments on the Draft EIS for the Hapuna Beach State Recreation expansion project. Should you have any questions, please feel free to contact Alice Kawaha of this office at 961-8288.

Sincerely,

Virginia Goldstein

VIRGINIA GOLDSTEIN
Planning Director

AK:mjs
HBSRA

xc: Mr. Edward Lau, DLNR-DOWALD
Ms. Susan S. Rutka, BCA

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Ms. Virginia Goldstein, Director
Planning Department
County of Hawaii
25 Aupuni Street, Room 109
Hilo, Hawaii 96720-4252

Dear Ms. Goldstein:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter, dated November 26 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

Stephen K. Yamashiro
Mayor

RECEIVED
'93 NOV 29 P 1:08

County of Hawaii
DEPARTMENT OF PUBLIC WORKS
25 Aupuni Street, Room 202 • Hilo, Hawaii 96720-4252
(808) 961-8321 • Fax (808) 969-7138

Donna Fay K. Kiyosaki
Chief Engineer

Riley W. Smith
Deputy Chief Engineer

cc: K. Chung
W. Harrison
J. Peterson 11/29/93

November 18, 1993

Belt Collins & Associates
680 Ala Moana Blvd.
Honolulu, HI 96813-5406

SUBJECT: Hapuna Beach State Recreation Area Expansion Project
(EIS) Preparation Notice
Location: Ouli & Lalamilo, South Kohala, HI
TMK: 6-6-1:2 & 6-9-1:15

We support the planned improvements to the park area and would be willing to transfer title of Puako Road to the State where it is within the park boundaries. Portions of the project are in flood zones VE, AE and A; this includes two flood channels as well as the tsunami zone.

Galen Kuba, Acting Division Chief
Engineering Division

TWP: sls

cc: Engineering-Hilo
Engineering-Kona

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
DILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Ms. Donna Fay Kiyosaki
Chief Engineer
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720-4252

Dear Ms. Kiyosaki:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 18, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
25 AUPUNI STREET • HILO, HAWAII 96720
TELEPHONE (808) 969-1421 • FAX (808) 961-8657

RECEIVED
1993 NOV -9 A 11:45
BELT COLLINS & ASSOCIATES

November 5, 1993

cy Donald 11/10/93
Peterson 11/12/93

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813-5406

HAPUNA BEACH STATE RECREATION AREA EXPANSION PROJECT
ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE
TAX MAP KEY 6-6-1:35, 37 AND 38; AND 6-6-1:2

We have reviewed the subject EIS.

Please be informed that water is limited to existing services.

Furthermore, the Department's existing water system facilities cannot support the proposed park expansion at this time. Extensive improvements and additions, including source, storage, transmission, booster pump and distribution facilities must be constructed. Currently, sufficient funding is not available and no time schedule is set.

Should you have any questions, please contact our Water Resources and Planning Section.

H. William Sewake
Manager

WA

... Water brings progress...

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURE DEVELOPMENT PROGRAMS
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:WL:LK

DEC 4 1995

Mr. Milton Pavao, Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Pavao:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 5, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch (in Honolulu) at 587-0230.

Aloha,

MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

KEOLA CHILDS
Councilmember

Rec'd 3:41 p
11/22/93

Phone: (808) 961-8266
Fax: (808) 969-3291

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

November 22, 1993

Ms. Sue Butka
Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813

RE: Hapuna Beach State Recreation Area Expansion Project

Dear Sue:

Thank you for the copy of the EISPN regarding the Hapuna Project. Please add my name, and that of Councilmember Robert Rosehill to your list of County Councilmembers, as well as E Mau Na Ala Hele and People's Advocacy for Trails Hawaii (P.A.T.H.) to your list of non-profit groups to be consulted.

While I am glad that the DLNR has decided to proceed with planning for these Hapuna lands, I am very uncomfortable with the proposed project moving into the EIS preparation stage when there have been (to my recollection) no public informational meetings regarding the proposed land uses.

I think DLNR and Belt Collins should halt the EIS Preparation Process until the public has affirmed or modified the proposed land use plan for which the study is to be done. Public scoping and informations meetings should be held in Waimea and Kona as soon as possible.

I think it would be very wise to gather public input on the ideas to be studied before a great deal of time and money is spent on something that may not have much support, or that the public may wish to be modified to an extent significant enough to require another EIS later.

Personally, I am very concerned about the proposal for development of a public golf course on the state land immediately mauka of the Queen Kaahumanu highway; I question whether that is appropriate or even desirable in the face of the clutch of golf courses proposed in this vicinity by Nansay Hawaii (mauka and south) which all will have substantial public play privileges.

Should the state wish to plan a public golf course for residents of West Hawaii, I would think a site closer to the population centers would make more sense, especially when these nearby courses will have public play privileges. However, I can think of a lot more important recreational facilities for our youth, and I'll bet other residents would like to have something to say about that, too.

I'd like to see DLNR throw it open to the public for ideas about how to use - or not use - the mauka lands, while also reviewing the makai side expansion concept. Maybe a regional amphitheater or special sports stadium and bike/runner raceway would be a better fit for the mauka lands?

Let's put this project on hold, and get the public involved first! Please see what you can do to help bring this about. I would be pleased to assist in any way I can; please feel free to call me (322-3646) with any comments or questions.

Sincerely,

Keola Childs
Councilmember

cc: Keith Ahue, Director, DLNR

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REF:WL:LK

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

DEC 4 1995

The Honorable Keola Childs
Councilman
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Childs:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 22, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project. We apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

We appreciate your interest in the project and will add Councilmember Joan Ray and People's Advocacy for Trails Hawaii (PATH) to our list of consulted parties. E Mau Na Ala Hele has already been sent a copy of the EIS preparation notice.

We agree with you that the public needs to be involved in planning the expansion of Hapuna. For your information, initial input on the master plan was received at a public informational meeting held on August 4, 1992 in Waimea. The preliminary master plan presented at the meeting was revised, based on many of the comments/questions received. The plan is still in draft form, pending receipt of comments on the Draft EIS. Both the EIS process and review of the Conservation District Use Application for the park expansion offer opportunities for further public participation.

Thank you for your interest. We look forward to your continuing guidance to help our department meet West Hawaii's outdoor recreation needs.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch in Honolulu at 587-0230.

Aloha,

MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

JAMES M. RATH
Councilman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
1993 NOV 23 A 10:59

November 19, 1993

Ms. Susan Rutka
Belt Collins and Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka:

I am in receipt of your letter, dated October 29, 1993, regarding the Hapuna Beach State Recreation Area Expansion Project EIS preparation Notice.

I have a concern on why another Golf Course is submitting an Environment Impact Statement when Hawaii County has to date, 29 approved golf courses and have not been built and 6 of those 29 are in that area?

Please respond to this concerns at your earliest convenience. Your attention to this matter is greatly appreciated.

With best regards,

Jim Rath
COUNCILMAN

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

REF:ML:LK

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

DEC 4 1995

The Honorable Jim Rath
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Rath:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 19, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project. We apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Your concern about the need for golf courses in Hawaii County will be addressed in both the environmental impact statement and the master plan being prepared for the proposed project. When our department prepared the 1990 State Recreation Functional Plan and the accompanying State Comprehensive Outdoor Recreation Plan (SCORP), one of the needs identified in West Hawaii was a municipal-type golf course. The proposed Hapuna course is intended to help fill that need.

Thank you for your interest. We look forward to your review of the Draft EIS, which is expected to be distributed within the next two or three months.

Should you have any questions, please contact Chief Engineer Manabu Tagomori of the Water and Land Branch in Honolulu at 587-0230.

Aloha,

Gilbert S. Coloma-Agaran
for MICHAEL D. WILSON

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

John & Ann Alkire
P.O. Box 44416
Kawaihae, Hawaii 96743

RECEIVED
1993 DEC -3 P 1:37

December 1, 1993

cc: K. Chung
W. Harrison
J. Pedersen
12/6/93

Ms. Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard
Honolulu, Hawaii 96813

Dear Ms. Rutka,

Thank you for your letter of November 2. We appreciate the opportunity to comment on the Environmental Impact Statement Preparation Notice for the Hapuna Beach State Recreation Area Expansion Project.

First, it is not clear from the EISPN whether the State intends to proceed with the condemnation of any additional privately owned parcels in the Wailea Bay Beach Lots, in accordance with the existing 1988 decision authorizing the DLNR to proceed with the acquisition of all privately owned parcels at Wailea Bay. We would like to request that as part of the environmental assessment process the State make a determination of whether it intends to proceed with condemnation of additional private properties. We feel this is relevant in assessing the range of potential impacts from the proposed expansion.

As residents of Wailea Bay we cherish the unique and fragile beauty of the beach and surrounding area, hence the following concerns and questions about the impact of the proposed development on this pristine environment.

1. We feel that the scope of the current proposal will create more usage than a beach of Wailea's size and fragility can handle. Even at the current levels of use the area suffers from onshore and offshore litter, contamination by human excrement, destruction of the kiawe trees by campfire builders. How many parking slots are planned in the vicinity of Wailea and how many people are expected to use the beach during peak times? Given the current degradation of the environment we do not feel the area is capable of withstanding development of this magnitude without irreversible damage. We recommend a greatly modified, "walk-in" park to protect the fragile bay and beach.

2. Would there be adequate maintenance and enforcement personnel? What does the annual $1.1 million dollar budget include? Currently the lack of proper supervision is leading to the gradual destruction of the natural environment. In addition, the beach is the site for much illegal behavior - drunks and drug dealers make people afraid to bring their families to Wailea. What assurances do we have that the State would be able to afford to maintain and supervise a project of this size?

3. It appears that the restrooms for the beach at Wailea would be located dangerously close to the flood plain just to the south of the 4WD access road. Every few years this stream runs heavily, flooding the adjacent land and carrying so much debris into the water that the bay is murky for weeks. To place the toilet facilities near this flood plain puts the bay at risk to raw sewage pollution.

4. Would the group picnic rental area directly behind the houselots include barbeques? We are concerned that any open fires would put our homes and lives at risk and create a smoky environment on the beach. Most of the year, winds are off-shore, at times gusting at 50-60 mph. In such conditions even the

judicious use of fire is dangerous; in one big fire beachgoers had to be evacuated by boat. Perhaps using areas like the Kanekanaka Point for fire would ensure that most stray fires blow quickly out to sea?

5. We are also concerned that the proximity of the proposed beach parking to the beach and our homes would create unnecessary noise and exhaust fumes.

6. It is difficult to tell from the plans whether any of the development would be visible from the beach. What provisions have been made to ensure that the capital improvements and planned structures would have the least impact on the visual beauty of the area? We feel that traditional Hawaiian structures and materials would be the most compatible with the natural environment, as opposed to the standard cinderblock luas, etc.

7. Are there any provisions to protect the kiawe trees on the beach? We feel that the beach would suffer severe erosion if the trees were removed. Also, the shade of the trees is enjoyed by many on the beach, especially the old and the young.

8. How would the bay be protected from the runoff of golf course fertilization and irrigation?

9. It is unclear from the plan how people using the parking lot and restrooms at the southern end of Wailea would get to the beach.

We thank you for giving us the opportunity to comment on the EISPN and look forward to participating in the planning process. To date, the residents of Wailea have been the primary caretakers of Wailea: removing litter, putting out fires, calling the DLNR, Department of Sanitation, Fire Department, and Police when hazardous conditions have arisen, even rescuing distressed swimmers. As good neighbors and taxpayers we ask that the State respect the privacy and integrity of the Wailea residents, particularly with regard to density and the capacity of the area. We in turn look forward to working as partners with the State, contributing our efforts and resources to make this project a model effort in the State of Hawaii of the preservation of a priceless natural resource.

Sincerely,

John Alkire

Ann Alkire

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. John & Mrs. Ann Alkire
P.O. Box 44416
Kawaihae, Hawaii 96743

Dear Mr. & Mrs Alkire:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 1, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

cc: K. Chung
W. Harrison
J. Pedersen
12/3/93 Rec'd 4:34p

SUE RITKA

To: BELT COLLINS & ASSOC
by Fax 808-538-7819

December 1, 1993
four pages incl cover

RE: EISPN Hapuna Beach State Recreation Area Expansion Project

The public meeting, held several months ago in Waimea, regarding the expansion of Hapuna Beach Park was well attended by residents from Kona, Hilo, North and South Kohala and Puako/Wailea. How can we get you to listen. We cannot afford what your plan proposes (the public meeting of a few short months ago proposed a $15 million expenditure, and now we are at $25.2 million). We are weary of the years of asking for minimal beach area improvements that are finally responded to with such grandiosity that we are stunned into disbelief, that in these recessionary times the State proposes an expenditure in excess of $25 million. We privately adopt/fund our public school classrooms on the Big Island because they do not have materials, the classrooms themselves are horribly overcrowded and understaffed, we volunteer our time to clean up our highways, we donate time and money to build our own hospital, and the list goes on. There isn't a person on this island that would not beg the State to spend these extraordinary funds on our schools. Wailea/Puako residents offered to privately raise funds throughout the County to make beach park improvements that we have needed for years, and the offer fell on deaf ears. There is no doubt in anyone's mind that the improvements needed at Wailea/Hapuna over the next five years could be addressed with less than three million dollars. We do not speak from ignorance, as we did considerable research on this matter. We feel helpless when dealing with so many departmental and political agenda that seem to have little to do with what the actual needs and desires are.

There was a clear consensus from that meeting that the public wants:

1- The State to make prudent use of the taxpayers hard earned funds. We do not want the State to build a $25.2 million park, when less than a tenth of that is needed now and for the forseeable future. The Plan can certainly be used as a guide over time, with periodic reassessment of the needs at later dates.

2- Wailea beach park on this fragile Bay, to be a walk-in park. This could effectively be achieved now with very little expenditure. Grade and chipseal the existing access. Grade and chipseal a parking area several hundred yards inland from the beach. Provide a turnaround area, posted No Parking, for a car to drop off family members and gear at the beach before parking the car in the parking area. Provide some sanitation facilities, with high standard waste water facilities (and upgrade Hapuna's cesspool), between the parking area and the beach. Provide picnic tables and safe barbecue areas on the condemned parcels at the beach. Provide and service several large trash barrels on site. Simple landscaping consisting of naupaka lined access and parking area, and other xeriscape plantings and palms sited at sanitation facilities and picnic areas. The beach itself is naturally landscaped with huge old kiawes that provide privacy and preserve the pristine quality of the beach so cherished by all who visit it. Ask the police to include the beach access and area in their daily patrols. Some simple camping facilities between Hapuna and Wailea could serve both beaches.

3- Rather than trying to concentrate all activity at Hapuna/Wailea, make use of other immediately adjacent shoreline areas frequented and enjoyed by all of us. In Puako alone, the State owns oceanfront properties that suffer from the same neglect as Wailea currently does. Couldn't those lots be partially cleared, sanitation facilities installed, picnic areas, small chipsealed parking areas, etc to provide for the much desired use of the Puako snorkeling areas. Puako has very different, but much desired, coastal use by snorkelers, divers, small children and their families, and currently is only served by narrow accesses and no sanitation facilities. Puako has over two miles of developed coastline that the public needs proper access and facilities for, and the State already owns land there that would be easily and economically upgradeable for use by the public.

Additionally, we request answers to the following questions:

1- "Urbanization of West Hawaii has mandated a re-examination of the potential for expansion of Hapuna..." It is my understanding that the recent, and very costly, acquisition of Mahaiula significantly reduced the demand on Hapuna and surrounding beach areas. This information came from within the State Dept of Parks and Recreation. Is this information not accurate? Does this not reduce the justification for such a grandiose plan at Hapuna/Wailea?

2- There is mention of an incremental development of the park in six phases. May we please know what those phases are and the relevant/expected timetable for each of them?

3- The estimate of 2400 persons per day at the Hapuna Park. It seems wise to plan for the future, but we appear to be quite far from that reality now. Could we please have, now, what we have been asking for decades (see items 1 and 2 in the first section of this letter), rather than what we clearly do not need, cannot afford?

4- You recommend that the golf course be operated and maintained by a private contractor. May we respectfully submit that that land be leased to a private developer, on fair market value terms, and built-out, maintained and operated by a private contractor, as well? The State has not proven itself to be a wise and fiscally responsible developer.

5- The $25.2 million over seven years, mentioned as costs to build out this Park expansion. What is the general breakdown of those costs? There must be a breakdown somewhere, may we please have a copy?

6- Bill Paty has assured several persons directly, including owners in Wailea, that the State cannot afford to, and therefore will not purchase more than the two properties it has condemned. This is reassuring, but it is time for the owners to have a written recission of the order to acquire any additional privately held parcels inWailea. Would you please provide written confirmation of this?

7- "Through increased recreational participation, economic benefits will be created through on-site food concession sales and regional fuel, food and sporting goods sales." Are you asking the taxpayers to foot a $25.2 million plus bill, as it always is more than the State estimates, for the "benefit" of selling food, fuel and sporting goods?

It is not too late to reassess the entire plan and its relevance, the proposed budget and funds allocation for this project. There is no hurry to implement a plan of this magnitude. Over and over again, at the public meeting, people asked for minimal improvements of what we have to meet the current and future needs, and that great care be exercised in preserving the fragile beach area environment. $25.2 million dollars is an extraordinary sum of money, being allocated to a project that far exceeds the need now or in the near future, when, by anyone's definition it is so desparately needed in other areas. If the children of this State do not begin receiving good fundamental educations, or the people of this State do not have the advantage of affordable housing, then you may as well spend that $25.2 million on prisons, because that is the time tested outcome of disenfranchising a generation. Keep in mind, that $25.2 million is just the amount mentioned for this particular beach park project. Mahaiula acquisiton alone cost multimillions, to say nothing of other acquisitons completed, or in the works. We do understand the need for beautiful beach parks, and the need for public access, but it appears all sense of proportion has been lost here.

Sincerely,

Laura C. Beckvold
P. O. Box 1775
Kamuela, HI 96743

cc: Governor John Waihee and Lynn Waihee
Mayor Steven Yamashiro
Charles Taguchi, DOE
Representative Larry Tanimoto
Les Brodie, Board of Education
President William Clinton

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURAL DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Ms. Laura C. Beckvold
P.O. Box 1775
Kamuela, Hawaii 96743

Dear Ms. Beckvold:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 1, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

11/29/93
cc: K. Chung
W. Harrison
J. Pedersen

DAVID T. HOSBEIN

RECEIVED
1993 NOV 29 A 8:29
BELT COLLINS HONOLULU

Belt Collins & Associates
680 Ala Moana Blvd.
Honolulu, Hawaii 96813-5406

November 23, 1993

To Whom It May Concern:

I have reviewed your Environmental Impact Statement regarding the Hapuna Beach Expansion Project and, as a landowner at Wailea Bay, wanted to clarify a few points which were brought up in the Statement.

First of all, the only mention you make of landowners at Wailea Bay is on page 5, paragraph 4: "Several private homes are present behind the beach and along the cliffs and rocky shoreline at the north and south ends." "Several homes" might be interpreted as 3 or 4 when in reality their are approximately 12 to 15 homes situated around the bay and a corresponding number of homeowners (many of whom are listed under the "Individuals" section on pp 13 of your Statement). I do not know exactly how many homes and homeowners there are, but I'm sure you can obtain such information from the Wailea Bay Homeowners Association. Furthermore, on your rough schematic depicting park expansion around Wailea Bay none of the existing homes are shown or delineated. Although this seems to indicate that the park planners might wish that there were no landowners at Wailea, in fact there are, and many of them have been landowners since long before the 1970 "master plan" for the Hapuna Beach Recreation Area was drawn up.

This apparent oversight regarding the Wailea landowners is particularly conspicuous because the State of Hawaii will clearly need to work with these landowners in further developing the park. I say "work with" because the stated budget for the park of $25.2 million (pp 1) is probably not enough to buy out the existing landowners (if that is the state's plan) which means the only feasible way the state can achieve their plan is by constructing the park around the landowners. This situation of the public and private interests working together is becoming the successful model for many such developments throughout the country. After all, the landowners are also members of the "public", and in America most all members of th "public" are also landowners (specifically homeowners).

Given the sensible necessity of coexisting in harmony I sincerely hope that the State of Hawaii will refrain from battling against the Wailea Bay landowners. The landowners have existed peacefully with the public users of the beach for many years (and even decades prior to the Hapuna Beach Expansion Plan) and I see no reason why this situation cannot continue if the resources are managed properly.

Regarding the proper management of the beach resources I would also like to point out that Wailea Beach is significantly different than is cursorily indicated in your Statement (pp 5, paragraph 4), and significantly different than neighboring Hapuna Beach. You state that the beach is "about 1700 feet in length" with a width that varies seasonally from "about 40 to 80 feet". Both of these reports tend to gloss over various facts: the beach is actually split in two by a lava outcropping on which most beachgoers park and in front of which there is no beach (this subtracts approximately 200-300 feet from your 1700 feet total); in only one or two quite narrow places (80-100 feet wide) is the beach actually 80 feet in depth; and in the winter, when even moderate swells are running, almost the entire usable portion of the beach shrinks to less than 20 feet in depth (unless you don't mind having your beach towels and blankets swept out to sea). Unlike Hapuna, which is a much longer and wider beach, Wailea is extremely small and quite fragile.

Given the realities of the small size and delicate condition of Wailea Beach it is abundantly clear that it cannot accommodate a lot of beachgoers at one time. This fact should be kept in mind when determining the number of parking spaces which are to be provided when the park is developed. Using Hapuna parking as a yardstick, if even a quarter as many spaces are provided at Wailea the beach will likely be overpopulated and permanently damaged.

There are many other specific issues which the park planners should be aware of as they refine their plans and the Wailea Bay landowners can provide a lot of pertinent information and assistance in helping to assure that the park which is built best serves the needs of all involved: the public, the land and marine environment of the beach, and the landowners.

Sincerely,

David Hosbein

David Hosbein

421 West Channel Road
Santa Monica, CA 90402
310/573-9375

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. David T. Hosbein
421 West Channel Road
Santa Monica, California 90402

Dear Mr. Hosbein:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 23, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at (808) 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

511 West Main Street
Grass Valley, CA 95945
November 11, 1993

RECEIVED
1993 NOV 17 A 11:36
BELT COLLINS & ASSOCIATES

Belt Collins & Associates
680 Ala Moana Blvd.
Honolulu, Hawaii 96813-5406

Thank you for the Hapuna Beach State Recreation Area Expansion Project EIS Preparation Notice.

Our family owns a lot at Wailea Bay. My father, Dr. AT Treadwell purchased lots in 1939 and 1942. We have loved and enjoyed the beach place ever since. Unhappily, my sister's lot was taken by the state this year along with Marjorie Bond Scott's three lots. It is sad and frightening to experience the power of the state. We feel that the right to hold property is the most basic right, with our other rights springing from it.

Now that the state has confiscated these lots, I think we must try to get along together. I do believe teamwork is the wave of the future and hopefully will work here.

At a meeting held in Kamuela, Hawaii by the Department of Land and Natural Resources on August 4th, 1992, the department had come to realize through public questioning, that the public didn't want a commercial-style beach like Hapuna, but preferred the family-style, low-key beach that Wailea presently is; an alternative-style beach. The beach-goers enjoy the uncrowded conditions, the shade of the tree-fringe, and the general non-commercial atmosphere including the small homes hidden in the trees.

Wailea Bay beach is a small, narrow beach fringed by kiawe trees and with a lava outcropping in the center. Page 5, paragraph 4 of your report states "...the width of the beach seasonally varies from about 40 to 80 feet." I find this inaccurate as even on a summer's day one may have to walk in the water to go around a kiawe tree at high tide. I'm also enclosing three photos of the north end of the beach at Christmas-time, 1991. This happened to be a winter when the sand did not completely wash out to sea exposing the black boulders beneath, but it was a winter when the sea went into the shower room of the 1920ies cottage in photo 13A and allowed a little sunbathing on a patch of sand close to the house. The public certainly realizes this

is not a year-round beach. It is a fragile beach.

Because of the fragility of the beach, because of the desire of the public for an alternative-style beach, because of the trend to work with the private sector, I think the planning of the beach project should be done thoughtfully and carefully. Being a north-end property owner and, therefore, more familiar with the lay of that land, I will comment on the planning in this area:

1. Parking far from the beach is a good idea. The parking at Wailea Bay should be at least as far away as it is at Hapuna.
2. The parking area should be landscaped with trees to provide shade as well as a windbreak as the wind at the north end of Wailea can be very strong. There are no protective hills as at Hapuna and the south end of Wailea.
3. Access paths from the parking area to the beach should be landscaped with tall bushes for beauty, soil preservation and to serve as a windbreak.
4. The car/family Campground between Kanekanaka Point and the Puako Road is too large. With approximately 75 family sites, I think you are impacting the area. I think the campground should be moved closer to Hapuna as that is the beach that can handle crowds. Good access paths from the campsite to Hapuna beach are necessary.
5. Campfires should not be allowed. There have been three destructive fires in recent memory, changing the kiawe forest into moonscape. The grass is back, but not the trees.
6. With the planned density, caretakers would be necessary at both Hapuna and Wailea. Over-nighters would make a night patrol necessary.
7. Because of the fragility of Wailea Bay as well as the desire to preserve the Marine Life Conservation District located there, limiting the access through a specific number of parking spaces would be important. Further, a gate at the Puako access road posted with opening and closing hours would make night access and vandalism difficult.
8. The private homes on Wailea Bay are not pictured on your map. On page 5, Paragraph 4, it is stated that "Several private homes are present behind the beach and along the cliffs..." This is a mistake. There are between 15 and 20 homes.

Thank you for inviting our comments. I do hope we can work together, and that together we will be able to preserve this unique and lovely beach the way the citizens have requested; as a quiet, tree-fringed family beach.

Sincerely yours,

Dr. & Mrs. D.J. Hosbein

Dr. and Mrs. D.J. Hosbein

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

NOV 24 1995

Dr. & Mrs. D.J. Hosbein
511 West Main Street
Grass Valley, California 95945

Dear Dr. & Mrs. Hosbein:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at (808) 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

11/29/93
cc: K. Chuck
W. Harrison
J. Pederson

RECEIVED
1993 NOV 29 A 8:54
BELT COLLINS HAWAII

1632 19th Street NW Apt #7
Washington DC 20009
11-21-93

680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406
Dear BCA:

I am a private landowner at Wailea Bay and wish to comment on the **Hapuna Beach State Recreation Area Expansion Project.** My three immediate concerns regarding your report are (1) the lack of attention to the private landowners (2) the amount the project will cost and (3) the width of the beach at Wailea Bay.

Private landowners own a large majority of the beach front property and MUST be considered in this plan. With many private homes within the proposed boundries of the park the landowners have a vested interest in the future of the bay. I believe that with cooperation between the state and the landowners a mutually acceptable plan can be created. I do not feel that any more of the private land needs to be condemned in order to create a successful park at Wailea Bay.

On page one of the report it states that $25.2 will be required to complete this project over seven years. This figure is too low. If the state were to follow your plan all private land at Wailea Bay would need to be condemned and I am confident this figure alone would exceed $25.2. The time and effort spent condemning all the private land at Wailea Bay would be better directed in communicating and working with the landowners to create a park plan.

In your report it states that the width of the beach is 35 feet wide. This estimate is to high. During the winter the beach is reduced to mostly rock making it very difficult to use. During the summer months the beach reaches 35 feet in depth only in certain places, and parts can only be used when the tide is low.

Thank you for the opportunity to respond to this report and I am confident that the state and private landowners can work together to design the park.

Sincerely,
John Hosbein

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. John Hosbein
1632 19th Street NW
Apartment 7
Washington, DC 20009

Dear Mr. Hosbein:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 21, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at (808) 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

Anne Marie Adams. M.D.
Lisa M. Hosbein. M.D.
Obstetrics and Gynecology
St. George Medical Center
6620 Coyle Avenue. Suite 416
Carmichael. California 95608

RECEIVED
NOV 29 1993
BELT COLLINS HAWAII
11/29/93
cc. K. Chung
W. Harrison
J. Petersen

November 23, 1993

Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Rutka,

I have read the Hapuna Beach State Recreation Area Expansion Project Environmental Impact Statement Preparation Notice which was sent to my parents, Dr. and Mrs. David J. Hosbein. My siblings and I are extremely interested in this project as we are the owners of one of the beach lots at the northern end of Wailea Bay. We have enjoyed the natural beauty of Wailea Bay for many years.

In considering the Recreation Area Expansion Project it is very important to accurately evaluate the size of the Wailea Bay beach. The Environmental Impact Statement Preparation Notice states on page five that the width the Wailea Bay beach "seasonally varies from about 40 to 80 feet." In actuality the beach seasonally varies from zero to about 80 feet. Even in the summer, high tide often reaches up to the kiawe trees. In the winter much of the sand washes out to sea and at high tide the remaining sand is frequently under water.

A beach as small and fragile as the Wailea Bay beach obviously cannot handle the same types of crowds as Hapuna Beach. Therefore it is important that the size of the parking lot is consistent with the capacity of the beach. A smaller parking lot set back from the beach would create a walk-in beach and would preserve the rustic natural setting at Wailea Bay.

Sincerely,
Lisa Hosbein
Lisa Hosbein

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Lisa M. Hosbein, M.D.
St. George Medical Center
6620 Coyle Avenue, Suite 416
Carmichael, California 95608

Dear Dr. Hosbein:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 23, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at (808) 587-0227.

Sincerely,
MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

DOCUMENT CAPTURED AS RECEIVED

JOHN J. LOWREY
P. O. BOX 44369
KAWAIHAE, HAWAII 96743

RECEIVED
11-21-93
1993 NOV 23 P 3:14
BELT COLLINS HAWAII

Susan S. Rutka,
Belt Collins and Associates
680 Ala Moana Blvd First Floor
Honolulu, Hawaii 96813

cc: Karen Quinn
Wayne W. Harrison
J. Pedersen

Dear Ms Rutka,

Thanks for your letter and enclosures.

1. Possibly you have a detailed topographical map which delineates the flood zones and stream beds. In 20 years some of us have seen at least three occasions when muddy, fresh, water, flood waters formed a lake from the stream at the beach right of way clear to the south west end of the beach. The 15 foot culvert at the highway runs full and unless the flood water is contained it may wash out the road, restrooms and parking space mauka of the condemned lots

2. The present access to the urban zoned property at the southwest part of the beach appears to be about as drawn. This is a temporary access expiring in 1995. We were refused a permanent access (easement) because the State's plans for the area were not determined. It would be helpful if the easement could be made permanent so it could be shared by the residents and public as it appears to be access to your parking lot and various picnic grounds.

3 The residents have been under the threat of condemnation since 1970. It would be helpful if the State would settle once and for all its plans for the use of this land.

4. Fires from campers and carelessly thrown cigarettes have wiped out the kiawe forests so practically the only trees are those planted by the residents.

5 Unless the State provides caretake the Beach area with increased usage will become a dump. If there were no residents living here to pick up the beach it would be a mess now.

We would be happy to discuss these concerns with anyone if you wish

Aloha
John J. Lowrey

DOCUMENT CAPTURED AS RECEIVED

Mike's Services
Building – Lumber – Consulting
P.O. Box B
Kurtistown, HI 96760
Ph: 966-7157

cc: R. Cleary
W. Harrison
J. Pedersen
12/1/93

RECEIVED
1993 DEC -1 P 12:20
BELT COLLINS HAWAII

11-30-93

To Sue Rutka

Thankyou for sending me a copy of the EIS prenotice. Here are some comment that I have.

1. Flooding although infrequent is substantial in volume and needs to be addressed.
2. The proposed parking ~~density~~ capacity will have a direct impact on beach quality what is the proposed volume?
3. I would like to request that as part of the EIS the state make a determination of whether it intends to proceed with condemnation of additional private properties this would seem quite relevant to your planning process. ~~and~~

Mahalo
Mike Lowrey

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. Mike Lowrey
Mike's Services
P.O. Box B
Kurtistown, Hawaii 96760

Dear Mr. Lowrey:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 30, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

cc: K. Chung
W. Harrison
J. Pedersen

RECEIVED

P.O. Box 986
Kamuela, HI 96743
December 6, 1993

Ms Susan Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813-5408

Dear Ms Rutka,

RE: Hapuna Beach State Recreation Area EIS

I received your EIS Preparation Notice for the Hapuna EIS and wish to inform you that would like to be a consulted party during the EIS process. Thank you for granting me a time extension for this notification.

As you know I have extensive files about the area under consideration, especially the Wailea Bay and Puako Bay areas. I have information about the history of the area and of alternative uses of the land that will be helpful to consultants charged with gathering information for the EIS. I have also had many years experience, living on the beach at Wailea as I do, with the users and campers in the area. The information I have compiled on weather and ocean conditions and on the recreational desireability of various areas should be helpful to your consultants.

There is widspread concern among users about the proposed access to the Wailea area. I am concerned that the State take a diligent role in expanding on the public's existing rights of access.

I am also concerned that the alternatives to the proposed State layout of the park include other proposals for uses, such as the alternatives I have presented to the DLNR for many years. Please have your consultants discuss these with me.

Sincerely,
Benjamin Moore
Benjamin Moore

cc: Andrew Monden

cc: K. Chung
W. Harrison
J. Pedersen

RECEIVED

December 12, 1993

Belt Collins & Associates
680 Ala Moana Boulevard
Honolulu, HI 96813

Re: Environmental Impact Statement Preparation (EISPN)
Hapuna Beach State Recreation Area Expansion Project
93P-699 (033.93)

To Whom It May Concern:

I make the following written comment regarding the Hapuna EISPN.

1. Initially, there is confusion over the name "Wailea." The current University of Hawaii Press topographic map identifies this area as "Waialea," not "Wailea. This spelling and pronunciation is confirmed in John R. K. Clark's classic book "Beaches of the Big Island." Further, the EISPN refers to "Beach 68," when in fact it is known as "Beach 69." An admittedly minor, arguably even innocuous, point these errors signal disturbing questions about the accuracy and completeness of the information provided.

2. The southern boundary of the area affected should be changed from Puako Boat Ramp to Puako Point, some seven parcels further south, to reflect the original master plan drafted when the land was in conservation district zoning.

3. According to page five of the EISPN, the Waialea Bay white sand beach is 1700' feet long. A more accurate measurement would be about half that, or 850'.

4. The private Waialea Bay houselot owners have succeeded in appropriating the former access road that most directly leads to the useable southern white sand portion of the beach. Labeled "private property," this road and prohibition denies access to historic public trails. Further, privately erected seawalls encroach on public shoreline access rights. The EISPN fails to address this continuing and even accelerating affront to public rights. The appearance of a conflict of interest, at the least, is suggested because Robby Robertson, a state-level government official serving as a liaison on this project, owns property there. Property owner William T. White III has made a significant gift to local government.

5. Contrary to the EISPN figure, I have logged over 40 varieties of birds at Waialea Bay.

-1-

6. There is absolutely no mention of the fact that the sizeable percentage of state land carries ongoing archeological and cultural obligations as part of ceded lands.

7. The EISPN statement of no negative effect on water quality from pesticide and fertilizer runoff dismissed in a cursory manner a highly controversial issue deserving of greater attention.

8. No current or projected need for a public golf course exists. South Kohala is amply supplied with golf courses, both extant and planned. (Six more are planned for Puako alone.) If public, as opposed to private, courses are claimed to be needed, a current private course should be (proportionately) condemned to permit (affordable?) public access. As it stands, acres of irrigated arid desert land are grossly underutilized, and constitute a criminal waste of a scarce natural resource in a chronic drought area.

Thank you for the opportunity to provide this written comment. I look forward to your response as well as the draft EIS.

Very truly yours,

Benjamin Moore

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. Benjamin Moore
P.O. Box 986
Kamuela, Hawaii 96743

Dear Mr. Moore:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 6, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

cc: K. Chung
W. Hayashi
J. Pedersen
12/3/93

12/2/93

December 1, 1993

Susan S. Rutka
Belt Collins and Associates
by Fax 808-538-7819

two pages incl cover

RE: Hapuna/Wailea Beach Park Expansion

After looking at the Hapuna Beach State Recreation Area Expansion Project, EIS Prep Notice, I find myself appalled at the disproportionate amount of monies being requested for this project versus community needs.

The estimated costs to build and maintain the improvements specified in this proposal give pause to any taxpayer with a short term memory of the asbestos removal costs at the Capitol, which began in 1991 at a promised $47 million cost to the taxpayer, and after several promised new cost ceilings, are currently at $66.3 million. Just a few short months ago, we were told at a public meeting for the Hapuna expansion, that the cost would be $15 million, a figure we found staggering, and just this short time later the figure has escalated to $25.2 million. On this issue alone, I question the feasibility or the wisdom of this project.

Even at the cost presently being quoted, how is it possible to rationalize an expenditure of this magnitude, when so many other projects are more urgent, such as: school facilities for Waimea and Waikoloa; and the long promised Waimea bypass road.

I believe the State considering the expenditure of $25.2 million on an expansion of a State beach park when we are unable to afford to put our children in decent classrooms is reprehensible. As it is now, our students are in obsolete, overcrowded and/or portable classrooms. High school students from Waimea and Waikoloa are being bused all the way to Honokaa, and we do not have enough teachers for the students currently enrolled. The justification we have been given for [illegible] that the State does not have the funds.

long way toward meeting the public mandate to improve our educational system. Please re-examine your priorities.

The homeowners in Wailea have been active for years in seeking to upgrade the access and provide amenities for the public at Wailea. They have met with disinterest from the State. Unfortunately, because the State has never done any of these things, nor allowed the private property owners to do so, the beach is currently being abused by people. It is, as the Waimea police will readily confirm, essentially an open toilet, a place for drug deals, and drunkeness, all of which is preventing the public's use and enjoyment of this very special place. There is no dispute about the need for improvements to preserve and enhance the beach areas on this and other islands. The proposed project as it stands now is not the answer; to the contrary, the proposed project is a negligent waste of the taxpayers money.

Please provide a good standard access road, parking, comfort stations, picnic spots on the beach, and some camping areas between the beaches. Please preserve Wailea as a walk-in beach as the public has requested to protect this fragile bay, and provide for a beach experience different from that of Hapuna. This is what is needed, and asked for by the public, and can be accomplished for a fraction of the present plan's budget, in a fraction of the time.

Thank you for your time and consideration in this matter.

Sincerely,

Patricia S. O'Kieffe
P. O. Box 1596
Kamuela, HI 96743

cc: Governor John Waihee and Lynn Waihee
Mayor Steven Yamashiro
Speaker of the House Joe Souki
Charles Taguchi, DOE
Representative Larry Tanimoto
Lex Brodie, Board of Education
Representative Calvin Say, Chairman of House Finance

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Ms. Patricia S. O'Kieffe
P.O. Box 1596
Kamuela, Hawaii 96743

Dear Ms. O'Kieffe:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 1, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

GEORGE H. ROBERTSON

RECEIVED
1993 DEC -2 A 11:46

November 30, 1993

cc: K. Chung
W. Harrison
J. Pederson
12/3/93

Belt Collins & Associates
680 Ala Moana Blvd., First Floor
Honolulu, Hawaii 96813

Re: Hapuna Beach Recreational Area Expansion

Dear Sirs:

I have several questions and concerns with regard to the project:

1. What is the intention of the State to condemn additional private parcels in the Waialea Bay area? The State should make such a determination as part of the environmental assessment process and declare its intent. This matter could have a profound impact on landowners and should be addressed now.

2. The planned public parking lot located to the south of the project off the access road to the private lots does not offer a convenient route to the beach. Is this lot necessary? Would it not be better to leave this area undeveloped yet still within the park boundaries?

3. Will the project address the abuses presently taking place at Waialea Bay regarding illegal camping and squatting and the health risks posed by these activities?

4. How will wastewater for the expanded park facilities be handled? The current wastewater problems in Puako affecting the near shore waters and reef must not be exacerbated in any way.

5. How will irrigation and fertilization of the proposed golf course be designed in order to mitigate the affects of leaching and run-off possibly affecting near shore waters?

6. Will there be an increase in traffic into Puako and what will be the consequences of this additional traffic if any?

Thank you for the opportunity to present these concerns to you.

Aloha,

George H. Robertson

George H. Robertson

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. George H. Robertson
P.O. Box 4905
Kawaihae, Hawaii 96743

Dear Mr. Robertson:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 30, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

cc. M. Chang
W. Harrison
J. Pedersen
12/22/93

Richard P. Schulze
ATTORNEY AT LAW

P.O. Box 795 • Kamuela, Hawaii 96743 • (808) 885-7539

December 17, 1993

RECEIVED
DEC 20 1993
BELT COLLINS HAWAII

Susan Rutka
Belt Collins & Assoc
680 Ala Moana Blvd
Honolulu, Hawaii 96813-5406

Re: Draft EIS, Hapuna Beach State Recreation Area
Expansion Project

Aloha:

I wish to participate in the review of the EIS of the above project. Please send me a copy of the document when it is ready.

Thank you, and best wishes for the holiday season.

Very truly yours,

Richard Schulze

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. Richard P. Schulze, Attorney at Law
P.O. Box 795
Kamuela, Hawaii 96743

Dear Mr. Schulze:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 17, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

DOCUMENT CAPTURED AS RECEIVED

11/24/93
cc: K Chang
W. Harrison
J Pederson

P.O. Box 1017
Ross, Ca. 94957

November 24, 1993

Ms. Susan S. Rutka
Belt Collins & Associates,
680 Ala Moana Blvd., First Floor
Honolulu, Hawaii 96813-5406

Re: Hapuna Beach State Recreation Area
Expansion Project EIS Preparation Notice

Dear Ms. Rutka:

With reference to your letter of October 29, 1993 and to the enclosure of the above-referred to EIS Preparation Notice, as a property owner in the Wailea Bay Beach Lots subdivision at Wailea Bay I am very interested and concerned as to whether or not the State intends to condemn any additional privately owned parcels at Wailea Bay. Therefore, I request that during the EIS process the private property owners at Wailea and their association be allowed, and indeed encouraged, to submit alternative plans, ideas, concepts, etc., which would achieve the objectives of the Hapuna Beach State Recreation Area Expansion Project without the condemnation of additional private property at Wailea.

As we are all aware, the beach at Wailea is entirely different than the beach at Hapuna in that it is very fragile and smaller and more seasonal as the beach largely washes away in the winter. Given this condition, Wailea beach is not suited to, and indeed would be damaged by, the large numbers of visitors that a close-in parking and facilities area would stimulate. Therefore, I request that the EIS process give serious consideration to the impact of large numbers of visitors and to the natural limitation of these numbers by making Wailea a walk-in beach with the parking and facilities area at least one-quarter mile mauka of the beach.

I appreciate the opportunity of presenting these comments and requests and I wish to be a consulted party during the EIS process.

Yours truly,

Richard R. Treadwell,
Trustee of the Richard
T. Treadwell Trust

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1993

Mr. Richard R. Treadwell
P.O. Box 1017
Ross, California 94957

Dear Mr. Treadwell:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 24, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at (808) 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

cc: K. Chiang
W. Haraden
J. Pellegrin
12/10/93

RECEIVED
1993 DEC 10 A 11:38
BELT COLLINS HAWAII

187-C Hokulani St.
Hilo HI 96720

December 9, 1993

Sue Rutka
Belt Collins Hawai'i
680 Ala Moana Blvd.
Honolulu HI 96813

RE: Comments on EIS Preparation Notice, Hapuna Beach State Recreation Area Expansion Project

Dear Ms. Rutka:

I realize that the official deadline for comment has passed. I am hopeful, however, that you will consider these observations on the above-mentioned document.

A niggling point: reference is made to Beach 68, whereas I believe the usual name for this area is Beach 69, referring to the number on the utility pole that marks the area where people park to have access to this beach.

On page 5, the statement is made that "becaue of difficult vehicular access and lack of facilities, Wailea [beach] rdceives considerably less use than Hapuna." A more appropriate comparison for the access to Wailea might be the access to Beach 69. While the statement is made that Beach 69 is accessible from the old Kawaihae-Puako Road, this same access is available to Wailea Beach -- which, after all, is the continuation of Beach 69 southward.

My primary interest in the development of this recreation area lies in insuring public access to public beaches, including Wailea Beach. I would bring to your attention the fact that the state owns in fee a 40-foot-wide government reserve that fronts the private houses along Wailea Beach and which cuts through an area that has been developed with luxury houses.

The state's plans for a park in this area have been well known since the late 1970s. During that time, and with full knowledge of the state's plans, owners of the land in this area have chosen to develop their houses -- and, in many cases, they have built more than one house per lot, opting to "subdivide" their property through the establishment of horizontal property regimes.

Toward the northern end of Beach 69, the government road reserve (as depicted on your own Figure 3) provides a possible link-up to the parking facilities. There is no reason why the recreation area plan should not include use of the roadway here.

The state has no particular reason to defer to any wish for privacy or exclusivity on the part of the private landowners' in the area.

For this reason, I would suggest that the development of the Hapuna Beach State Recreation Area fully exploit all opportunities available for public access to the entire length of Wailea Beach-Beach 69, including the government road reserve. This road should be well marked and public access over it should be encouraged.

In addition, I would like to be sure you are aware of, and take consideration of, the fact that even where the shoreline is rocky, public access is assured. Toward the southern end of Wailea Bay, for example, a wide seawall was built in 1987. A condition of the permits for that wall ensures lateral access along and on the seawall.

As to the proposed golf course: I am concerned that the development of yet another golf course along Queen Ka'ahumanu Highway will go far toward destroying what remains of the natural character of the landscape. In addition, the construction of a golf course could have direct and dire impacts to lands downslope on the makai side of the highway -- the same land that is proposed for expanded recreational use. Floodways might require enlarging, thus reducing the usable areas downslope. In addition, compaction of the earth for the golf course could increase runoff and nutrient loading of the nearshore waters.

In short, I fear that the plans for Hapuna Beach Recreation Area may not be as firm as I believe they should be in affirming the public's right to access the *entire* beach along Wailea Bay. The 40-foot road reserve is government property, and I would remind you that it lies well inside the certified shoreline.

Please utilize this roadway by making access over it part of the official plans for the proposed recreation area.

Sincerely,

Patricia Tummons

Patricia Tummons

cc: Ralston Nagata

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Ms. Patricia Tummons
187-C Hokulani Street
Hilo, Hawaii 96720

Dear Ms. Tummons:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 9, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MAHABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

Post Office Box N
Kailua-Kona, Hawaii 96745-9012
Tel: (808) 326-7946 Fax: (808) 326-7474

November 22, 1993

1993 NOV 24 A 11:43

Edward Lau
Division of Water and Land Development
DEPARTMENT OF LAND AND NATURAL RESOURCES
1151 Punchbowl Street
Honolulu, Hawaii 96813

VIA TELEFAX 1-587-0283

Subject: EIS Preparation Notice (EISPN) for Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii Island

Dear Mr. Lau:

The subject document has been reviewed by me in some detail. While I support the concept of expanding and improving the public park facilities at Hapuna Beach and the adjoining South Kohala Coastline, I have some reservations about the "public golf course" planned on the mauka side of Queen Kaahumanu Highway. I offer the following observations, questions, and comments on this proposal:

1. A number of golf courses are already planned for the South Kohala area, and it is my understanding that substantial public play privileges will be available in most, if not all, of these. Why is the state proposing to use public lands for this purpose? Further, when were public informational hearings held to obtain citizen input and agreement for pursuing this aspect of the project?

2. The EISPN does not state whether these lands are ceded lands. If they are, and I strongly suspect they are, then what plans does your agency have to consult with the Office of Hawaiian Affairs regarding this proposal, and at what point in the land use process will they be consulted. The EISPN does not show OHA as one of the parties to be consulted; please explain this apparent omission.

3. The EISPN states that the proposed golf course will be operated and maintained by private industry. If this is so, please explain what provisions will be included in that contract to protect any existing traditional and customary rights affirmed in and protected by the state constitution?

4. Since the Hawaii State Supreme Court has made it very clear that disputes concerning management of ceded lands and rights of native tenants must be resolved before development takes place, please explain the agency's plans to manage these lands and safeguard the native rights as well as those of the general public. What will be the basis for the management regulations and procedures?

5. Given the apparent lack of opportunity for public input on this proposed golf course, I believe any further preparation of the EIS should be stopped until such time as well-publicized public hearings are held for the residents of West Hawaii. I suggest meetings be held in at least two locations in West Hawaii at times and places convenient to the users of the park facilities so Kona and Kohala residents can provide meaningful input. In this way, the state will avoid spending valuable time and money to study a project that may not have much local public support.

6. The EISPN does not refer to or provide any information about the Ala Kahakai trail or its proposed designation as a national trail; nor do the maps indicate the location of this trail. It is my understanding that, at least, parts of this ancient trail are still present in the subject area. Please provide further information regarding this important resource.

7. Mention is made in the EISPN of developing water wells in the mauka lands for irrigation of the golf course. What plans does the agency have to address the issue of water rights and how will the water and its uses be allocated between the private developer and the general public, including Native Hawaiians?

8. Two hundred fifty-nine (259) archeological sites have been noted in the subject area, and the EISPN indicates that, with the exception of two sites, all the others are significant for informational purposes only. Does this imply that only those two will be preserved. Who determines the significance of these sites and which will be destroyed? To what extent will local kupuna and residents be consulted for their knowledge and expertise of the area and possibly these sites?

9. There is a footnote in the EISPN indicating that approximately 15 agencies or individuals were consulted during preparation of the master plan, and that a public information meeting was held for this master plan. What was the basis for consulting with those selected few? If such information is available, please provide information on the date, time, and place of that meeting, the extent of the presentation, and the number of attendees from the public sector.

10. Since the EISPN indicates that the proposed golf course will be public, how will the fact that it will be maintained and operated by a private developer impact the use by the public? Additionally, what state monies will be needed to develop, operate, and maintain this golf course? Is the state planning to develop the site or use someone from the private sector? If the latter, how will that developer be chosen, and to what extent will any of the subject lands be disposed in its favor (lease, sale, easement, royalties, etc.)?

11. With respect to the private land now located at Wailea, does the state have any plans to acquire those as part of the park? If so, how and when will that happen? Is condemnation likely to have to occur? The EISPN refers to "Beach 68." Is this adjacent to or synonymous with "Beach 69"?

Thank you for this opportunity to respond to the subject EISPN. If you have any questions about this letter, or if I can be of further help, please call me. I look forward to hearing from you soon regarding my inquiries.

Sincerely,

J. Curtis Tyler, III

cc: Susan S. Rutka, Belt Collins & Associates

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

April 25, 1995

Mr. J. Curtis Tyler, III
P.O. Box 9012
Kailua-Kona, Hawaii 96745-9012

Dear Mr. Tyler:

Hapuna Beach State Recreation Area Expansion Project

This is in reference to your letter of March 29, 1995. We apologize for the long delay in responding to your letter dated November 22, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project. The issues you have identified will be addressed in the Draft EIS. The document will provide more detailed information than what was included in the preparation notice. For example, copies of the archaeological inventory report and golf course feasibility study will be presented in the appendix for review.

We agree with you that the public needs to be involved in planning the expansion of Hapuna. For your information, initial input on the master plan was received at a public informational meeting held on August 4, 1992 in Waimea. Enclosed is a list of the comments and questions received. The preliminary master plan presented at the meeting was revised, based on many of these comments/questions. The plan is now in pre-final form, pending receipt of comments on the Draft EIS. The Draft EIS is scheduled to be published in the OEQC Bulletin shortly. Both the EIS process and review of the Conservation District Use Application (CDUA) for the park expansion offer opportunities for public participation.

Thank you for your interest. We look forward to your continuing guidance to help our department meet West Hawaii's outdoor recreation needs.

Should you have any questions, please contact Mr. Edward Lau of the Project Development Branch in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Manager-Chief Engineer

ME:ek
Enclosure
c: Sue Rutku, Belt Collins Hawaii

CADES SCHUTTE FLEMING & WRIGHT
ATTORNEYS AT LAW

RECEIVED
1993 DEC -2 A 11:13

December 1, 1993

cc: K. Chung
W. Harrigan
J. Pedersen
12/3/93

Belt Collins & Associates
Susan S. Rutka
680 Ala Moana Boulevard
First Floor
Honolulu, Hawaii 96813-5406

Re: Hapuna Beach State Recreation Area Expansion Project, Environmental Impact Statement (EIS) Preparation Notice

Dear Ms. Rutka:

This office represents several Wailea Bay landowners. On behalf of our clients I would like to submit the following comments with respect to the proposed Hapuna Beach State Recreation Area Expansion Project EIS Preparation Notice and request to be a consulted party during the EIS process.

The proposed Master Plan for the project does not indicate whether the State intends to condemn any additional private properties at Wailea Bay. Clearly this should be specified by the State if the full range of environmental impacts is going to be identified and evaluated in this process. The State should specify which properties, if any, it intends to condemn, a time table for condemnation, and some exposition of the criteria utilized by the State in determining which properties, if any, are to be condemned.

As you are aware, Wailea Bay is in a marine life conservation district. It is a somewhat fragile marine environment which deserves a greater degree of protection than the larger Hapuna Beach area. The EIS prep notice does not contain any assessment of the "carrying capacity" of Wailea Beach nor does it contain a description of steps to be taken by the "developer" to ensure that the beach is not "over utilized." Obviously there are concerns of sanitation, overcrowding, inappropriate mix of activities, pollution, and excess fishing pressure on the area which may be resulting from the proposed recreational area expansion.

Wailea residents are also concerned respecting the risks of fire, flooding resulting from modified drainage following golf course development, security, and public and private access concerns. These issues should be dealt with very thoroughly in the Environmental Impact Statement process.

Unfortunately it appears that topography and environmental conditions have not been adequately considered for many components of the proposed recreational area expansion. Several of the sites identified for picnicking, group picnic rental, and camping may not be appropriate for those purposes. Significant landscaping would be required in order to reduce dust and wind and to make these proposed areas more usable. This activity would result in additional environmental impacts including earth moving, landscaping requirements, water demands, potential wind-blown dust, etc.

Of course there are also potential impacts relating to golf course construction and use of herbicides, pesticides, and fertilizers. Obviously, care should be taken to develop the proposed public golf course in as environmentally sensitive a manner as possible. Additionally, there is concern as to the water demand for the proposed golf course given the limited water resources apparently available in this area.

I would like to thank you for the opportunity to comment on the prep notice and I look forward to being a consulted party in the EIS process.

If you have any questions or require additional information please call me at 521-9345 or 329-5811.

Very truly yours,

Roy A. Vitousek III
for
CADES SCHUTTE FLEMING & WRIGHT

RAV/bah

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. Roy Vitousek III
Cades Schutte Fleming & Wright
Hualalai Center, Suite B-303
75-170 Hualalai Road
Kailua-Kona, Hawaii 96740

Dear Mr. Vitousek:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 1, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

RECEIVED
1993 NOV 30 P 12:05
DEPT OF LAND & NATURAL

November 28,1993

Belt Collins and Associates
680 Ala Moana Blvd.
First Floor
Honolulu, Hi 96813-5406

Attn: Susan S. Rutka

Regarding: Preparation Report (EIS)
Hapuna Beach State Recreation Area Expansion
Project.

As a resident of Wailea Bay since 1981, I would like to make the following comments.

Since the State has condemned certain properties in Wailea Bay, it is imperative for me to know whether the State plans to condemn additional parcels in the Wailea Bay Beach Lots. I am 63 years of age and I feel that for me to plan my remaining years, that as a citizen and taxpayor of this State I be afforded this information. Since the 1988 decision to authorize the D.L.N.R. to proceed with acquisition, it is only fair to the property owners for the State to make a determination of whether it intends to proceed with condemnation of additional private properties. This should be part of the environmental assessment.

I disagree with the proposed (what I perceive from the plan) public parking lot and restroom facilities shown to be on the southern part of the plan. Is the plan to have access thru and or in front of peoples homes? I believe it would make more sense to leave it where the present public access has been established. The reason being, that is where the properties have been condemned and acquired. The public has been using this access for all the years and is used to that entrance. The terrain is more suited to this use.

Wailea is a walk-in beach. However, the restrictions and laws of no fires and no over-nite camping have never been adhered to or enforced. Three major fires have destroyed part of the area over the last 8 years. Two of these fires by illegal camp fires. Sanitation has been a major problem over the years. Many years ago their was an outbreak of hepatitus. I feel the enforcement of laws and regulations must addressed.

The parking spaces must be consistent with the ability of the beach to accomodate the number of people. The small size of the beach is shown in your report. It should be noted also that over the years the amount of beach has shrunk drastically.

I am concerned also about over use of this marine reserve in regards to excessive fishing, motor boating, overnite boaters weighing anchor because the bay is so well protected from rough seas, jet skiers, etc. Naturally the traditional EIS information regarding sewage, water, fertilization, and irrigation with the proposed golf course.

As a resident and taxpayer for many years, I look foward to Wailea Bay being upgraded with a nice park, restroom facilities and proper parking. The size of improvements must be in keeping with the size of the bay. Enforcement of the laws and regulations is an absolute necessity. The State must make a determination of whether they plan to proceed with the acquisition of private parcels. These issues must be addressed to maintain an environmental balance for this pristine area, with the publics need for additional beach facilities, as well as the property owners.

Thank you.

Yours Truly,

Al Weinert

Al Weinert
Box 2680
#3 Wailea Bay
Kamuela, Hi. 96743

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. Al Weinert
Box 2680
#3 Wailea Bay
Kamuela, Hawaii 96743

Dear Mr. Weinert:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 28, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

1112393
cc: K. Chung
W. Harrison
J. Pedersen

Joe D. Wray, M.D.
16 Emerson Street
Brookline, Massachusetts 02146

RECEIVED
93 NOV 29 A 8:32
BELT COLLINS & ASSOCIATES

23 November 1993

Belt Collins & Associates
680 Ala Moana Blvd.
Honolulu, HI 96813-5406

Att: Susan S. Rutka

Dear friends,

We have received your Environmental Impact Statement Preparation Notice for the Hapuna Beach State Recreation Area Expansion Project. I have several questions and comments regarding issues that should be addressed in the EIS.

I am one of the property owners whose property at Wailea Bay has been confiscated by the State of Hawaii. It is not clear from the drawings of the new Master Plan if other private property at Wailea Bay is to be taken by the State. Certainly this would be a factor in the environmental impact of the park, insofar as there are now more than twenty houses on private property near Wailea Bay.

A related issue is the parking lot and restrooms indicated on the south side of the expanded park. It is not clear from the drawings how people would get from this area to the beach; most of the coastline adjacent to this area is lava rock. I suggest that it would be better to have the parking lot and restroom facilities consolidated in the area mauka of the center of the beach bay, at some distance from the water.

As you are aware, the beach at Wailea Bay is very small and fragile. To preserve the beach, only a limited number of visitors should be allowed to use it at one time. For this reason, the number of parking spaces available should be limited, also the camp sites and picnic facilities. Perhaps additional facilities should be added at Hapuna beach itself, as it is a much larger beach and can accomodate more than ten times the number of people that can be accomodated at Wailea.

When considering the impact of the park on this fragile and delicate environment, you should assess the effect of increased fishing in the bay, a Marine Life Conservation District, where already the number of fish is much smaller than it was several years ago.

Also, you must take into consideration the impact of increased sewage water disposal, and the proposed golf course fertilization and irrigation.

Please send me a copy of the Draft Environmental Impact Statement when it is prepared. Thank you.

Sincerely yours,

Elizabeth T. Wray

Elizabeth T. Wray (Mrs. Joe D. Wray)

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P O BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Ms. Elizabeth T. Wray
16 Emerson Street
Brookline, Massachusetts 02146

Dear Ms. Wray:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 23, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at (808) 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

HALE KEA FARMS
A DIVISION OF BLANCO INVESTMENTS & LAND, LTD.

RECEIVED
'93 DEC -2 A 11:57

cc: K. Chung
W. Harrison
J. Pedersen 12/3/93

November 18, 1993

Susan S. Rutka
Belt Collins and Associates
680 Ala Moana Boulevard
Honolulu, Hawaii 96813

RE: Hapuna Beach State Recreation
Area Expansion Project - EIS
Preparation Notice

Dear Ms. Rutka:

I am in receipt of your letter requesting comments for the EIS for the proposed Hapuna State Park Expansion Plan.

Please except these hastily drafted remarks in my attempt to meet your deadline. I have not thoroughly investigated all the categories addressed in your environmental report and would hope to have the chance to do so prior to the plan's final approval.

As a resident of Wailea Bay my comments are more appropriately addressed to that particular environment.

1. You indicate that Wailea Bay has a white sand beach of about 1700 feet in length, only 150 less than Hapuna Beach. I do not know if your linear figures are accurate but the concept suggested is false. Hapuna Beach is wide and unobstructed with a sandy bottom. Wailea is overgrown with sharp kiawe trees, lots of rock out croppings and a partially rock and coral bottom. It is a very narrow beach and is extremely limited as to the number of human beings it can reasonably hold without damage to the environment or the people themselves.

2. Hapuna Beach has much more wave action in-shore. In fact, it has waves breaking on the beach which aid in the movement of waste, debris, etc. from within the bay. A littoral current (or rip) is created with any wave action which tends to move old water out and new water in there. A wonderful cleansing action.

On the other hand, Wailea Bay does not have this type of wave action. Wailea is a very still bay protected by an outer reef and two points. The wave action occurs outside the bay off the two points and never enters the bay itself - there is no littoral current or cleansing activity.

3. After hurricane Iniki we experienced torrential rains which produced an inundation of mud in the bay. It took 6 months for the bay to clear. The improvements planned for the park expansion will only add to the run-off and waste that will continue to inundate a bay that has the potential for stagnation. I am hopeful this will be given serious consideration as to limitations on usage, flood control, and waste disposal.

a. Certain areas of Wailea Bay have been designated high risk flood zones by the A.C.E.; we need to study the impact and/or enhancement of the flooding potential presented by the park development.

b. I know nothing about run-off from golf courses - but, I read that the fertilizer can effect the quality of the ocean's ecology.

4. SURF

Hapuna is a beach break over a sandy bottom and much easier to patrol. It's a short swim to the victim and easily cited from the beach. Wailea is a point break - 500 to 1000 yards from shore over a shallow coral reef - a much more dangerous and difficult place to patrol.

The new park will add surfing pressure in greater numbers - the risk of injury will rise exponentially. Making Wailea Bay inaccessible or difficult to reach (i.e. a longer walk from the parking area) will help to limit the numbers.

5. VEGETATION

Kiawe is dense on Wailea Beach - it serves an important purpose. It is home to the wild life there, provides shade, and holds the beach intact from tidal action. It provides a natural boundary and limits the number of users on the beach. I am hopeful the existing kiawe trees will remain untouched.

P.O. BOX 1537 • KAMUELA, HAWAII 96743 • TEL: (808) 885-7053

6. BIRDS

The March 1978 study by Ernest Kosaka is accurate. I can attest that all those birds mentioned are still in existence in good numbers. I am fearful as to what will happen to the Grey and Black Franklin when the park is in place. It is a delicious game bird and will probably be eaten to extinction in no time. The cardinals still make their homes in the kiawe trees.

7. HUMAN BEINGS

I am certainly hopeful your report will consider the impact on those human residents who live around the bay. The DLNR still has a resolution in place since 1988 to acquire all the residences around Wailea Bay. We certainly would like to know if we will be displaced by this plan. I would suggest that we act as an aesthetic buffer to the public's domination of an ecologically sensitive area and should be allowed to remain to continue to provide it.

8. A public parking lot is proposed along the easement/roadway provided as access to most the residences around Wailea Bay. It is difficult to see the need for such a facility. Access to the beach from that lot will be difficult and generally across private property.

9. FIRE

Nothing is mentioned about fire potential and the extreme high risk of fire in the Hapuna area. During my time in Wailea I have experienced 3 major fires all of which caused residential damage and numerous smaller ones. All of the above were created by campers/beach goers.

The strong NE (offshore) trade winds in this area push fires rapidly from mauka to makai. A park with additional camp grounds will only enhance the potential for fire. This should be of major concern to everyone.

Thank you for keeping us informed.

Sincerely,

Bill White

Bill White

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mr. Bill White
Hale Kea Farms
P.O. Box 1537
Kamuela, Hawaii 96743

Dear Mr. White:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 18, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS, including the impact of the park expansion on the private landowners at Wailea. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

cc: H. Chang
W. Harrison
J. Pederson
12/10/93

Hawaii Island Environmental Council

Coastal Resources Action Group

P.O. Box 76, Hawi, Hawaii 96719

November 30, 1993

1993 DEC 10 P 2:53

Ms. Susan Rutka
Belt Collins & Associates
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813-5406

Dear Ms Rutka,

RE: Hapuna Beach State Recreation Area Expansion Project --EIS Preparation Notice

We recieved the notice on preparation of the Environmental Impact Statement for the Hapuna Beach Park Expansion. We do wish to be a consulted party during the EIS process.

Our group is made up of 10 community organizations, all concerned with coastal issues and uses, as well as several individuals. Between us we have extensive knowledge about the swimming, diving, boating and fishing (both commercial and family) in the immediate area. Some of us have knowledge of historic and cultural resources.

At earlier meetings about the Hapuna plans our group asked that the amount of land designated for the marine science center for the UH be increased back to its original designation of 40 acres. We still feel the 5-acre designation is not enough.

Public access is another big issue with us. We ask to be included on any preliminary discussions on public and fishing access.

In light of the increasing interest in eco-tourism we believe that the lands mauka of the highway might best be kept open for future recreational opportunities rather than committed to another golf course. However, it is propably wise within the EIS process to complete a non-developer initiated review of the effects of a coastal golf course for the informational value.

Please let us know if any of our resources can be helpful to the EIS consultants.

Malama na aina e kai,

Toni Withington

Toni Withington

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Ms. Toni Whitington
Hawaii Island Environmental Council
P.O. Box 76
Hawi, Hawaii 96719

Dear Ms. Whitington:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 30, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MAMABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

BANK OF HAWAII
BISHOP ESTATE
CABLEVISION
CASTLE & COOKE INVESTMENT CO
CHARLES M. COOKE
CHARLES INTERNATIONAL
CHEVRON
CLARK CORP
CROCKETT
DAVIES PACIFIC CENTER
DOLE CORP
DOLE FOOD CO
DOLE PACIFIC LIMITED
DOLE PLANTATION
DOLE RANCH
DOLE REAL ESTATE
DOLE TRADING
DOLE TRANSPORTATION
DOLE TRUCKING
DOLE WAREHOUSE
DOLE WHOLESALE
DOLE WORLDWIDE
DOLE WORLDWIDE TRADING
DOLE WORLDWIDE TRANSPORTATION
DOLE WORLDWIDE WAREHOUSE
DOLE WORLDWIDE WHOLESALE
DOLE WORLDWIDE RETAIL
DOLE WORLDWIDE MANUFACTURING
DOLE WORLDWIDE SERVICES
DOLE WORLDWIDE TECHNOLOGY
DOLE WORLDWIDE FINANCE
DOLE WORLDWIDE INSURANCE
DOLE WORLDWIDE REAL ESTATE
DOLE WORLDWIDE LEGAL
DOLE WORLDWIDE HUMAN RESOURCES
DOLE WORLDWIDE PUBLIC RELATIONS
DOLE WORLDWIDE MARKETING
DOLE WORLDWIDE SALES
DOLE WORLDWIDE CUSTOMER SERVICE
DOLE WORLDWIDE QUALITY ASSURANCE
DOLE WORLDWIDE RESEARCH AND DEVELOPMENT
DOLE WORLDWIDE ENGINEERING
DOLE WORLDWIDE CONSTRUCTION
DOLE WORLDWIDE MAINTENANCE
DOLE WORLDWIDE SECURITY
DOLE WORLDWIDE SAFETY
DOLE WORLDWIDE ENVIRONMENTAL
DOLE WORLDWIDE HEALTH
DOLE WORLDWIDE WELLNESS
DOLE WORLDWIDE FITNESS
DOLE WORLDWIDE RECREATION
DOLE WORLDWIDE SPORTS
DOLE WORLDWIDE ENTERTAINMENT
DOLE WORLDWIDE TRAVEL
DOLE WORLDWIDE TOURISM
DOLE WORLDWIDE HOSPITALITY
DOLE WORLDWIDE FOOD SERVICE
DOLE WORLDWIDE RESTAURANTS
DOLE WORLDWIDE CATERING
DOLE WORLDWIDE VENDING
DOLE WORLDWIDE RETAIL STORES
DOLE WORLDWIDE WHOLESALE STORES
DOLE WORLDWIDE MANUFACTURING PLANTS
DOLE WORLDWIDE DISTRIBUTION CENTERS
DOLE WORLDWIDE WAREHOUSES
DOLE WORLDWIDE TRANSPORTATION
DOLE WORLDWIDE TRUCKING
DOLE WORLDWIDE SHIPPING
DOLE WORLDWIDE AIRLINES
DOLE WORLDWIDE AIRPORTS
DOLE WORLDWIDE SEAPORTS
DOLE WORLDWIDE RAILROADS
DOLE WORLDWIDE PIPELINES
DOLE WORLDWIDE UTILITIES
DOLE WORLDWIDE ELECTRIC
DOLE WORLDWIDE GAS
DOLE WORLDWIDE WATER
DOLE WORLDWIDE SEWER
DOLE WORLDWIDE TELECOMMUNICATIONS
DOLE WORLDWIDE INTERNET
DOLE WORLDWIDE COMPUTER
DOLE WORLDWIDE SOFTWARE
DOLE WORLDWIDE HARDWARE
DOLE WORLDWIDE NETWORKING
DOLE WORLDWIDE SECURITY
DOLE WORLDWIDE ENCRYPTION
DOLE WORLDWIDE FIREWALL
DOLE WORLDWIDE ANTIVIRUS
DOLE WORLDWIDE BACKUP
DOLE WORLDWIDE RECOVERY
DOLE WORLDWIDE DISASTER
DOLE WORLDWIDE EMERGENCY
DOLE WORLDWIDE MEDICAL
DOLE WORLDWIDE DENTAL
DOLE WORLDWIDE VISION
DOLE WORLDWIDE PHARMACY
DOLE WORLDWIDE LABORATORY
DOLE WORLDWIDE RESEARCH
DOLE WORLDWIDE DEVELOPMENT
DOLE WORLDWIDE TESTING
DOLE WORLDWIDE QUALITY
DOLE WORLDWIDE CERTIFICATION
DOLE WORLDWIDE ACCREDITATION
DOLE WORLDWIDE STANDARDS
DOLE WORLDWIDE REGULATIONS
DOLE WORLDWIDE COMPLIANCE
DOLE WORLDWIDE AUDITING
DOLE WORLDWIDE ACCOUNTING
DOLE WORLDWIDE FINANCE
DOLE WORLDWIDE BANKING

Kohala Coast Association

HC02 Box 5300 Kohala Coast, Island of Hawaii 96743 • Telephone (808) 885-4915, Facsimile (808) 885-1044

RECEIVED
'93 NOV 29 A 9:31

November 4, 1993

11/29/93
cc: K. Chung
W. Harrison
J. Pedersen

Sue Rutka
Belt Collins & Associates
680 Ala Moana Blvd.
First Floor
Honolulu, HI 96813-5406

Re: PREPARATION NOTICE (EIS) FOR HAPUNA BEACH STATE RECREATION AREA EXPANSION PROJECT

Dear Sue:

Thank you for the preparation notice and for the opportunity to review the document.

In August 1992, at a public informational meeting in Waimea, several items not listed in this notice were mentioned. We assume these will be part of the environmental impact statement.

The issues are: water safety and conservation programs; public shoreline access; land acquisition of Waiakea; fire prevention program; special recreational needs for the elderly and handicapped; and interpretive programs.

We welcome the opportunity to participate in the planning for the expansion of Hapuna Beach State Recreation Area.

Sincerely,

William F. Mielcke
President

cc: The Kohala Coast Resort Association, Board of Directors

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. William F. Mielcke, President
Kohala Coast Resort Association
HC02 Box 5300
Kohala Coast, Hawaii 96743

Dear Mr. Mielcke:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated November 4, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified will be addressed in the forthcoming Draft EIS. We expect to file the Draft EIS with the State Office of Environmental Quality Control (OEQC) within the next two or three months. At that time, we will send you also a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

Kona Hawaiian Civic Club

November 22, 1993

Edward Lau
Department of Land and Natural Resources
Division of Water and Land Development
1151 Punchbowl Street
Honolulu, HI 96813

Subject: PREPARATION NOTICE
HAPUNA BEACH STATE RECREATION AREA EXPANSION PROJECT
TMK: 6-6-01:por. 2; 6-6-02:1-36, 40-44; 6-9-01:15

Dear Mr. Lau:

On behalf of the Kona Hawaiian Civic Club, we would like to relay our deep concern in regards to the Hapuna State Recreation Area Expansion Project and respectfully request that the Kona Hawaiinn Civic Club, the Waimea Hawaiian Civic Club, and the National Association of Hawaiian Civic Clubs be added to your list of non-profit groups to be consulted (Addresses provided at the end of this letter).

While we are very glad that the DLNR has decided to proceed with plans to develop the Hapuna Beach State Recreation Area including a 62-acre park in South Kohala, there are some areas of concern.

1. An 18-hole public golf course is planned for development on State land mauka of the Queen Ka'ahumanu Highway. What is the reasoning behind this as we understand that Ramsay Hawaii has also proposed a golf course in the same vicinity. And, are these State lands ceded lands? If so, has the Office of Hawaiian Affairs (OHA) been consulted in the initial planning?

It has been stated in the OEQC Bulletin (11/8/93) that wells will be developed in mauka lands to provide irrigation water for the proposed golf course and park. Are the lands where the wells will be dug ceded lands? If so, how will you address the water rights? The native tenant rights?

2. Has the DLNR done an archaeological and historical site survey of the area? If this has been done, please forward any information you may have on this. It is stated in the OEQC Bulletin, November 8, 1993, that some less significant archaeological sites will be eliminated. Our understanding is that there are 250 archaeological sites identified in the subject area. Who has determined what is significant and what is not?

P.O. Box 4098, Kailua-Kona, Hawai'i 96745

Kulia I Ka Nuu

It is also stated that trails will provide opportunities for interpreting both cultural and natural resources. What trails are these? Has the E Mau Na Ala Hele been consulted on the plans for this expansion?

There has not been, to our knowledge, any public informational meetings on the proposed land uses for the Hapuna Beach lands. We do not understand how the EIS Preparation Process can be initiated without public input. In light of the critical questions being asked, we urge that public informational meetings be held in Waimea and West Hawai'i as soon as possible, before any further action or study is undertaken, or before any more funds are expended. Areas of concern to be addressed at a public informational meeting would also be what is planned for the makai side of the expansion.

Thank you for the opportunity to respond to the Preparation Notice. We look forward to your earliest response.

Sincerely yours,

Leimana DaMate

Leimana DaMate, President
Kona Hawaiian Civic Club

cc: Belt Collins Hawaii
H. K. Bruss Keppler, President, National Association of Hawaiian Civic Clubs
Ann Nathaniel, President, NAOHCC, HI District Council
Mabel Tolentino, Vice-President, Waimea Hawaiian Civic Club

Addresses:

H.K. Bruss Keppler, President
National Association of Hawaiian Civic Clubs
841 Bishop Street, #1800
Honolulu, HI 96813

Ann Nathaniel, President
NAOHCC HI District Council
141 Pilipaa Street
Hilo, HI 96720

Mabel Tolentino, Vice President
Waimea Hawaiian Civic Club
P.O. Box 295
Kamuela, HI 96743

DOCUMENT CAPTURED AS RECEIVED

RECEIVED
DEC 2 - 1993
BELT COLLINS HAWAII

Peter Merriman
President
Puako Community Assn
P.O Box 4435
Kawaihae, HI 96743

Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Blvd
First Floor
Honolulu, HI 96813-5406

cc: K. Chung
W. Harrison
J. Pederson
12/1/93

Dear Ms Rutka,
Thankyou very much for sending A copy of the EIS For Hapuna Beach State Recreation Project.
At this time the Puako Community Association is not prepared to comment. We would like to be a consulted party during the process. Please address all future correspondence to Peter Merriman, at the above address. Thankyou very much

Sincerely

Peter J. Merriman

me 808-885-6822
pk 808-885-8756

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

NOV 24 1995

Mr. Peter Merriman, President
Puako Community Association
P.O. Box 4435
Kawaihae, Hawaii 96743

Dear Mr. Merriman:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

KA LĀHUI HAWAI'I
National Land Committee
P.O. Box 1256 • Pahoa, HI 96778

SEND COPIES TO APPROPRIATE PARTIES
RECEIVED
93 NOV 24 P1:10
INV. OF WATER & LAND DEVELOPMENT

cc: W. Harrison
J. Peterson
12/1/93

November 22, 1993

Honorable John Waihee
Governor, State of Hawaiʻi
c/o Office Environmental Quality Control
220 South King Street, Suite 4009
Honolulu, Hawaii 96813

Department of Land and Natural Resources
Division of Water and Land Development
1151 Punchbowl Street
Honolulu, Hawaii 96813

Attention: Mr. Edward Lau

Gentlemen:

Re: Hapuna Beach State Recreation
Area Expansion Project

Ka Lahui Hawaii OBJECTS the destruction of archaeological sites as stated in the OEQC Bulletin dated November 8, 1993.

We request as to what are you eliminating archaeological sites?

We also request the study of trails. Will they affect the Park expansion project?

May we hear from you on this matter.

Sincerely Yours,

(Mrs.) Clara L. Kakalia
Ch air, National Land Committee

cc: Kia'aina H. Trask
Belt Collins Hawaii
Edward Lau, DLNR, Division of Water and Land Development

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIR
BOARD OF LAND AND NATURAL RES

DEPUTY
GILBERT COLOMA-AGUI

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1993

Mrs. Clara L. Kakalia, Chair
National Land Committee
Ka Lahui Hawaii
P.O. Box 1256
Pahoa, Hawaii 96778

Dear Mrs. Kakalia:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter, dated November 22, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project. We apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

An archaeological inventory survey of the project area was conducted by Paul H. Rosendahl, Ph.D., Inc. (PHRI) a few years ago and a report completed in 1994. The tentative decision to eliminate certain sites was based on site significance assessments and treatment recommendations by the archaeologist. A copy of the survey report will be included in the Draft EIS.

The PHRI study also included a survey of trails in the project area. These trails will either be preserved in place and/or incorporated into the trail complex being planned for the park. The shoreline trail will be part of the Ala Kahakai network that has been nominated for National Trail status and which has been designated as Hawaii Island's demonstration trail by the State's Na Ala Hele program.

Thank your for your interest in this project. When the Draft EIS is completed, we will send you a copy for review and comment.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Ms. Leimana DaMate, President
Kona Hawaiian Civic Club
P.O. Box 4098
Kailua-Kona, Hawaii 96745

Dear Ms. DaMate:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter, dated November 22, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project. We apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

The issues you have identified, including the use of ceded land for the proposed project, the involvement of the Office of Hawaiian Affairs in the planning process, and the development of an 18-hole golf course on State land, will be addressed in the Draft EIS, and we have added the Waimea Hawaiian Civic Club and the National Association of Hawaiian Civic Clubs to our list of parties to be consulted.

For your information, initial input on the master plan was received at a public informational meeting held on August 4, 1992 in Waimea. A representative of the Office of Hawaiian Affairs was invited to attend the meeting. The preliminary master plan presented at the meeting was revised, based on many of the comments and questions received. The plan is still in draft form, pending receipt of comments on the Draft EIS. Both the EIS process and review of the Conservation District Use Application for the park expansion offer opportunities for further public participation.

An archaeological inventory survey of the project area was conducted by Paul H. Rosendahl, Ph.D., Inc. (PHRI). The tentative decision to eliminate certain sites was based on site significance assessments and treatment recommendations by the archaeologist. A copy of the1994 survey report will be included in the Draft EIS.

The PHRI study also included a survey of trails in the project area. These trails will either be preserved in place and/or incorporated into the trail complex being planned for the park. The shoreline trail will be part of the Ala Kahakai network that has been nominated for National Trail status and which has been designated as Hawaii Island's demonstration trail by the State's Na Ala Hele program. E Mau Na Ala Hele is one of the consulted parties on the EIS.

Thank you for your interest in this project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

KA LĀHUI HAWAI'I
National Land Committee
P.O. Box 1256 • Pahoa, HI 96778

SEND COPIES TO APPROPRIATE PARTIES

RECEIVED
93 NOV 24 P1:10
DIV. OF WATER & LAND DEVELOPMENT

cc: W. Harrison, J. Pedersen 12/14/93

November 22, 1993

Honorable John Waihee
Governor, State of Hawaiɪ
c/o Office Environmental Quality Control
220 South King Street, Suite 4009
Honolulu, Hawaii 96813

Department of Land and Natural Resources
Division of Water and Land Development
1151 Punchbowl Street
Honolulu, Hawaii 96813

Attention: Mr. Edward Lau

Gentlemen:

Re: Hapuna Beach State Recreation Area Expansion Project

Ka Lahui Hawaii OBJECTS the destruction of archaeological sites as stated in the OEQC Bulletin dated November 8, 1993.

We request as to what are you eliminating archaeological sites?

We also request the study of trails. Will they affect the Park expansion project?

May we hear from you on this matter.

Sincerely Yours,

(Hrn.) Clara L. Kakalia
Ch air, National Land Committee

cc: Kia'aina H. Trask
Belt Collins Hawaii
Edward Lau, DLNR, Division of Water and Land Development

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV 24 1995

Mrs. Clara L. Kakalia, Chair
National Land Committee
Ka Lahui Hawaii
P.O. Box 1256
Pahoa, Hawaii 96778

Dear Mrs. Kakalia:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter, dated November 22, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project. We apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

An archaeological inventory survey of the project area was conducted by Paul H. Rosendahl, Ph.D., Inc. (PHRI) a few years ago and a report completed in 1994. The tentative decision to eliminate certain sites was based on site significance assessments and treatment recommendations by the archaeologist. A copy of the survey report will be included in the Draft EIS.

The PHRI study also included a survey of trails in the project area. These trails will either be preserved in place and/or incorporated into the trail complex being planned for the park. The shoreline trail will be part of the Ala Kahakai network that has been nominated for National Trail status and which has been designated as Hawaii Island's demonstration trail by the State's Na Ala Hele program.

Thank your for your interest in this project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

RECEIVED
DEC 2 - 1993
BELT COLLINS HAWAII

Peter Merriman
President
Puako Community Assn
P.O Box 4435
Kawaihae, HI
96743

Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Blvd
First Floor
Honolulu, HI
96813-5406

cc: K. Chung
W. Harrison
J. Pedersen
12/3/93

Dear Ms Rutka,
Thankyou very much for sending A copy of the EIS for Hapuna Beach State Recreation Project.
At this time the Puako Community Association is not prepared to comment. We would like to be a consulted party during the process. Please address all future correspondence to Peter Merriman, at the above address. Thankyou very much

Sincerely

Home 808-885-6822
Fax 808-885-8756

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN

NOV 24 1995

Mr. Peter Merriman, President
Puako Community Association
P.O. Box 4435
Kawaihae, Hawaii 96743

Dear Mr. Merriman:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

WAIMEA
COMMUNITY ASSOCIATION

P.O. Box 685 • Kamuela, Hawaii 96743

1993 DEC 20 A 9:14

December 14, 1993

cc: K. Chung
W. Harrison 12/20/93
J. Pedersen

Susan S. Rutka
Belt Collins & Associates
680 Ala Moana Blvd.
Honolulu, Hawaii 96813-5406

Subject: Hapuna Beach State Recreation Area Expansion Project

Dear Susan:

The Waimea Community Association would like to be a consulted party during the EIS process for the above-named Project.

We have no comments at this time but would appreciate the opportunity to participate at any point in the development and review process. Perhaps a presentation of the Preliminary Plan to the Waimea Community Association could be scheduled.

Thank you for the invitation to participate in this important public project.

Sincerely,

Aza Summers, Chairman
Waimea Community Assoc. Planning Committee

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
WATER AND LAND DEVELOPMENT
P.O. BOX 373
HONOLULU, HAWAII 96809

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

NOV 24 1995

Mr. Aza Summers, Chairman
Waimea Community Association
P.O. Box 685
Kamuela, Hawaii 96743

Dear Mr. Summers:

Environmental Impact Statement
Proposed Expansion Project
Hapuna Beach State Recreation Area
South Kohala, Hawaii

We acknowledge the receipt of your letter to Belt Collins & Associates, dated December 14, 1993, regarding the Environmental Impact Statement (EIS) Preparation Notice for the Hapuna project and apologize for the delay in this response. The proposed project has been undergoing a development schedule refinement.

Thank you for your interest in the project. When the Draft EIS is completed, we will send you a copy for review and comment.

Should you have any questions, please contact Mr. Andrew Monden of the Project Development Section in Honolulu at 587-0227.

Sincerely,

MANABU TAGOMORI
Chief Engineer

c: Sherri Samuels, State Parks Division
Susan A. Sakai, Belt Collins Hawaii
Warren Harrison, Harrison Associates

CHAPTER 7
CONSULTED PARTIES AND THOSE WHO PARTICIPATED IN THE PREPARATION OF THE FINAL EIS

The announcement of the availability of the Draft Environmental Impact Statement (DEIS) for the proposed Hapuna Beach State Recreation Area Expansion was published in The Environmental Notice by the Office of Environmental Quality Control on June 23, 1996. The agencies, organizations, and individuals listed below were sent copies of the DEIS with a request for comments on the project. Those believed to have an interest in the project or requested consulted party status were also mailed a copy of the document. Parties who replied with comments are marked with an asterisk (*) and copies of their letters are reproduced herein. Parties that replied with "no comment" statements are marked with a dash line (--).

If the comments on the project were substantive and required a response, copies of the response letters are presented on the following pages. Those who responded in writing on their own (a copy of the DEIS was not sent to them) are indicated by a plus sign (+) at the end of their name. Those who submitted substantive comments after the extended August 30, 1996 deadline are indicated with two asterisks (**); copies of their letters and the State's response are included in this chapter.

Federal Agencies

U.S. Environmental Protection Agency
U.S. Army Support Command Hawaii
Department of the Interior, Fish and Wildlife Services
* Department of the Interior, Geological Survey
* Department of the Navy, Naval Base Pearl Harbor
National Marine Fisheries Service, Pacific Area Office
-- National Resources Conservation Service
* U.S. Army Corps of Engineers
U.S. Coast Guard

State Agencies

* Office of Environmental Quality Control
Department of Agriculture
-- Department of Accounting and General Services
Department of Business, Economic Development & Tourism
Department of Business, Economic Development & Tourism, State Energy Office
* Department of Defense
* Department of Hawaiian Home Lands
* Department of Health
Department of Land and Natural Resources
* Department of Land and Natural Resources, State Historic Preservation Division
* Housing Finance and Development Corporation, Department of Budget & Finance

* Department of Transportation
Na Ala Hele Program, Division of Forestry & Wildlife
Office of State Planning
* State Commission on Persons with Disabilities
* State Land Use Commission

County of Hawaii

* Planning Department
Department of Parks and Recreation
Department of Public Works
Department of Research and Development
* Department of Water Supply
University of Hawaii-Hilo Campus Library
Civil Defense Agency

University of Hawaii

* Environmental Center
** Marine Programs
Water Resources Research Center

Libraries

State Main Library
State Archives
Legislative Reference Bureau
University of Hawaii, Hamilton Library
Department of Business, Economic Development & Tourism Library

Regional Libraries

Kaimuki Regional Library
Kaneohe Regional Library
Pearl City Regional Library
Hilo Regional Library
Kahului Regional Library
Kauai Regional Library

Hawaii Island Libraries

Bond Memorial (Kohala) Library
Holualoa Public Library
Kailua-Kona Public Library
Kealakekua Public Library
Thelma Parker Memorial Library

Non-Government Agencies

American Lung Association
Hawaii Electric Light Co. Inc.
* Office of Hawaiian Affairs

State Legislators

Senator Malama Solomon
Representative David Tarnes
Representative Virginia Isbell

County Council

* Councilman Keola Childs
Councilman Jim Rath
Councilman John Ray

News Media

Honolulu Star Bulletin
Honolulu Advertiser
Hawaii Tribune Herald
West Hawaii Today

Community Organizations

E Mau Na Ala Hele
Hale Kea Farms
Hawaii Island Environmental Council
* Hawaii Leeward Planning Conference
* Hui Lihikai +
Kohala Coast Resort Association
Kona Hawaiian Civil club
National Association of Hawaiian Civic Clubs
National Land Committee, Ka Lahui Hawaii
People's Advocacy for Trails Hawaii (PATH)
Puako Community Association
Waimea Community Association
Waimea Hawaiian Civic Club
* Waimea Property Owner's Association (2 letters) +

Private Parties

* John & Ann Alkire
* Anonymous +
Laura C. Beckvold
* John Broussard +

* Andrew Condrey +
* David T. Hosbein
* Dr. & Mrs. David J. Hosbein
* John Hosbein
* Lisa M. Hosbein, MD
* John J. Lowrey
* Mike Lowrey
Mauna Kea Properties, Inc.
* Gregory R. Mooers +
* Benjamin Moore
* Ana Nawahine-Kahoopii +
* Patricia S. O'Kieffe
Palekoki Ranch, Inc.
* Kelly Pomeroy +
* Morage Rice +
George H. Robertson
Richard R. Schulze
* Zanga Schutte +
* Mary Hugh Scott +
* Allan S. Treadwell, MD +
* Richard R. Treadwell
* Patricia Tummons
J. Curtis Tyler III
* H. Visser +
* Roy A. Vitousek, III
Al Weinert
* Arthur von Wiesenberger +
Elizabeth T. Wray
* Marcia S. Yardey +

Fill-In Form

* Carla Beard +
** Martha M. Black +
* Richard M. Devine +
* Holley K. Fredrickson +
* Dorothy N. Gulbrandsen +
* Deborah Harkins +
* Frederick Jones +
* Helen J. Thomas Maddock +
* Herbert McKelvy +
* Andrew L. Morgan & wife +
** Leon T. Thevenin +
* Constance A. Treadwell +

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

June 27, 1996

Mr. Gary Gill
State of Hawaii
Office of Environmental Quality Control
220 South King St., Fourth Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Draft Environmental Impact Statement
Hapuna Beach State Recreation Area Expansion
Lalamilo, South Kohala, Hawaii

We have received the Draft Environmental Impact Statement (DEIS). We regret that because of prior commitments we are unable to review the DEIS within the 45-day deadline.

Enclosed is the DEIS which is being returned to your office for your future use.

Sincerely,

William Meyer
District Chief

Enc.

cc: Mr. Andy Monden, Department of Land & Natural Resources
Mr. Glen Koyama, Belt Collins Hawaii Ltd.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

DEC - 3 1996

Mr. William Meyer, District Chief
U.S. Geological Survey
Water Resources Division
U.S. Department of the Interior
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

Dear Mr. Meyer:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of June 27, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

Although you were unable to comment on the Draft EIS, we appreciate your effort to review the document.

Sincerely,

Andrew M. Monden
ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DEPARTMENT OF THE NAVY
COMMANDER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860-5020

RECEIVED
96 AUG -5 P 2:59

IN REPLY REFER TO
11010
Ser N4(23)/ 6321
01 Aug 96

Governor
Attn: Mr. Gary Gill
State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, HI 96813

Dear Mr. Gill:

Subj: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE HAPUNA BEACH STATE RECREATION AREA EXPANSION, LALAMILO, SOUTH KOHALA, HAWAII OF JUNE 1996

Thank you for the opportunity to review the DEIS for Hapuna Beach State Recreation Area Expansion, Lalamilo, South Kohala, Hawaii of June 1996.

The Navy has no comment to offer at this time and appreciates the opportunity to participate in your review process.

The Navy's point of contact is Mr. Stanford Yuen at 474-0439.

Sincerely,

Stanford B. C. Yuen, P.E.
By direction

Copy to:
Mr. Andy Monden
Division of State Parks
c/o Land Division
State of Hawaii
1151 Punchbowl Street, Room 221
Honolulu, HI 96813

Mr. Glen Koyama
Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809
DEC - 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. Stanford B. C. Yuen, P.E.
Naval Base Pearl Harbor
Department of the Navy
P.O. Box 110
Pearl Harbor, Hawaii 96860-5020

11010
Ser N4 (23)/6321

Dear Mr. Yuen:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 1, 1996, regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

We appreciate the time and effort you took to review the DEIS.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

United States Department of Agriculture

Natural Resources Conservation Service

P. O. Box 50001
Honolulu, HI
96850-0001

August 9, 1996

Governor of the State of Hawaii
c/o Mr. Gary Gill, Director
Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

Dear Governor Cayetano:

Subject: Draft Environmental Impact Statement (DEIS) - Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii

We have reviewed the above-mentioned document and have no comments to offer at this time.

We thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc:
Mr. Andy Monden, Division of State Parks, Department of Land and Natural Resources, 1151 Punchbowl Street, Room 221, Honolulu, Hawaii 96813
Mr. Glen Koyama, Belt Collins Hawaii Ltd., 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813

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

AN EQUAL OPPORTUNITY EMPLOYER

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  DISTRICT OFFICES
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

REF:LD-EK

DEC -3 1996

Mr. Kenneth M. Kaneshiro
State Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
P.O. Box 50004
Honolulu, Hawaii 96850-0001

Dear Mr. Kaneshiro:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 9, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

We appreciate your time and effort for reviewing the DEIS.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

July 5, 1996

Planning and Operations Division

Mr. Gary Gill
Office of Environmental Quality Control
State of Hawaii
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act:

a. Based on the information provided, a DA permit will not be required for the project. However, if the applicant proposes future activities in or near jurisdictional waters, consultation will need to take place with our Operations Branch to determine if a DA permit may be required (438-9258; extension 14). Please refer to file number 960000278 for future inquiries.

b. The flood information provided on page 3-34 of the DEIS is correct.

Sincerely,

Lawrence O. Muraoka, P.E.
Acting Chief, Planning
and Operations Division

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC -3 1996

Mr. Lawrence O. Muraoka, P.E.
Acting Chief
Planning and Operations Division
Corps of Engineers, Pacific Ocean Division
Department of the Army
Fort Shafter, Hawaii 96858-5440

Dear Mr. Muraoka:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 5, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project. We acknowledge your comments on the Draft EIS and will include your letter in the appendices of the Final EIS.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

August 30, 1996

Mr. Michael Wilson, Chair
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Wilson:

Subject: Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii

Thank you for the opportunity to review the subject document. We have the following comments.

1. Some new golf courses in Hawaii have conditions which require substantial "public play" rates and use privileges. Please survey existing and proposed golf courses in West Hawaii to determine whether the demand for affordable golf can be met by existing and approved private golf courses.

2. To meet the irrigation water requirement for the proposed golf course, an existing brackish water well will be rehabilitated and two new wells will be developed. How much water will be extracted from the new wells? What is the quality of the water? What is the sustainable yield of the underlying aquifer?

3. Most of the lands encompassed by the proposed park expansion are ceded lands. Please consult with the Office of Hawaiian Affairs regarding the use of ceded lands for the proposed recreation area expansion.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Jeyan Thirugnanam

for Gary Gill
Director

c: Belt Collins

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

REF:LD-EK

DEC -3 1996

Honorable Gary Gill, Director
Office of Environmental Quality Control
State of Hawaii
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

Environmental Impact Statemen (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 30, 1996, to the Department of Land and Natural Resources regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

1. Existing West Hawaii golf courses which offer public playing privileges have kamaaina rates that vary between $35 and $45 for Big Island residents and $35 and $55 for neighbor island residents. There are two exceptions to this; one golf course located north of Waimea and one that is south of Kailua-Kona offer kamaaina rates in the mid to high $20 range. The Hapuna Beach State Recreation Area's proposed golf course is expected to offer rates that are below the typical West Hawaii kamaaina rates. We anticipate a strong demand for golf at this fee level which will be nearer the rate charged by Hilo's municipal golf course. As you may know, West Hawaii does not have a public golf course.

2. At least about 650,000 gallons per day of brackish water will be drawn from two of the on-site wells. The third well will serve as a back-up source for the first two wells. Information on the sustainable yield in this particular coastal area is scarce and generally not available because of a limited informational base. A draft copy of the Hawaii County Water Use and Development Plan, dated December 1991, indicate, however, there are approximately 54 million gallons per day of sustainable yield in the South Kohala region. As a whole, this is more than adequate to serve the long-term demand for this area. The current usage in the region is about 6.3 mgd (1995 State Water Commission records).

3. We have received comments from the Office of Hawaiian Affairs as well as from some residents of the community regarding ceded lands. Our response has been that DLNR confirmed that almost all of the park expansion area is ceded land and that the State is proposing improvements for public benefit and use. Additionally, the State's position on ceded land is that it will not sell or trade ceded land in exchange for other land. Any exception to this policy will be first approved by the Chairperson of the Board of Land and Natural Resources. Furthermore, 20 percent of all revenues received from the use of ceded land will be remitted to the Office of Hawaiian Affairs.

We trust our response adequately addresses your concerns.

Aloha,

MICHAEL D. WILSON

c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR

SAM CALLEJO
COMPTROLLER

MARY PATRICIA WATERHOUSE
DEPUTY COMPTROLLER

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

RECEIVED
96 JUL 25 A10:41
OFC. OF E.Q.
QUALITY CONTROL

LETTER NO. (P)1447.6

JUL 22 1996

TO: The Honorable Benjamin J. Cayetano
Governor, State of Hawaii

THROUGH: Mr. Gary Gill, Director
Office of Environmental Quality Control

SUBJECT: Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii
Draft Environmental Impact Statement

Thank you for the opportunity to review the subject document. The proposed project will have no immediate impact on our facilities. Therefore, we have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Public Works Division at 586-0488.

SAM CALLEJO
State Comptroller

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

REF:LD-EK

DEC -3 1996

Honorable Sam Callejo, State Comptroller
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Callejo:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 22, 1996, to the Office of Enviromental Quality Control (OEQC) regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

We appreciate your time and effort for reviewing the DEIS.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR

MAJOR GENERAL EDWARD V. RICHARDSON
DIRECTOR OF CIVIL DEFENSE

ROY C. PRICE, SR.
VICE DIRECTOR OF CIVIL DEFENSE



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



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

July 25, 1996

TO: Governor, State of Hawaii
c/o Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

ATTENTION: Mr. Gary Gill

FROM: Roy C. Price, Sr.
Vice Director of Civil Defense

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS); HAPUNA BEACH STATE RECREATION AREA EXPANSION

State Civil Defense (SCD) appreciates this opportunity to comment on the DEIS submitted by the Division of State Parks, Land Division, on Hapuna Beach State Recreation Area Expansion, Hapuna, District of South Kohala, island and State of Hawaii; TMK 6-6-01:por. of 2; 6-9-01:por. of 1; 6-2-2:1; 6-6-2: 1 to 4, 6, 7, 10, 17 to 32, 34, 35, and 39 to 43.

We do not have negative comments specifically directed at the DEIS. However, the proposed project area requires four (4) sirens and siren support infrastructure. Currently, the proposed area is covered by a single, antiquated, mechanical 113 dB siren. SCD proposes that the developer purchase and install four (4) electronic sirens to include replacement and relocation of the existing siren and adding three (3) more sirens as the development of the recreation project area progresses. The existing mechanical 113 dB siren should be replaced with an electronic, solar powered, 121 dB omnidirectional siren. To provide better coverage, this replacement siren should be resited to another location in the existing parking lot. SCD also proposes that a second electronic, solar powered, 121 dB omnidirectional siren be purchased and installed near the rest rooms at the proposed "Group Picnic Rentals" area. The 121 dB sirens require a 250-foot radius in which there are no residential buildings. Two other electronic, solar powered sirens with specialized speaker arrays should be purchased and installed in the proposed golf course area as indicated in Figure 2-4, "Hapuna Beach Recreational Area Expansion Master Plan." Just as fire

hydrants, underground/overhead utilities, roads and streets, sidewalks, water and drainage systems are planned as integral parts of planned developments, so must emergency warning systems be planned for the safety and well-being of the workers and guests/users when an impending or actual event threatens the area.

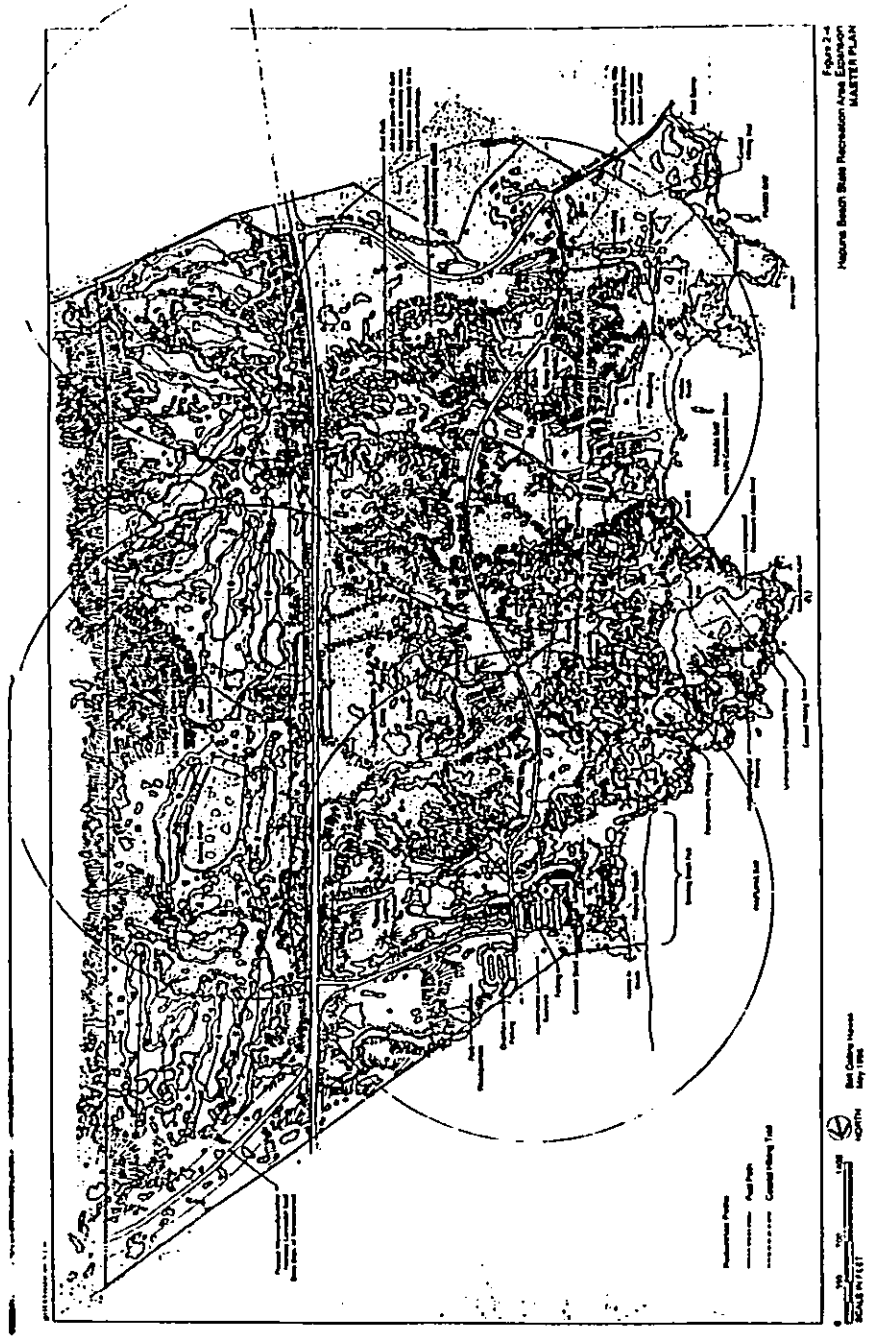
CHAPTER 3, "EXISTING CONDITIONS, ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES," Section 3.3, "TOPOGRAPHY, GEOLOGY, AND SOILS," Subsection 3.3.1, "Existing Conditions," sub-subsection 3.3.1.1, "Physiography," describes the typically uneven surface of the property, with minor knolls, small ravines and gullies and an average slope of 4.5 percent and elevations from the shoreline to approximately 320 feet. While sub-subsection 3.3.1.3, "Geologic Hazards," addresses the volcanic and seismic hazards and Section 3.4, "CLIMATE," Subsection 3.4.1,"Existing Conditions," addresses rainfall and wind conditions. Additionally, Section 3.7, "COASTAL AND MARINE ENVIRONMENT, Subsection 3.7.3.1, "Existing Conditions," sub-subsections 3.7.3.1.3, and 3.7.3.1.4 address "High Surf/Storm Swells" and "Tsunamis," respectively. However, the impact of tropical cyclone /hurricane force winds (to include terrain amplification) and the inundation resulting from both storm driven waves and the torrential rainfall associated with such storms need to be addressed and evaluated. Facilities within the project area must be favorably sited, designed and constructed to mitigate against and withstand these conditions of the project elevations. These structures could then be evaluated and surveyed for use as public shelters in disasters.

Our SCD planners and technicians are available to discuss this further if there is a requirement. Please have your staff call Mr. Hel Nishihara of my staff at 733-4300.

Enc.

bc: Belt Collins Hawaii, Ltd.
Attn: Mr. Glen Koyama

DOCUMENT CAPTURED AS RECEIVED



BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

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

REF:LD-EK

DEC -3 1996

Mr. Roy C. Price, Sr.
Vice Director of Civil Defense
Office of the Director of Civil Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Mr. Price:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your memorandum of July 25, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

We acknowledge your recommendation for new and replacement sirens and siren support infrastructure for Hapuna and will consult with you on the final installation requirements during the project design stage.

With respect to tropical cyclones, hurricanes, storm driven waves and torrential rainfall, we will address and evaluate the effects of these natural forces, especially on the proposed park structures, in the Final EIS.

We trust our response adequately addresses your concerns.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

KALI WATSON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

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

1996 AUG -9 P 2:

BELT COLLINS HAWAII

August 8, 1996

MEMORANDUM

TO: The Honorable Gary Gill, Director
Office of Environmental Quality Control

FROM: Kali Watson, Chairman
Hawaiian Homes Commission

SUBJECT: Hapuna Beach State Recreation Area Expansion

The Department of Hawaiian Home Lands (DHHL) anticipates significant growth on Hawaiian home lands at Kawaihae, Lalamilo and Waimea. We support the proposed project which will increase recreational opportunities in the South Kohala region.

Thank you for the opportunity to review and comment. If you have any questions, please call Joe Chu of our Planning Office at 586-3838.

4090L15

c: DLNR (State Parks)
Belt Collins Hawaii, Ltd.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
BOUNDARIES BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

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

REF:LD-EK

DEC -3 1996

Honorable Kali Watson, Chairperson
Hawaiian Homes Commission
State of Hawaii
P.O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Watson:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your memorandum of August 8, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

We appreciate your time and effort for reviewing the DEIS and your expressed support of the proposed park expansion.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

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

In reply, please refer to

96 SEP -4 P 2:23

August 26, 1996 93-312A/epo

To: The Honorable Benjamin Cayetano
Governor, State of Hawaii
c/o Director, Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

From: Lawrence Miike
Director of Health

Subject: Draft Environmental Impact Statement
Hapuna Beach State recreation Area Expansion
South Kohala, Hawaii
TMK: 6-6-01: por. of 2; 6-9-01: por of 1; 6-2-02: 1;
6-6-02: various

Thank you for allowing us to review and comment on the subject document. We have the following comments to offer:

Wastewater

The project proposes to use State land and funds for the expansion of an existing beach park at Hapuna Bay in South Kohala, Hawaii.

The subject project is located in both a critical wastewater disposal area (CWDA) with five (5) acre lot exception and noncritical wastewater disposal area as determined by the Hawaii Wastewater Advisory Committee. However, as these are public facilities, new cesspools will not be allowed as a means of wastewater disposal (Section 11-62-31.1(d)).

There is no public sewage collection system in the South Kohala District. The expanded park facilities are to be partially served (8000 gpd) by a new sewer line between the project site and the Mauna Kea Resort Wastewater Treatment Facility. We recommend that the agreement to utilize the treatment facilities of Mauna Kea Resort be expanded to handle additional flows from the proposed park. Of particular concern are wastewater flows from areas such as the main park area, concessions, and organized group camping facilities. Existing cesspools may be required to

be upgraded and when public sewers become available, connection will be required.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems."

Should you have any questions on this matter, please contact Ms. Lori Kajiwara of the Wastewater Branch at 586-4294.

Solid Waste

The DEIS estimates the volume of refuse that will be generated as a result of the park expansion, but does not address reduction or recycling efforts. The Integrated Solid Waste Management Act of 1991, formally established a solid waste reduction goal for the sate of 50% by the year 2000. Any new development should identify, and commit to the opportunity to divert recyclable materials from traditional disposal. The increase in refuse generated within the park will include glass and aluminum beverage containers which could be segregated by separate collection bins.

The golf course will generate increased green trimmings as a portion of the waste stream, and these should be composted, rather than handled as waste. The Department of Health's "Guidelines Applicable to Golf Courses in Hawaii," guideline number 8, encourages composting and reuse of greenwastes as a soil conditioner. Also, the guideline suggests that locally produced compost and soil amendments should be used whenever available. Guidelines are enclosed.

Should you have any questions on this matter, please contact Ms. Carrie McCabe of the Office of Solid Waste Management at 586-4240.

Enc.

c: Belt Collins Hawaii Ltd.
DLNR
OSWM
WWB

ATTACHMENT

STATE OF HAWAII
DEPARTMENT OF HEALTH

August, 1994 (Version 5)

GUIDELINES APPLICABLE TO GOLF COURSES IN HAWAII

In order to assure that environmental quality is promoted, protected and enhanced, the State Department of Health (DOH) recommends the following for all golf courses in Hawaii. The owner/operator must also comply with all applicable DOH rules.

1. Baseline groundwater quality and, if appropriate, coastal water quality should be established.

2. The owner/operator should establish a groundwater and, if appropriate, a coastal water monitoring plan. The groundwater and coastal water monitoring plans should minimally describe the following components:

   a. A routine monitoring schedule of at least once every six (6) months for the first three (3) years of operation and once a year thereafter, or more frequently in the event that the monitoring data indicates a need for more frequent monitoring.

   b. Compounds which should be tested for include compounds associated with fertilizers, biocides, and effluent irrigation. These data should be permanently retained by the golf course and submitted periodically to the State DOH and the Planning Department of the county in which the golf course is being proposed. These data should be provided both in detail and in summary format and should relate to the baseline data and to adverse impact levels.

   c. If the monitoring data indicate increased levels of a contaminate associated with golf course maintence activities that poses, or may pose, a threat to public health or the environment, the owner should immediately inform the State Department of Health and the County Planning Department. Subsequently, the owner must mitigate any adverse effects caused by the contamination.

3. If a wastewater treatment works with effluent reuse becomes the choice of wastewater disposal, then the owner/developer and all subsequent owners should develop and adhere to a wastewater reuse plan which should incorporate the provisions of the Department of Health's Guidelines for the Treatment and Use of Reclaimed Water, developed by the Wastewater Branch and dated November 22, 1993. A copy of the guidelines may be obtained by contacting the Wastewater Branch at 586-4294.

4. Above ground storage tanks for storing petroleum products for fueling golf carts, maintenance vehicles, and emergency power generators should be used rather than underground storage tanks (USTs). USTs may pose a potential risk to the groundwater and should not be encouraged.

5. Buildings designed to house fertilizers and biocides should be bermed to a height sufficient to contain a catastrophic leak of all fluid containers. It is also recommended that the floor of this room be made waterproof so that all leaks can be contained within the structure in order to facilitate a cleanup.

6. A golf course maintenance plan should be prepared and implemented with regards to the use of fertilizers and biocides as well as an irrigation schedule. This maintenance plan should be based on operational practices that would minimize or prevent environmental pollution, including, but not limited to, pratices that are taught at the certification school of the National Association of Golf Course Superintendants.

7. Every effort should be made to minimize the amount of noise from golf course maintenance activities. Essential maintenance activities (e.g., mowing of greens and fairways) should be conducted at times that do not disturb nearby residents.

8. Solid waste should be managed in a manner that does not create a nuisance. Whenever possible, composting of green wastes for subsequent use as a soil conditioner or mulching material is encouraged. The composting and reuse should be confined to the golf course property to eliminate the necessity for offsite transport of the raw or processed material. In addition, during construction the developer should utilize locally-produced compost and soil amendments whenever available.

9. Pesticides and other agricultural chemicals should be applied in a manner that prevents the offsite drift of spray material. The State Department of Agriculture should be consulted in this regard.

10. To avoid soil runoff during construction, the developer should consult with the U.S. Department of Agriculture, Soil Conservation Service to assure that best management practices are utilized.

If there are any questions regarding the guidelines recommended above, please contact the Environmental Planning Office at 586-4337. We appreciate your cooperation in preserving and protecting environmental quality in Hawaii.

Contact People at the Department of Health for Information Regarding the Guidelines for Golf Course Development in Hawaii

Subject	Contact Person/Phone No.
1. Groundwater Quality & Management Plans	Chauncey Hew--Safe Drinking Water Branch 586-4258
2. Drainage Drywells	Chauncey Hew--Safe Drinking Water Branch 586-4258
3. Coastal Water Quality & Monitoring Plans	Denis Lau--Clean Water Branch 586-4309
4. NPDES Permit	Denis Lau--Clean Water Brnach 586-4309
5. Maintenance Plan	Chauncey Hew--Safe Drinking Water Branch 586-4258
6. Wastewater Reuse Plan	Harold Yee--Wastewater Branch 586-4294
7. Composting Green Waste	John Harder--Office of Solid Waste Management 586-4240
8. Noise from Maintenance Activities	Jerry Haruno-- Noise & Radiation Branch 586-4700
9. Underground Storage Tanks	Steven Chang--Solid Hazardous Waste Branch 586-4226

Other Contact People

Subject	Contact Person/Phone No.
1. Runoff During Construction	U.S. Department of Agriculture, Soil Conservation Services 541-2600
1. The Application Pesticides & other Agricultural Chemicals	State Department of Agriculture 973-9403

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  DISTRICT OFFICES
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

REF:LD-EK

DEC -3 1996

Honorable Lawrence Miike, Director
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Miike:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your memorandum of August 26, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

Wastewater

In compliance with Section 11-62-31.1(d) of the Department of Health's Administrative Rules, we will not install cesspools to service the park expansion. Instead, we will provide septic tanks that will meet your department standards. Meanwhile, we will upgrade, if required, existing cesspools and connect with a public sewer system when one becomes available in the area.

Solid Waste

In compliance with the Integrated Solid Waste Management Act of 1991, the State Parks Division will provide separate receptacles or collection bins for cans and bottles for recycling purposes. The rest of the trash will be taken to the nearest County landfill. Grass and other landscape cuttings, particularly in the golf course area, will be collected and then composted and recycled as soil conditioners.

We trust our response adequately addresses your concerns.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

August 2, 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

MEMORANDUM

LOG NO: 17304
DOC NO: 9607PM07

TO: GARY GILL
Office of Environmental Quality Control

FROM: DON HIBBARD, Administrator
Historic Preservation Division

SUBJECT: Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion
Lalamilo, South Kohala, Hawaii Island
TMK: 6-6-1: por. 2; 6-9-1: por. 1; 6-2-2: 1; 6-6-2: 1 to 4, 6, 7, 10, 17 to 32, 34, 35, and 39 to 43

Our office is currently reviewing the Phase I and II archaeological reports prepared by Paul H. Rosendahl, Inc. (PHRI) for compliance with Chapter 6E-8, HRS for this proposed project. Until our office has approved all of the archaeological consultant reports no land alteration should be allowed to take place.

PM:jk

cc: Andy Monden, Division of State Parks
Glen Koyama, Belt Collins Hawaii Ltd.
Luis Manrique, Office of Hawaiian Affairs

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809
DEC - 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Hibbard:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your memorandum of August 2, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

Our Division of State Parks has also received a memorandum from you dated August 29, 1996, which provides an updated review of Paul H. Rosendahl, Ph.D., Inc.'s (PHRI) current archaeological report. A representative from PHRI will respond to your comments and fulfill all necessary State Historic Preservation Division requirements for an acceptable inventory survey for the subject property.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR

ROY S. OSHIRO
EXECUTIVE DIRECTOR

IN REPLY REFER TO

96:PPE/2870

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587 0600

August 5, 1996

TO: The Honorable Benjamin J. Cayetano
Governor, State of Hawaii
c/o Office of Environmental Quality Control

FROM: Roy S. Oshiro
Executive Director

SUBJECT: Draft Environmental Impact Statement (DEIS) for Hapuna Beach State Recreation Area Expansion

We have reviewed the subject DEIS and note that proposed park expansion will require the acquisition of 18 privately-owned parcels behind Wailea Bay.

As HFDC has oversight responsibility for statewide relocation programs pursuant to Chapter 111, HRS, we ask that you submit a copy of the relocation plan for our review.

Thank you for the opportunity to comment.

c: DLNR, State Parks Division
Belt Collins Hawaii Ltd.
L. Wond, HFDC

HFDC

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
Engineering Branch
Planning Branch
Technical & Support Branch
STATE PARKS
WATER RESOURCE MANAGEMENT

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

REF:LD-EK

DEC -3 1996

Mr. Roy S. Oshiro, Executive Director
Housing Finance and Development Corporation
Department of Budget and Finance, State of Hawaii
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Dear Mr. Oshiro:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your memorandum of August 5, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

We will comply with Chapter 111, HRS, and submit for your review a relocation plan prior to any acquisition of the privately-owned parcels at Wailea Bay.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
JERRY M. MATSUDA
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
STP 8.7502

August 12, 1996

TO: THE HONORABLE BENJAMIN J. CAYETANO, GOVERNOR
STATE OF HAWAII
C/O OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: HAPUNA BEACH STATE RECREATION AREA EXPANSION
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
TMK: 6-6-01: POR 2; 6-9-01: POR 1; 6-2-2: 1; 6-6-2: 1-4,
6, 7, 10, 17-32, 34, 35, AND 39-43

Thank you for your transmittal requesting our comments on the subject DEIS.

Our comments are as follows:

1. The Island of Hawaii Long Range Highway Plan recommends the widening of Queen Kaahumanu Highway. Additional rights-of-way or setbacks may be required and should be coordinated with our Highways Division.

2. The alignment of the proposed Waimea-Kawaihae Bypass Road through the subject area should be coordinated with our Highways Division.

3. The existing channelized intersections with the Hapuna Beach Road and Puako Spur Road will require traffic signals. The developer should monitor and coordinate with our Highways Division when the traffic signals would be warranted.

4. The developer will be required to provide a fully channelized intersection with traffic signals for the proposed new golf course access road. The developer should be required to monitor and coordinate with our Highways Division when the traffic signals are warranted.

5. These improvements should be at no cost to the State.

6. Plans for any construction work within the State highway right-of-way must be submitted for our review and approval.

We appreciate the opportunity to provide comments.

c: Mr. Andy Monden, Division of State Parks c/o Land Division
Mr. Glen Koyama, Belt Collins Hawaii Ltd.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

REF:LD-EK

DEC -3 1996

Honorable Kazu Hayashida, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your memorandum of August 12, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

Our plans for park expansion have been prepared to accommodate widening of the Queen Kaahumanu Highway and development of the new Waimea-Kawaihae Bypass Road. If and when these highway improvements occur, the park expansion will not be negatively affected. As requested, further refinements to our plan will be coordinated with the Highways Division of your department.

As indicated in the DEIS, traffic lights will be needed at the Queen Kaahumanu Highway intersections of Hapuna Beach Road and Puako Spur Road some time in the future. We will work with the Highways Division on the appropriate timing for the traffic lights installation. We will also work with that office on the timing and installation of a channelized intersection with traffic signals for the golf course entry road.

Cost sharing will be sought from the Highways Division on the development of the intersection improvements. Much of the traffic on Queen Kaahumanu Highway already exists generated by growth in the region. Traffic will continue to increase due to overall development in West Hawaii, and the DOT should assume some of the cost of the highway intersection improvements.

We will submit plans for approval to the Highways Division for any construction work within the State highway right-of-way

We trust our response adequately addresses your concerns.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

COMMISSION ON PERSONS WITH DISABILITIES

919 Ala Moana Boulevard, Room 101 • Honolulu, Hawaii 96814
Ph. (808) 586-8121(V/TDD) • Fax (808) 586-8129

July 30, 1996

Belt Collins Hawaii Ltd.
680 Ala Moana Blvd, First Floor
Honolulu, Hawaii 96813

Attention: Mr. Glen Koyama

Subject: Hapuna Beach State Recreation Area Expansion

Dear Mr. Koyama,

I have received and reviewed the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Specific areas that are required to be accessible include: at least 5% of picnic tables and barbecue facilities per site; all comfort stations and public, and employee restrooms; if provided, at least one indoor shower per building; one of each cluster of outdoor showers per site; cabins; pavilions and associated facilities; public telephones; parking; kitchen facilities; lavatories; and storage and stage. Other areas or elements such as the golf course building would also be covered, however, the course itself has only recommendations at this time. Although we want to maintain the integrity of *all* historic places or sites, recommend that, as much as is possible, provide access to these areas (including beaches and fishing areas) under the guidance of the State Historic Preservation Office.

For the Park Headquarters, public areas and indoor common use areas, e.g., lounge or meeting rooms, are required to be accessible. Employee work spaces need only be designed so one can approach, enter, and exit. Example: office of the Head Park Ranger need only be designed with an accessible door and hardware, however, maneuvering within the space, shelving, etc., need not be accessible. This principle also applies to the maintenance yard.

If you have any questions, feel free to call me.

Sincerely,

Ben Gorospe
Facility Access Coordinator

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC -3 1996

Mr. Ben Gorospe
Facility Access Coordinator
State of Hawaii
Commission on Persons with Disabilities
919 Ala Moana Boulevard, Room 101
Honolulu, Hawaii 96814

Dear Mr. Gorospe:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 30, 1996, and your comments on the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

When the proposed project proceeds to the design stage, the State Land Division will work with your office to comply with the Americans with Disabilities Act and provide appropriate facilities for the disabled.

We trust our response adequately addresses your concerns.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

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

July 16, 1996

The Honorable Benjamin J. Cayetano
Governor, State of Hawai'i
c/o Office of Environmental Quality Control
220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813

Dear Governor Cayetano:

Subject: Hapuna Beach State Recreation Area Expansion - Draft Environmental Impact Statement (June 1996)

We have reviewed the subject Draft Environmental Impact Statement (DEIS), received by our office on June 25, 1996, and have the following comments to offer:

1) We confirm that the following parcels of land, identified by the following tax map keys, are within the respective State Land Use Districts:

TMK:	District
6-2-02: 01	Conservation
6-6-01: por. 02	Agricultural
6-6-02: 01, 02, 03, 04, 07, 10, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, por. 32	Urban
6-6-02: por. 32	Conservation
6-6-02: 34	Urban
6-6-02: por. 35	Conservation
6-6-02: por. 35	Urban
6-6-02: 39, 40, 41, 42, 43	Conservation
6-9-01: por. 01	Urban

2) Clarification should be provided as to whether or not TMK: 6-6-02: 05 is included in the Hapuna Beach State Recreation Area Expansion.

We understand that TMK: 6-6-02: 05 is a private residential lot located behind Wailea Beach.

In the event that TMK: 6-6-02: 05 is determined to be included in the Hapuna State Park Expansion, the parcel is within the State Land Use Urban District.

3) We confirm that the Office of Planning (formerly Office of State Planning) included a recommendation to reclassify a portion of the existing Hapuna State Park from the Urban District to the Conservation District in its State Land Use District Boundary Review - Hawaii report, completed pursuant to HRS §205-18.

To date, the Office of Planning has not filed a petition for district boundary amendment for said recommendation.

4) Further, we confirm that the Office of Planning included a recommendation to reclassify a portion of TMKs: 6-6-02: 40 and 41 (approximately 9.61 acres adjacent to Queen Kaahumanu Highway), from the Agricultural District to the Conservation District.

However, review of our records show that the area in question as already being within the State Land Use Conservation District. On May 24, 1985, a correction was made to the Agricultural/Conservation District Boundary to have the Conservation District Boundary abut the makai (western) side of Queen Kaahumanu Highway.

5) We note that the mauka portion of the Mauna Kea Resort area, located immediately northeast of the Hapuna State Park Expansion was the subject of a Commission approval (LUC Docket No. A84-574/Mauna Kea Properties, Inc.) On May 6, 1985, the Commission approved reclassification of approximately 317 acres from the Agricultural District to the Urban District for residential, recreational, and golf course uses. The Commission also made approximately 82 acres subject to Incremental Districting.

On December 6, 1994, the Commission approved reclassification of the approximately 82 acres, for residential use.

We have no further comments to offer at this time.

Thank you for the opportunity to provide comments on the DEIS.

If you have any questions in regards to this matter, please feel free to contact me or Leo Asuncion of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

cc: DBEDT (Dir. Ref. No. 96-243-E)
Mr. Andy Monden, Division of State Parks
Mr. Glen Koyama, Belt Collins Hawaii, Ltd.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

REF:LD-EK

DEC -3 1996

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

Dear Ms. Ueda:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 16, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project. Below is our response to your comments.

1) We acknowledge your confirmation of the subject parcels.

2) Parcel 5 of TMK 6-6-02 is a private parcel, but the State is planning to acquire the property and include it as part of the park master plan.

3) We acknowledge your confirmation of the recommended Urban to Conservation District reclassification for a portion of the existing Hapuna Beach State Recreation Area.

4) We will include the corrected Agricultural/Conservation District Boundary abutting the makai side of Queen Kaahumanu Highway in the Final EIS.

5) The Urban District classification for the mauka Mauna Kea Resort area is reflected on Figure 4-1 of the Draft EIS.

We trust our response adequately addresses your comments.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Norman Olesen
Deputy Director

96 AUG -9 P 2:53

BELT COLLINS HA...

County of Hawaii

PLANNING DEPARTMENT

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8615

August 4, 1996

Mr. Glen Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813

Dear Mr. Koyama:

Hapuna Beach State Recreation Area Expansion
Draft Environmental Impact Statement
Tax Map Key: 6-6-01:2; 6-9-1:1; 6-2-2:1;
6-6-2: 1 to 4, 6, 7, 10, 17 to 32, 34, 35, and 39 to 43

We have received the draft EIS for this project and have the following comments:

1. The DEIS includes discussion of the several issues raised during our review of the EISPN for this project with the exception of comment number 6 relating to the proposed UH Hilo Puako Field Station Kalakaua Marine Education Center.

2. State Parks proposes to purchase the existing residential lots and improvements immediately mauka of Wailea Bay in what appears to be a move to minimize conflicts between public and private purposes. Similar thought/discussion should be presented on the relationship and impacts of the proposed park expansion and the Education Center.

Thank you for the opportunity to comment. Should you have any questions, please feel free to contact Rodney Nakano or Alice Kawaha of my staff at 961-8288.

Sincerely,

VIRGINIA GOLDSTEIN
Planning Director

RKN:cmr
F:/wp60/rodney/96-3/lhapuna1.rkn
xc: West Hawaii Office

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC -3 1996

Ms. Virginia Goldstein, Planning Director
County of Hawaii
25 Aupuni Street, Room 109
Hilo, Hawaii 96720-4252

Dear Ms. Goldstein:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 4, 1996, regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

In Section 3.1 of the DEIS, we discussed the proposed University of Hawaii-Hilo facility at Puako. The new facility will be ocean-research oriented and operated as part of the Kalakaua Marine Education Center. Since the project is still in its conceptual stage, specific information on proposed facilities is not known.

Considering the nature of the facility and its location at the isolated southern end of the project site, the State Parks Division does not anticipate any conflict of use or interference with access and views. From the marine center standpoint, low-profile uses near the facility are not expected to disturb the center's research or educational activities.

We trust our response adequately addresses your concerns.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
25 AUPUNI STREET • HILO, HAWAII 96720
TELEPHONE (808) 969-1421 • FAX (808) 969-6998

July 1, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 South King Street, Fourth Floor
Honolulu, HI 96813

DRAFT ENVIRONMENTAL IMPACT STATEMENT
HAPUNA BEACH RECREATION AREA EXPANSION
TAX MAP KEY 6-6-01: POR. OF 2; 6-9-01: POR. OF 1; 6-2-02:1; 6-6-2: 1-4, 6, 7, 10, 17-32, 34, 35, AND 39-43

We have reviewed the subject document.

Water system improvements, including, but not limited to source and transmission facilities, will need to be constructed to provide for the domestic water needs of the park expansion project. Construction plans and design calculations will be required for our review in insure adequacy and compliance with our water system standards.

Milton D. Pavao, P.E.
Manager

copy - Division of State Parks, c/o Land Division
Belt Collins Hawaii, Ltd.

Water brings progress...

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC -3 1996

Mr. Milton D. Pavao, P.E., Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Pavao:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 1, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

We are planning to develop a new well at the approximately 1,200-foot elevation of the Lalamilo land tract. This well site is situated in a proven well field which has already produced four successful wells. Existing transmission lines from the well field to the Queen Kaahumanu Highway right-of-way will be used to convey potable water for domestic purposes to the proposed park expansion.

Construction plans and design calculations will be submitted to the State Department of Land and Natural Resources and to your department for review and approval before construction begins.

We trust our response adequately addresses your concerns.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
cc: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
2550 Campus Road • Crawford 317 • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

RECEIVED
'96 SEP -9 P 3:51

August 30, 1996
RE:0675

Mr. Edward Lau
Department of Land and Natural Resources
Land Division
1151 Punchbowl Street, Room 227
Honolulu, Hawaii 96813

Dear Mr. Lau:

Draft Environmental Impact Statement (EIS)
Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

The Division of State Parks proposes expansion of the existing Hapuna Beach State Recreation Area in South Kohala, Hawaii from 62 acres to 846 acres. The enlarged park will extend from Hapuna Bay to Puako Bay and from the shoreline to the 320-foot elevation approximately 1,600 feet mauka of Queen Kaahumanu Highway. The park expansion will include numerous outdoor recreational facilities to implement the 1990 State Comprehensive Outdoor Recreation Plan objectives and to accommodate the projected demand in the West Hawaii area. Planned improvements include camping and picnic sites for families and groups, parking and vehicular accesses to the shoreline, pedestrian trails and shoreline accesses, a park headquarters, maintenance facilities, and an 18-hole public golf course to be located mauka of the highway. The expansion will require acquisition by the state of 18 privately owned parcels currently occupied by part- and full-time residences. The schedule for acquisition will depend on availability of funds from the State Legislature.

This review was completed with the assistance of George Curtis, UH Hilo; Terry Hunt, Archaeology; and Tom Hawley and Paul Berkowitz of the Environmental Center.

The Hapuna Beach State Recreation Area expansion comprises a firm commitment on the part of the State to enhance outdoor recreation opportunities for residents and visitors. Hapuna Beach already is a popular outdoor recreation venue and we concur with efforts to augment its use sensibly. We also applaud the State's intent to provide amenities aimed primarily at residents, and we agree that many features of the proposed expansion work toward the satisfaction of Big Island recreational demands. However, there are several issues which lack adequate discussion in the draft EIS, and others which need to be clarified in the final document. We have outlined them below for your information.

Water

Establishment of an adequate water supply for both the park improvements and the proposed golf course is acknowledged to be one of the major issues of the proposed project. Water supply issues generally are significant on the Big Island's Kona Coast and will likely be exacerbated by continuing development. Merely acknowledging such difficulties, however, is insufficient. This draft EIS needs to provide substantive information as to how such issues will be resolved for purposes of the proposed action.

According to the draft EIS, potable water for improvements makai of Queen Kaahumanu Highway will be drawn from the existing Lalamilo water system. The document acknowledges that acquisition of water from this source will require the development of a new well, because the current system already is at capacity. However, the draft EIS lacks any sustained discussion of the feasibility of this option. Has the Lalamilo system been analyzed with a view toward further extraction? What is the sustainable yield of this system? What future development in the area is likely to seek water from this system? In the absence of such analyses, it is premature to assume that existing sources will meet project demand.

Considerably more information must be included in the final EIS in order to permit an informed consideration of the proposed project's potable water needs.

Irrigation water for the proposed golf course on the mauka side of Queen Kaahumanu Highway is an equally important issue. The draft EIS proposes use of brackish water for golf course irrigation and states that ". . . rehabilitation of the existing brackish water well and development of two new wells within the golf course will be undertaken" (p. 3-75). Though the draft EIS estimates that golf course irrigation will require 650,000 gallons of water per day, no indication is given as to whether the source of this brackish water can sustain such usage. What is the sustainable yield of the proposed source, and to what degree will the proposed drawdown affect water chloride content? What other users currently draw from the proposed source? Have any studies been conducted on behalf of the two new wells proposed for golf course irrigation? Given the extent of project planning thus far, it is not unreasonable to expect that such data could be acquired. This information must be included in the final EIS.

Due to the lack of adequate water resource information, there is little assurance that water provisions for the project area are viable. Such a circumstance not only bodes ill for successful project completion, but also it makes political assessment and evaluation of the project more difficult. With regard to information on water resources, this draft EIS fails to meet requirements of Chapter 343, Hawaii Revised Statutes, which states that applicants shall make such information available ". . . at the earliest practicable time." These shortcomings are underscored by remarks included in the draft EIS from the U.S. Department of Agriculture's Soil Conservation Service (Chapter 6) to the effect that the Hapuna Beach Area ". . . is very close to exceeding the sustainable yield of the aquifer." The County of Hawaii Department of Water Supply also noted the need for additional water infrastructure to service the proposed project. At the very least, such water resource information should be included in the final EIS. In fact, if the omitted details are likely to alter analysis

of the project's environmental merit, then the document ought to be revised and resubmitted before continuing further with the process. Only then can the public and project planners be assured of timely and adequate information with which to assess and implement the proposed action.

Project Alternatives

The draft EIS offers three alternative actions for the Hapuna Beach State Recreation Area expansion. Alternative A (the preferred alternative), encompasses improvements makai of Queen Kaahumanu Highway and development of a public golf course on the mauka side. Alternative B excludes development of the golf course, while alternative C calls for no-action. Our reviewers note that the stated rationale for proceeding with alternative A (development of the golf course), over alternative B (no golf course), is poorly articulated. In rejecting alternative B, the draft EIS states only that affordable golfing opportunities are inadequate in the region (page 2-36). Yet as a letter from the County of Hawaii Planning Department points out, "[t]here are approximately 19 existing and planned golf courses in the South Kohala District" (Chapter 6). As further pointed out by a Big Island County Council member, many of these golf courses will provide for substantial public play privileges.

Given these considerations, we question the applicant's statement that the need for affordable golf in the region will not be satisfied in the absence of alternative A. It seems that future development already planned for the Hapuna Beach Area could easily meet this demand. The importance of recognizing this possibility is underscored by both the cost of the proposed action and by community concerns regarding the size and scope of the Hapuna Beach improvements. At a projected cost of $40 million (page 1-3), the preferred alternative represents a substantial public expenditure to fulfill needs which will likely be met by the private sector. As suggested by one of our reviewers, since the probability of building the golf course is low, it may be more realistic to analyze the project without it.

Area residents have voiced opposition to the proposed improvements for similar reasons. As one commenter noted, prior requests for small-scale improvements at the Hapuna Beach site went unanswered for years, only to be subsequently addressed by the current proposal which seems unworkable, prohibitively expensive, and out of proportion to the needs of the region. In light of regional concerns, it would be appropriate for the State to reconsider the alternatives contained in the draft EIS with a view toward economics, demand for the project, and public input.

Condemnation of Wailea Bay Lots

In concert with comment letters contained in the draft EIS which suggest that it is incumbent upon the State to preserve shoreline access, we concur with the State's effort to acquire beachfront property for the proposed action. Further, we agree with the opinion expressed in the draft EIS that the Wailea Bay lots ". . . would serve the public best if this area were developed for public park use" (page 2-23). Nevertheless, there are some elements of the condemnation issue which require clarification in the final EIS.

Our reviewers point out that despite the importance of condemnation to the proposed action, it receives disproportionately small consideration in the draft EIS. As recognized in the document, the plan to acquire the Wailea Bay lots remains an unresolved issue, because it lacks a definite timetable and because this portion of the proposed action still requires funding from the Legislature. Indeed, the $40 million proposed cost of the Hapuna Beach expansion does not include the cost of acquiring the lots, nor does the draft EIS attempt to estimate how much funding acquisition will require. The economic analysis with regard to this portion of the project makes very precise claims based on incomplete and imprecise data. Given these circumstances, we urge planners of the proposed action to devise an alternative to the Hapuna Beach improvements that does not include acquisition of these lots. Such an alternative is even more important when

considering the State's current fiscal limitations. In short, it does not seem certain that acquisition of the lots at Wailea Bay will in fact occur, a circumstance which warrants formulation of a project alternative which reflects this possibility.

Apart from whether acquisition does or does not occur, we find some of the language contained in the draft EIS confusing. Page 3-58 of the document mentions concerns of Wailea Bay residents regarding park safety and the potential increase in illicit activities at the park which might accompany expansion. Irrespective of the substance of these concerns, we are unsure about the use of the term "resident" in this context. Given that the proposed action calls for relocation of people living in the expansion area, such language suggests the possibility that some residents in the area may be allowed to stay, while others are forced to move. Though we recognize that the paragraph in question most likely refers to the incremental nature of the proposed expansion, we would nevertheless appreciate a clarification.

Omissions

For the sake of completeness, this draft EIS ought to explore two additional items in greater detail. First, the adjacent planned UH Hilo Kalakaua Marine Education Center is omitted from most maps and descriptions. Aside from a brief reference stating that planning funds have been granted for this facility and some pictorial maps in section 2, the document substantially ignores the project. Certainly in terms of utilities, access, and usage, these State projects will have some interaction. As stipulated in Section 11-200-17, Hawaii Administrative Rules, ". . . the interrelationships and cumulative environmental impacts of the proposed action and other related projects shall be discussed."

Second, the detailed archaeological section fails to include any discussion of Lapakahi State Historical Park which lies just a few miles away. This park contains well preserved examples of the stonework found in the project area.

Thank you for the opportunity to comment.

Sincerely,

John T. Harrison
Environmental Coordinator

cc: OEQC
Roger Fujioka
✓Belt Collins Hawaii, Inc.
George Curtis
Terry Hunt
Tom Hawley
Paul Berkowitz

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  ENGINEERING BRANCH
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809
DEC - 3 1996

Mr. John T. Harrison, Environmental Coordinator
Environmental Center
University of Hawaii at Manoa
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Dear Mr. Harrison:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 30, 1996, regarding the Draft Environmetal Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

Water

Information on groundwater in South Kohala is scarce and not precise, particularly because there is a lack of available hydrological data. A December 1991 draft of the Hawaii County Water Use and Development Plan prepared for the Department of Water Supply, County of Hawaii estimated the groundwater aquifer in South Kohala, which comprises the Waimea and Anaehoomalu hydrological sectors, has a sustainable yield of 54 mgd. This aquifer includes the areas of Waimea, Kawaihae, Waikoloa, Puako, South Kohala resorts, and west slopes of Mauna Kea and northwest slopes of Mauna Loa. The current usage in this area is about 6.3 mgd (1995 State Water Commission records) which indicates that there is still a large reserve of water in the region.

The best available hydrological information for the project area is the data compiled from the existing potable wells at the 1,200-foot elevation of the Lalamilo land tract. These wells have been the most successful and have provided the best feasible option for additional source development in South Kohala. Each of the three largest wells in this area is capable of producing approximately 1.4 million gallons per day.

Better hydrological information for the project would come from test drilling for potable water. Test drilling, however, is typically done when a project is in the latter stages of planning and in the design process. It would be premature to incur the high costs of test drilling a well during the present phase in the absence of entitlements for the park improvements.

Irrigation water is currently obtained from a brackish well (Elevation 244') above Queen Kaahumanu Highway. It is anticipated that additional wells at this elevation would produce similar results. As an alternative, better quality water may be obtained at higher elevations within the same State land tract, however transmission of the water to the project site would then become a consideration. Use of higher quality water may be an advantage if excessive use of sources of water at lower elevations invite higher potential of salt water intrusion.

Project Alternatives

The Draft Environmental Impact Statement (Appendix B) includes a market study of public golf course demand in the project area. The DEIS also notes that other planned golf courses in the region are delaying implementation and may not move forward at all. Therefore, to be conservative, the DEIS does not consider planned golf courses in its analysis unless they are under construction.

Existing West Hawaii golf courses which offer public playing privileges have kamaaina rates that vary between $35 and $45 for Big Island residents and $35 and $55 for neighbor island residents. There are two exceptions to this: one golf course located north of Waimea and one that is south of Kailua-Kona offer kamaaina rates in the mid to high $20 range. The Hapuna Beach State Recreation Area's proposed golf course is expected to offer rates that are below the typical West Hawaii kamaaina rates. We anticipate a strong demand for golf at this fee level which will be nearer the rate charged by Hilo's municipal golf course. As you may know, West Hawaii does not have a public golf course.

The estimated cost of $40 million covers improvements for the entire park expansion. Approximately 60 percent of this cost is projected for the golf course construction. In Section 2.4.2 of the DEIS, we indicated the possibility of a joint sponsorship of the project with a private developer. This arrangement would have the developer bear the entire construction cost of the golf course thus saving the State substantial money. The developer in return would get a majority of the revenues from the golf course operation and a favorable lease on the property.

The proposed project is part of a medium-range master plan calling for improvements to the Hapuna Beach State Recreation Area over a 12 to 13-year period. This development program will be dependent upon funding by the State Legislature and priorities of other public improvement projects. The proposed plan, hence, is only a blueprint or guide for development of the Hapuna area, and the State legislators and administrators will make a final determination on implementation.

Condemnation of Wailea Bay Lots

One reason we did not estimate property values at Wailea during the DEIS preparation process was that real estate values had and were expected to vary considerably over the years.

From 1994 to 1996, land values in the area dropped by about 10 percent, largely due to the state's weakening economy and the statewide real estate slump. We have also seen a number of Wailea properties recently increase in value as owners developed extensive homes even with the announcement of the State's acquisition plan. It should be noted that the actual acquisition cost may be different from the market value, especially after negotiations between the State and owners. Since development is planned for 12 to 13 years in the future and acquisition would be timed with development, present estimates of property value may not be indicative of the ultimate acquisition cost to the State. We believe the estimates would be more reliable if they were made nearer the time of actual acquisition.

Since receiving requests from some residents in the community for a master plan alternative that would exclude acquisition of the private lots at Wailea, we have re-evaluated our options and have determined that the acquisition process would really depend on the State's top administrators and Legislature. Alternatives A and B in the FEIS will discuss the possibility of implementation without the private lot acquisition. This information will provide sufficient background for the State administrators on available options for implementation in accordance with their priorities.

The owners of private property at Wailea Bay and residents of Wailea Bay are one and the same. Although the residents of Wailea Bay will eventually be relocated through the acquisition process, they are still occupants of the area and their concerns must still be addressed.

Omissions

The planned Kalakaua Marine Education Center is shown on the project master plan (Figure 2-4) and described on page 3-5 of the DEIS. It is preliminary and conceptual, and information on specific facilities and programs were not available when the DEIS was being prepared. For better clarity, we will show the planned facility on more figures in the Final EIS.

In regard to your comment on the Lapakahi State Historical Park, the proposed project is located more than 10 miles from the North Kohala facility and will not impact any of its features.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

POSTED 9/13/96

RECEIVED
'96 SEP -4 P1:24
OEQC

University of Hawai'i at Mānoa
Marine Option Program
School of Ocean and Earth Science and Technology
1000 Pope Road, MSB 229•Honolulu, Hawai'i 96822 U.S.A.
(808) 956-8433•Fax (808) 956-2417•INTERNET: mop@hawaii.edu
An Equal Opportunity/Affirmative Action Institution

31 August 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii
220 S. King Street, Fourth Floor
Honolulu, HI 96813
Attn. Mr. Gary Gill

Dear Mr. Gill:

I have only briefly perused the "Draft Environmental Impact Statement: Hapuna Beach State Recreation Area Expansion, Lalamilo, South Kohala, Hawaii" dated June 1996.

My principal concern is that the DEIS does not adequately address the "Proposed UH Hilo Puako Field Station of the Kalakaua Marine Education Center". Reference is made to this Station occupying only five acres of land, whereas the UH Board of Regents has requested a lease for a total of twenty acres to fully develop the facility. BLNR approval is pending more detailed plans from the University. Substantial community support exists for the UH to build this facility, and such development would be inconsistent with proposed park use. If the total acreage is awarded to the University, modifications to park plans and environmental impacts would likely be required. If park development precludes the University from full use of the twenty acres, then there will be direct impacts on the State Plans for both Education and Higher Education.

I am also concerned about environmental impacts of developing the park. This reef area is one of the most pristine and healthy reefs in Hawaii. The DEIS proposes insufficient controls, monitoring, and mitigation for sediment and runoff generated by construction and maintenance of such parcels as the golf course. To my knowledge, no nearshore construction projects of this scope in Hawaii have had acceptable impacts on the adjacent marine waters. If this project is to advance, more stringent requirements on the developer must be designed and enforced.

Thank you for this opportunity to comment.

Sincerely,

Sherwood Maynard, Ph.D.
Director, Marine Option Program

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809
DEC -3 1996

Mr. Sherwood Maynard, Ph.D., Director
Marine Option Program
School of Ocean and Earth Science and Technology
University of Hawaii at Manoa
1000 Pope Road, MSB 229
Honolulu, Hawaii 96822

Dear Dr. Maynard:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 31, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

At the time this Draft EIS was being prepared, the scope of work for the Kalakaua Marine Education Center was not defined. No specific development plans were available and no property lines were defined. In the spirit of cooperation, the Land Division will maintain an open line of communication with the University as it defines its program and site requirements for the new center.

In our DEIS, we considered the possible location and future use of a marine studies facility at Puako Bay. We are assuming that when development plans are completed and details of the marine facility are known, the University will prepare its own EA or EIS. At that time, we will be pleased to review the University's document and provide input and comment.

Section 2.4.2 of the Draft EIS discusses the proposed project and its overall location inland of the shoreline area. Section 3.5.2 discusses the anticipated impacts from project-generated runoff and the State's intent to comply with government regulations to provide mitigative measures. These regulations must be met if any permits are issued for the proposed project.

We thank you for your comments regarding the DEIS.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813-5249
PHONE (808) 594-1888
FAX (808) 594-1865

RECEIVED
'96 AUG 19 A9:44
OFC. OF ENVIRONMENTAL QUALITY CONTROL

August 05, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
220 S. King St., Fourth Floor
Honolulu, HI 96813

Dear Sir:

Thank you for the opportunity to review the Draft Environmental Impact Statement, Hapuna Beach Park, State Recreation Area Expansion, Lalamilo, South Kohala, Hawaii. The Land and Natural Resources Division has reviewed the plan and prepared the attached report. Please contact me, or Linda K. Delaney, the Land and Natural Resources Division Officer (594-1938), or Luis A. Manrique (594-1755), should you have any questions on this matter.

Sincerely yours,
Martha Ross
Martha Ross
Deputy Administrator

LM:lm
enclosure

Report
A Review of the:
Draft Environmental Impact Statement,
Hapuna Beach State Park Recreation Area Expansion

This report contains comments on the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii. According to the preparers, the State is proposing to expand the existing Hapuna Beach State Recreation Park from 62 acres to approximately 846 acres to (i) accommodate an 18-hole public golf course, and (ii) expand park facilities. The following comments are outlined with no particular order of importance.

1. The Hapuna Beach State Park and proposed expansion area are located on ceded lands. The use of ceded lands and concomitant revenues, which are paramount issues to OHA, are not addressed in the DEIS. OHA is truly concerned that neither Native Hawaiians in the area nor OHA were consulted in the development of the DEIS. In view of the recent ruling by Judge Heely that the State does not own ceded lands but holds them in trust and should be liable for damages for the breach of its fiduciary duties, OHA strongly advises the preparers that proposed changes in land use in the Hapuna Beach State Park must be pursued in close consultation with Native Hawaiians.
2. Contrary to what the archaeological survey concludes (Appendix G), the area for the proposed expansion contains such a high density of historically significant

features of the Hawaiian culture that the development of additional facilities including an 18-hole golf course may generate public outcry and may further the perception of lack of sensitivity of State agencies to the cultural heritage of Native Hawaiians.

3. The expansion area is part of a low rainfall ecosystem comprising rugged landscapes, young, shallow, coarse-textured, steep, highly erodible soils, and scanty vegetation (mostly grasses and shrubs). This ecosystem is one of high fragility with several potential hazards (i.e., soil erosion, waterlogging and/or salinity) if earth-moving operations take place and the present soil-water balance is disrupted by growing intense nutrient-driven and high water-demand species such as a turfgrass. Table 1 in Appendix E of the DEIS indicates that about 14,600 kg of nitrogen (N) will be applied annually to 86 acres golf course but fails to indicate how much of this amount will be actually removed by turfgrass. Without this information, it is virtually impossible to ascertain a N balance after fertilization, plant uptake, and leaching losses. Because of the high likelihood of leaching losses in coarse-textured soils, additional baseline information is required, particularly for the area where the golf course will be located. Data on soil physical properties determining water and pollutant movement within and out the soil profile plus

some kind of simulation of sediment and pollutant transport and loading through the soil profile are needed to forecast potential land degradation, underground water contamination, and shoreline pollution.

4. The Office of Hawaiian Affairs has serious concerns about the rationale, or lack of it, of the proposal to develop an 18-golf course in this part of the island known for having a high density of golf courses. Recent accounts indicate that "South Kohala, which now has seven courses, will continue to lead all Big Island districts with 19 courses if each planned course was completed."* The development of a golf course in a densely recreational but otherwise sparsely populated area raises serious concerns about local land use policies solely driven by supply and demand.

In view of the above, OHA unequivocally opposes the proposed expansion of the Hapuna Beach State Park. There are serious concerns associated to the expansion that warrants a careful and thorough re-examination of the DEIS. Areas of concerns are the planning and use of ceded lands for revenue and profit without consultation with Native Hawaiians, potential land degradation, and disturbance of highly significant archeological sites.

---

* 1995 Bobby Command's article entitled "4 courses added to county list" published in West Hawaii Today.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  DISTRICT OFFICES
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

REF:LD-EK

DEC -3 1996

Ms. Martha Ross, Deputy Administrator
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813-5249

Dear Ms. Ross:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 5, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

Section 3.11.2.1 of the DEIS indicates that the State-owned portion of the park expansion area is ceded land and that 20 percent of all revenues received from the use of this land must be remitted to the Office of Hawaiian Affairs. The State's proposal to expand the Hapuna Beach State Recreation Area is intended to provide new facilities for the residents and visitors of West Hawaii. In this regard, the State is fulfilling its responsibility of meeting the recreational needs of its people.

An EIS Preparation Notice was sent to the Office of Hawaiian Affairs as well as the Kona Hawaiian Civic Club and Ka Lahui Hawaii during the preliminary Draft EIS consultation process, but no response was received from your office. With the availability of the Draft EIS, we are able to furnish detailed information on the project to allow you to provide insightful comments. The proposed park expansion will continue to be presented for public review during the permitting process which includes additional meetings and public hearings.

Judge Heely made the ruling because the question came up as to the State's right to sell ceded lands. He reiterated the present condition, where the State does not own ceded lands but holds them in trust and should be liable for damages for the breach of its fiduciary duties. The proposed project is being planned for the benefit and use of the public. As stated above, the project will continue to be presented for public review during the permitting process.

The State Historic Preservation Division (SHPD) is presently reviewing the study prepared by Paul H. Rosendahl, Ph.D. Inc.. PHRI will work with SHPD to meet its informational and mitigative measures requirements and consider any specific comments received from your office as well as the Kona Hawaiian Civic Club, National Association of Hawaiian Civic Clubs, National Land Committee (Ka Lahui Hawaii), Waimea Hawaiian Civic Club, Na Ala Hele Hawaii Island Advisory Council, Life of the Land (Big Island Chapter), and Sierra Club (Moku Loa Group). All of these organizations were sent copies of the Draft EIS.

The new golf course will modify a barren sparsely vegetated area into a lush landscaped environment that will improve the visual and ecological character of the area. It will also preserve the area in permanent open space. When properly constructed and maintained, the turf grass will reduce soil erosion and waterlogging. The potential of increased salinity from brackish water irrigation will be minimized by the use of lower salinity water, improved soil conditioning, and periodic turf rinsing by the golf maintenance crew.

Dr. Charles Murdoch and Dr. Richard Green have conducted a number of studies in South Kohala as well as West Hawaii. From their experience and training, they have concluded that it is very unlikely that nitrogen enrichment of the shoreline waters will occur. The site's location in the region and from the shoreline, topography, geology, soil condition, irrigation practices, rainfall, evapotranspiration characteristics, groundwater condition, and leaching actions were all considered in the assessment. Murdoch and Green have indicated that the 3,200 foot buffer area between the makai boundary of the proposed golf course and the nearest shoreline waters will be advantageous in causing dispersion and dilution of nitrate and other chemicals which may leach periodically during periods of high rainfall. It should be noted that the groundwater beneath the project site will not be used for domestic use. If it were, then, according to Murdoch and Green, a more detailed analysis would be required.

For precautionary measures, Murdoch and Green have suggested careful irrigation management to reduce the likelihood of recharge from irrigation of the turf, use of slow-release nitrogen fertilizers, and use of adequate surface soil depths. It is also suggested that a well qualified golf course superintendent be employed who is capable of good golf course management.

Although there are a number of existing and planned golf courses in West Hawaii, there are no public courses. Such a facility would provide a much needed amenity to this side of the island. Green fees at the new golf course would be affordable providing lower fees than the private golf course fees. This would be particularly beneficial to fixed-income residents, retirees, and junior golfers.

We thank you for your comments regarding the DEIS.

Aloha,

MICHAEL D. WILSON

c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

KEOLA CHILDS
Councilman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

Kona Phone: (808) 326 5684
Kona Fax: (808) 326 5697

RECEIVED
96 JUL -5 P1:39
OFC. OF ENVIRON. QUALITY CONT.

July 1, 1996

Benjamin J. Cayetano, Governor
State of Hawaii
c/o O.E.Q.C.
220 S. King Street, 4th Floor
Honolulu, HI 96813

Re: Draft E.I.S. - Hapuna Beach State Recreation Area Expansion

Dear Governor Cayetano:

I have had a chance to briefly review the draft environmental impact statement for the above referenced project, and inasmuch as the document is largely intended to generate public discussion on the project concept, moreso than the adequacy of the document as an E.I.S., I would like to offer the following preliminary comments on the proposed project:

1. Of the two "Alternatives" suggest, I strongly favor Alternative B, which does not include development of the state lands on mauka side of Queen Kaahumanu Hwy. I would oppose the use of state resources to fund or otherwise sponsor the development of a public golf course in this area, due to

   (i) significant private investor interest in developing additional golf courses within several miles of this site, including courses that, by zoning condition, will require substantial "public play" rates and use privileges, (Nansay - Puako);

   (ii) the likelihood that the devotion of public lands in the same vicinity will undermine the viability of those other courses being developed;

   (iii) the clearly evident lack of sufficient quality and quantity of sub-surface water for irrigation purposes on additional golf courses beyond those privately planned;

I believe the economics and water quality issues may become viable in 15 - 20 years hence, after the areas zoned and intended for such development have matured, and a proper market fit (including, "public needs") for this site can be better determined.

2. Although the makai 500 acre park concept is generally good, the parking lots should be pulled back toward Puako Road, to provide for a longer walk-in approach and a near-natural ambience throughout this "walk-in zone." Of course, paved, handicapped-accessible pathways would be required; key pathways should be largely tree-shaded with indigenous trees.

   This alternate approach (literally and figuratively) would serve several specific purposes:

   (i) in recognition of the higher "fragility" of the shore-side waters and reef within targeted bay, versus the waters and ocean bottom fronting Hapuna Beach, the user public would approach the beach and bay with a different attitude than for an "all purpose" beach park like neighboring Hapuna Beach.

   (ii) the user public would have to expend greater effort to get to the narrower, shorter beach and more fragile ocean resources, and thus the user count would be necessarily lower as it should be for such a location.

   (iii) this model of near-natural coastal recreational development would provide a much-needed alternative to the generic, all-purpose approach provided at most large beach parks. Thematically, it would provide an excellent resort-fringe transition to the natural park environments being conceptualized for the Mahaiula-Maniniowali "six mile" state coastal park, and presumably to be later brought forth for the Kiholo coastal area.

   Given its proximity to Hapuna and the eventual Marine Research Center next to the Puako boat ramp, as well as its fine winter surf and potential for fishery development, this section of the master-planned area should be viewed as more of an " coastal adventure/education center" than just another "beach park."

Hawaii island residents (and visitors) are hungry for access to and use of "low key" coastal areas which are improved with basic sanitation and shelter facilities in a clean, modestly vegetated environment. I think most of us care less about "parks" than we do about those other elements.

3. I concur with the concept of buying out the 18 private properties to make the whole thing work. However, the relatively high cost militates toward some form of compromise, so I suggest that the state do the following:

   Condemn the improved properties in "increments" of 3 - 5 at a time, and as each is acquired, immediately re-sell a 20 year leasehold interest in the lots which are needed the soonest, and a 30 year lease in the others; of course, lots needed immediately would not be leased out. Septic tank/leach field systems should be installed by lessees of properties using cesspools.

   Rationale: a 20 - 30 year lease of these homes would provide a return of roughly 50% of the condemned fee simple value, if the lease rents are nominal; this would save the state many millions. A phased or incremental condemnation plan would also halt speculative increases in property values of the remaining lots.

   Also, the park will take at least five years to be otherwise developed; the transitional period will go by very quickly. In addition, some measure of site security will be provided by the property users during the "build up" phase.

4. The "Wailea Beach" section of this master-planned complex should be managed by one or two kahu, given the nature of resources involved here.

Sincerely,

Keola Childs
Councilmember, 7th District

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

REF:LD-EK

DEC -3 1996

The Honorable Keola Childs
Councilmember, 7th District
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Councilman Childs:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 1, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

1. As provided in Appendix B of the Draft EIS, there is a need for a public golf course in West Hawaii. We are aware of the golf course plans proposed by private developers involving "public play," but there is uncertainty on whether they will be built at all. Considering the need to move forward with our project, we acknowledge the proposed privately-sponsored golf courses but do not consider them market factors unless they are under construction or in operation. It is our responsibility to look at the existing and projected demands in the region and be realistic about what exists in the market place today to meet those demands.

   We believe that brackish water suitable for irrigation is available from potential on-site wells above the Queen Kaahumanu Highway. An existing well near the site currently serves the Mauna Kea Resort golf course and is at the same elevation as the proposed Hapuna well. Our consultant believes the potential well site will provide adequate water for landscape irrigation.

2. The concept of a walk-in beach will continue to be included in the master plan for Wailea beach; however, a compromise will be required to have parking located away but not too far from the shoreline. As the area becomes more popular, it will need paved accesses for maintenance and security personnel as well as emergency and fire-equipment vehicles. Parking areas are being incorporated with these accesses to accommodate park users and visitors.

For Wailea, we share your ideas of a walk-in beach. We recognize the beach as very dynamic and that it can dramatically change in size depending on the season. Therefore, its use by the public would also change depending on the condition of the shoreline. We do not visualize Wailea as being similarly used like Hapuna Beach.

3. We appreciate your suggestions on the means in which the State could recover some of the cost in acquiring the private properties at Wailea. We will include your suggestions in the Final EIS.

4. The park expansion will require an increase in park staff and establishment of a headquarters building. As identified in the Draft EIS, park managers, groundskeepers, lifeguards, and security personnel are recommended positions for the park. Specific as well as general staff assignments would be made to cover Wailea Bay.

We thank you for your comments and suggestions regarding the DEIS.

Aloha,

MICHAEL D. WILSON

cc: QEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

BANK OF HAWAII
CHALLEN INTERNATIONAL
CASTLE CORPORATION
FIRST HAWAIIAN BANK
GENTRY PACIFIC, LTD
GERRY ROTT & ASSOCIATES
HAWAII ELECTRIC LIGHT CO
HAWAII LAND COMPANY
HOUAKAA MANAGEMENT CORP.
HUALALAI DEVELOPMENT CO
KAHUA RANCH LIMITED
KAI MALINO RANCH
KAMEHAMEHA INVESTMENT CORP
KAMEHAMEHA SCHOOLS BISHOP ESTATE
KAUPULEHU DEVELOPMENTS
KEALAKEKUA DEVELOPMENT CORPORATION
KEALAKEKUA RANCH, LTD
KEAHOLE RANCH
KEHENA BEACH, INC.
KEWIT PACIFIC COMPANY
KONA TRANSPORTATION
LANIHAU PARTNERS L. P.
MAUI FARMS OF HAWAII

HAWAII LEEWARD PLANNING CONFERENCE
P.O. BOX 635 • KAILUA-KONA, HAWAII 96745-0635

MAUI DEVELOPMENT, INC.
MAUNA KEA PROPERTIES
MAUNA LANI RESORT, INC.
McCANDLESS RANCH
MOORES ENTERPRISES
OCEANSIDE 1250
ORCHARD MARINE, INC.
PARKER RANCH
PONO HOLO RANCH
QUEEN LILIUOKALANI TRUST
R. M. TOWILL CORPORATION
REAL ESTATE DEV. CONSULTANTS INC.
REALTY INVESTMENT
REID & ASSOCIATES, INC.
RENNA OWENSBY PLANNERS ARCHITECTS
SUN CABLEVISION
THE QUEEN EMMA FOUNDATION
TRIAD ENGINEERING
WAIKOLOA DEVELOPMENT COMPANY
WAIMEA WATER SERVICES, INC.
WEST HAWAII CONCRETE
WIMBERLY, ALLISON, TONG & GOO

July 10, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii
Attention: Mr. Gary Gill
220 S. King St., Fourth Floor
Honolulu, HI 96813

Dear Mr. Gill:

Hawaii Leeward Planning Conference has reviewed the draft environmental impact statement for Hapuna Beach State Recreation Area Expansion. We feel the draft document adequately addresses our concerns and have nothing to add.

Thank you for the opportunity of reviewing this document.

Very truly yours,

H. Peter L'Orange
President

cc: Division of State Parks
c/o Land Division
State of Hawaii
Attention: Mr. Andy Monden

Belt Collins Hawaii Ltd.
Attention: Mr. Glen Koyama

HAWAII LEEWARD PLANNING CONFERENCE
P.O. BOX 635 • KAILUA-KONA, HAWAII 96745-0635

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC -3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
MANAGEMENT BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. H. Peter L'Orange, President
Hawaii Leeward Planning Conference
P.O. Box 635
Kailua-Kona, Hawaii 96745-0635

Dear Mr. L'Orange:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 10, 1996, regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project. We appreciate your review of the Draft EIS and are pleased to hear you are satisfied with the way the document has addressed your concerns.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

RECEIVED

'96 AUG 30 P2:32

HUI LIHIKAI
Citizens for Protection of the North Kohala Coastline
P.O. Box 76, Hawi, Hawaii 96719 Ph 889-5553

QUALITY CONTROL

August 30, 1996

Mr. Andy Monden
Fax: 1-808-587-0283

Re: DEIS on Hapuna Beach Expansion

Dear Mr. Monden,

Although our organization's primary interest is preservation of the North Kohala coastline, we take an interest in what happens along nearby shoreline areas because of potential implications for coastal resources in our own district.

The draft EIS expresses concern that Hapuna Beach could become overburdened. The expansion and further development which it envisions could, however, simply make matters worse, by bringing in many more people to the very limited beach resources there.

The long-term solution to this problem is to make more coastal lands available for park use. The Legislature has endorsed the idea of preserving the leeward North Kohala coast makai of the Akoni Pule Highway. There are already several stretches of state land there, which could be joined together to form an important permanent scenic and recreational resource. Other portions of the coastline should also be acquired for this purpose.

While we have no objection to enhanced recreational opportunities in the Hapuna-Wailea Beach area, we would prefer that you focus your resources on longer-range planning and specifically that you move ahead with implementing the will of the legislature by devising a timetable for acquisiton of North Kohala coastal lands. If you wait until the Kohala Coastal Transmission Pipeline goes in, if it does actually materalize the cost of land could be substantially more or development could have taken place that would make acquisition permanently unfeasible.

Respectfully submitted,

Richard Boyd

Richard Boyd, Chairman

cc: Glen Koyama
QEQC

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AGRICULTURE DEVELOPMENT PROGRAMS
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC -3 1996

Mr. Richard Boyd, Chairman
Hui Lihikai
P.O. Box 76
Hawi, Hawaii 96719

Dear Mr. Boyd:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 30, 1996, regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

The proposed project will draw more people to the Hapuna Beach State Recreation Area, but the expanded facilities and additional shoreline areas are expected to disperse the park users and visitors over the entire park and minimize overburdening individual areas.

Expansion of the Hapuna Beach State Recreation Area is a higher priority at this time than the development of a park or coastal amenity on the leeward coast of North Kohala. The Hapuna property, to a large extent, is expected to fill the recreational demand for the North and South Kohala Districts for the next ten to fifteen years. Since future funding may be limited, we would like to focus our resources on our existing park with its excellent white sand beaches and wide popularity among residents. Hapuna has been demonstrated to be a popular beach which we would like to improve and direct our resources. Additionally, since Hapuna already has existing infrastructure, we would not need to expend as much on initial improvements.

We appreciate your comments on the Draft EIS.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Wailea Property Owner's Association

PO BOX 1537 • Kamuela, HI 96743 • TELPHONE (808) 885-7053 • FAX (808) 885-4716

July 24, 1996

Govenor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813
Contact: Mr. Gary Gill

RE: Hapuna Beach Park Expansion Plan

To Whom It May Concern:

Please be advised that I am a tax paying homeowner at Wailea Bay and president of the Wailea Property Owners Association.

I wish to address your draft Environment Impact Statement for the Hapuna Beach State Recreation Area Expansion.

1. General Environmental Issues

A) Your report suggests that Wailea Bay and Beach are both about 75% the size of Hapuna Bay and Beach. This is erroneous. Wailea Bay is a much smaller and more delicate water reserve. It cannot handle the capacity which you suggest. Further, the beach size and length measurements are in fact about 1/2 the size your report indicates. Here again, (assuming the existing kiawe trees which provide shade, fauna preservation, and prevent beach erosion; will not be removed), the existing beach is quite narrow and cannot handle the numbers you suggest. This study should be revisited and revised.

B) Wailea Bay is subject to rain water flooding. The river overflows numerous times each year. Any further paving and grading will enhance the flooding conditions. If the private homes are removed, the Bay will be turned into a mud bath.

C) Wailea should be a limited use park which encourages walk-in traffic and discourages vehicular usage. Ingress and egress points already exist at either ends of the bay and proposed park property. This would then allow the Parks Department to open and close access efficiently as it saw fit. The private homes in the middle could act as a buffer to undesired access, flooding, and fire.

2. Revenues and Expenses

A) To purchase 18 lots around Wailea Bay today would exceed $40 million dollars and double the cost of the park development.

B) To displace homeowners would cost the county over $200,000 in property tax revenues and who knows how much in income tax revenues. Many would probably relocate outside the State. Many of the residents are also business owners and employers who generate other income and excise revenues.

C) The property owners have been true stewards of the aina. They continue to maintain and protect the beach as well as beautify the environment at no cost to the State or County.

D) The property owners have brought power and water to the area at no cost to the County or State, and have aided the police in terms of security and vehicle appropriation.

E) A proposal to enhance the existing access, parking, and enforcement at their expense has fallen on deaf ears.

F) Is the expenditure of $40,000 million to purchase property which already does not impede the use of the beach or surrounding park area justified? It would seem from the appearance of other parks in West Hawaii (North Kona, Spencer, etc.), that funds are needed desperately to improve and maintain existing facilities closer to centers of population (i.e., North and South Kona).

3. Private and Public Co-Existence

It has been demonstrated in numerous instances that private property can co-exist within public lands. In this case, we have the perfect blend.

A) The public already has existing access and full rights to the beach and ocean at no cost.

B) The private property does not hinder or impede the use of the beach, the ocean, or the surrounding property.

C) The private property owners actually enhance the environment via landscaping, flood control, fire prevention, and security.

D) The revenues derived from the private lands and owners helps to defray the cost to maintain the parks and build the facilities.

It is recommended that the provision for condemnation of private property be deleted from the study plan. Such inappropriate use of taxpayers funds could generate a major public backlash which might jeopardize the entire park plan approval.

Sincerely,

William T. White, III
President
Wailea Property Owners Association

cc: Division of State Parks, c/o Land Division
Contact: Mr. Andy Monden

con't.

cc: Belt Collins Hawaii, Ltd.; Contact: Mr. Glen Koyama ✓
David Tarnas, Representative
Malama Soloman, Senator
Stephen Yamashiro, Mayor
Wailea Property Owners Association

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC - 3 1996

Mr. William T. White, III, President
Wailea Property Owners Association
P.O. Box 1537
Kamuela, Hawaii 96743

Dear Mr. White:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 24, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

Below is our response to your comments in the general order that they were presented in your letter.

1. General Environmental Issues

The beach capacity analysis, prepared by Pedersen Planning Consultants, was conducted for the fullest size of the beach to determine its potential use. We recognize that the beach varies in size during the year. In the winter when the surf is heaviest, the beach is smallest. Consequently, beachgoers would patronize other beaches where space is available. Our intent in conducting this capacity analysis was to obtain an idea of the current and potential use of the beach. It was not intended to determine a target population of beach users. The analysis along with field observations, information from residents, and literature review provided a comprehensive assessment of the area.

From the study, we found the beach to be generally underutilized. This could be due to a number of factors such as the condition of the beach access, quality of the beach, lack of facilities, general knowledge of the beach's existence and the quality of the overall beach atmosphere. The proposed park improvements are designed to improve on some, if not all, of these conditions.

The proposed project is not expected to contribute to flooding. Safeguards will prevent or, at least, reduce the amount of project-generated runoff. Section 3.5.2 of the Draft EIS describes the retarding effect of landscaped lawns and golf course turf on surface runoff and the improved ground percolation that results from upgraded soil conditions. It also describes State Parks' plans to install drywells around the parking areas to collect stormwater runoff. When the private parcels at Wailea Beach are converted to park improvements, the plans for site preparation and landscaping will be subject to County Department of Public Works review and approval.

Additionally, the State Department of Health is expected to require a National Pollutant Discharge Elimination System (NPDES) Stormwater Runoff Permit which requires the developer to prepare a Best Management Practices (BMP) Plan. This plan calls for an erosion and sedimentation control program and other surface runoff control measures to be implemented during project construction.

Our concept plan shows controlled vehicular access to the beach. We are locating the parking areas more than 420 feet from the shoreline and promoting the idea of a "walk-in" beach. Like other planned improvements at Hapuna, vehicular accesses will be improved or upgraded. These new accesses may be controlled during periods of natural hazards.

Park personnel will be increased with the expansion of the park and, with County agencies, provide needed emergency services such as fire protection, medical assistance, and security surveillance.

2. Revenues and Expenses

The private property owners have been an important asset to Wailea Beach. Their contributions and value to the park are deeply appreciated, but the long-term value of the beach to the community must also be considered.

It is acknowledged that the acquisition of all of the lots at one time will be expensive, but an extended timetable for purchase will make the acquisition more affordable. Additionally, the cost of the project seems to stand out in the Draft EIS, but it should be noted that the benefits as described in Sections 2.2 and 3.11 of the DEIS are very positive and worth considering.

3. Private and Public Co-Existence

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As described above, access will be better with the park expansion and could be controlled in times of natural hazard.

Although property tax revenues will be lost from the removal of private homes and properties at Wailea, user fees and economic effects will generate substantial direct and secondary benefits for the project. As described in Section 3.11.1 of the DEIS, approximately $27.8 million per year by the 2015 would be accrued. Operations and maintenance costs would total approximately $5.1 million, thus providing an annual net benefit of $22.8 million per year. These numbers don't even tell of the additional jobs that would be created in the local economy.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Wailea Property Owner's Association

PO BOX 1537 • Kamuela, HI 96743 • TELPHONE (808) 885-7053 • FAX (808) 885-4711

August 26, 1996

Land Division
Department of Land and Natural Resources
1151 Punchbowl Street, Room 211
Honolulu, Hawaii 96813

ATTENTION: Andy Monden

RE: Comment on EIS Draft/Hearing for
Hapuna State Park Expansion

Please be advised that I attended the recent hearing and presentation regarding the EIS Draft for the proposed Hapuna State Park Expansion in Waimea on August 22, 1996. Congratulations, the program was very well facilitated.

What I heard from the Belt Collins presentation and the peoples' comments at the meeting was that the increase in pedestrian and vehicular traffic will be so great that the limited shoreline there will be tremendously overburdened. Basically, you are planning to create too large of an attraction. (I.e., Too many camping and picnicking spots, too many roads and parking lots.) You should consider spreading your parks out across West Hawaii's coastline in smaller increments which would then accommodate a greater public and more communities rather than one giant regional traffic jam.

Please consider a fourth option: A smaller, kinder, gentler park.

Basically, this would be to use the existing property as it is. With the addition of a few strategically placed luas, opala containers, and law enforcement personnel, the entire area could remain a pristine spot for all members of the general public. This would then reduce the cost of construction leaving funds available for other similar parks to be created along the coast on other State land.

Finally, the purchase of any private property appears to be an inappropriate use of valuable State funds. It is also apparent that private and public landowners can co-exist in a mutually beneficial mode.

I certainly hope you will, as you say, consider the comments from the public hearing. There seemed to be a unanimity in content.

Sincerely,

William T. White, III
President

cc: Governor Cayetano
Mike Wilson, Chairperson Board of Land and Natural Resources
Chris Yuen, Board of Land and Natural Resources - Hilo
Malama Soloman, Senator
David Tamas, Representative
Allen Koyama, Belt Collins
Susan Rutka, Belt Collins
Ralston Nagata, State Parks and Recreation

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809
DEC -3 1996

Mr. William T. White, III, President
Wailea Property Owners Association
P.O. Box 1537
Kamuela, Hawaii 96743

Dear Mr. White:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for letter of August 26, 1996, regarding the proposed Hapuna Beach State Recreation Area Expansion project.

Expansion of the existing park will draw more people and traffic to the area, but we do not anticipate a tremendous overburdening of the beach and shoreline areas. There will be a number of other recreational opportunities in the park expansion to disperse human activity.

Overall, the park expansion will be a low-profile development (maybe small, kind and gentle in nature) involving less than 28 percent of the area below the highway for such uses as picnicking, camping, and beach and shoreline recreation. The rest of the land will remain in its natural condition.

The use of public funds to acquire private property for a public park is not unusual. If the acquisition is for a public purpose, the State can exercise its power of eminent domain.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The need to acquire the private lots at Wailea is established in the State Recreation Functional Plan. The private properties at Wailea Bay are situated in the middle of the proposed park expansion. These properties would serve the public best if they were developed for park use. The mauka park land would have a better connection to the beach land and its ocean resources if the private parcels were converted to open use and provided unobstructed access and visual corridors between the two areas.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

We appreciate your response on the proposed project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Governor's Office
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

GK

John & Ann Alkire
P.O. Box 44416
Kawaihae, Hawaii 96743

July 16, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, 4th fl
Honolulu, Hawaii 96813
contact : Mr. Gary Gill

Re : Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion, Lalamilo, South Kohala, Hawaii, June 1996

TO WHOM IT MAY CONCERN,

Thank you for giving us the opportunity to respond to the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion dated June 1996.

As residents of Wailea Bay we appreciate its unique and fragile beauty. We remain concerned that development of the magnitude proposed could irreparably damage this pristine environment and deprive future generations of the enjoyment of this irreplaceable natural treasure. At the same time, we support development of limited public improvements such as improved public access, sanitary facilities and the infrastructure necessary to provide better maintenance and enforcement.

Following are our questions and concerns about the proposed project's impact on Wailea Bay:

1. We are pleased that the plan calls for a low-impact walk-in park at Wailea and hope that this will preserve the character of the beach. We believe a low impact park at Wailea would provide families with an alternative to the more intensive park use at Hapuna. We feel that having one main public access will best accomplish this objective, allowing visitors to pick the degree of isolation they choose based on how far they care to walk. It will also enhance law enforcement, sanitation and lifeguarding. Since the shape of the beach and foliage make it difficult to find a vantage point from which the entire beach can be seen, keeping the main focus of activity in one area will better allow lifeguards and caretakers to safeguard the public and enforce the rules pertaining to a marine sanctuary.

2. Density and capacity measurements need to be reassessed. Section 3.2.3 describes Wailea Beach as "measuring approximately 1,400 feet wide and approximately 40 to 60 feet deep", and bases projections on the capacity of the beach on these numbers. It is unclear whether capacity calculations make accomodation for the kiawe on the beach, which create a unique environment and offer all visitors an environment that cooler and more private experience than other beaches. We feel that these measurements greatly overstate the size and capacity of the beach and agree with the written comment that "a more accurate measurement could be about...850'."

3. Enforcement and sanitation issues must be addressed first. It is important that a full-time, live-in enforcement position be funded prior to development, which will increase use and abuse of the beach. Wailea continues to be degraded by lawless and thoughtless users. Intoxicated individuals, drug users and loud parties day and night make for an unsafe environment. The beach is used as a lua and polluted by litter. There have been several recent petty thefts. DLNR enforcement agent Mr. Rufus Kuilipule has made a major positive contribution to law enforcement, public safety and sanitation at Wailea, volunteering countless hours of service at the beach. Funding his efforts to allow for a consistent presence at Wailea is critical.

4. We object to the portion of the plan that contemplates condemnation of our home and all other privately owned parcels fronting Wailea Bay, and feel that and is not necessary or appropriate. The thought of our family home being condemned by the state continues to be stressful and we do not view it "as an opportunity to relocate or reinvest for other purposes." In our opinion the State is not currently authorized to condemn these properties and the draft EIS does not adequately address the environmental and social impact of condemning private property. We question both the need for the condemnation and the cost. The private lots do not limit public use and enjoyment of the beach, since the private properties are set back from the beach and separated from the shoreline by the 40 foot of State access road. As residents we continue to work cooperatively with the public to maintain the beauty and sanitation of Wailea Bay. We note that the cost of condemnation is in addition to the already anticipated expenditure of approximately $40 million for the park expansion and feel that State monies could be better spent elsewhere.

5. Drainage and runoff issues need to be carefully and more fully addressed. The more paving mauka of the bay the more risk of runoff into the bay instead of percolation. It is important that additional runoff caused by development and paving will be adequately controlled by site planning and dry wells and not wash into the bay. If the proposed golf course were built, the bay would also be vulnerable to runoff of agricultural fertilizers and biocides.

6. Golf Course Development - We question the need for another golf course in this area and the accompanying destruction of the natural landscape. Potential runoff of agricultural fertilizers endangers poses a direct threat to life in the marine sanctuary.

We thank you for the opportunity to comment on the draft EIS during the public review period and look forward to the development of a plan which will protect and preserve the natural beauty of Wailea for generations to come.

Sincerely,

John Alkire

Ann Alkire

cc: Division of State Parks, Mr. Andy Monden
Belt Collins Hawaii Ltd., Mr. Glen Koyama ✓

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

MICHAEL D WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
BRANCH OFFICES
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. John Alkire
Mrs. Ann Alkire
P.O. Box 44416
Kawaihae, Hawaii 96743

Dear Mr. and Mrs. Alkire:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 16, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

1. As you mentioned, Wailea Bay will have one main access at the central northern section of the beach. A secondary access will be provided at the beach's southern end. It is not the State's desire to restrict access to any public beach. Adequate access as provided in our master plan will allow park personnel to readily reach Wailea Bay and provide necessary maintenance and security services as well as water safety operations. In view of possible beach overuse, controls may be warranted to protect the natural resources of this area. A concept that was suggested by several area residents is the provision of a "walk-in" beach. This concept is currently embraced in our master plan. It shows the proposed parking for Wailea at a distance from the beach.

2. The beach capacity analysis, conducted by Pedersen Planning Consultants, was one form of analyses used to provide an update of current and potential use of Wailea. It was not used to determine a target population of beach users. The analysis, along with field observations, information from residents, and a literature review, provided a comprehensive assessment of the area. From this assessment, we have found the beach to be generally underutilized. It could be due to a number of factors such as the condition of the beach access, quality of the beach, lack of facilities, general knowledge of the beach's existence, and the quality of the overall beach atmosphere. The proposed park improvements are designed to improve on some, if not all, of these conditions.

3. As described above, with the proposed Hapuna Beach State Recreation Area expansion comes better access and increased staffing to improve maintenance, security, and water safety operations at Wailea. These services could further be enhanced with public educational programs on resource awareness and management and training sessions conducted at the new park headquarters.

4. The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping and relaxation, along with beach and nearshore recreation activities.

   The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

   As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

   Acquisition is not scheduled to occur in one phase. As development progresses over a 12- to 13-year period, acquisition will take place also over this extended period thereby reducing the acquisition expense to a reasonable and affordable level. We believe the proposed park expansion improvements will have a more far-reaching benefit to the community than the apparent short-term costs related to construction and land acquisition.

5 A detailed drainage study was conducted by Belt Collins Hawaii in 1992. Results of that study were presented in the Draft EIS and reviewed by the County Department of Public Works. During the forthcoming project design stage, construction plans including grading, erosion and sedimentation control and detailed drainage plans will be submitted to the County for final review and approval. County approval will require drainage improvements to accommodate runoff from project improvements. One of the requirements will state that no net increase in runoff shall result from development of the property. Additionally, the State Department of Health is expected to require a National Pollutant Discharge Elimination System (NPDES) Stormwater Runoff Permit which requires the developer to prepare a Best Management Practices (BMP) Plan. This plan calls for an erosion and sedimentation control program and other surface runoff control measures to be implemented during project construction.

In a study by Charles Murdock and Richard Green (Appendix E of the DEIS), it was concluded that use of fertilizers, herbicides and pesticides on the proposed golf course, which is located more than 3,000 feet from the ocean, is not expected to result in any adverse impact on the quality of either groundwater or nearby shoreline waters.

6. We do not view the development of a golf course as a destructive element to the natural landscape. It may alter the visual character of the site, but it would clearly enhance the landscape. The proposed golf course will provide a lush, green vegetative appearance on an area that presently is barren and sparsely vegetated. The existing condition, in fact, presents a greater threat of dust storms during windy periods and severe erosion after heavy rainfall. Additionally, a dry landscape with deadwood and unhealthy vegetation is a ready source for brush fire.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

July 23, 1996

RECEIVED
1996 SEP 17 A 11:13
OFFICE OF ENVIRONMENTAL QUALITY CONTROL STATE OF HAWAII

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii. 220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813

Attention: Mr. Gary Gill

RE: Hapuna Beach Park
Expansion Plan

Dear Sir:

I am aware of your plan to expand the Hapuna Beach Park to Wailea Bay.

I go to Hapuna Beach and Wailea Bay all the time. There is a big difference between the two locations. Hapuna is big, lots of folks, good volleyball, all sand beach break, and all the State Beach amenities. Wailea is small, local, a preserve, trees, good snorkeling, laid-back, fast tubular waves over a shallow reef.

Why not leave 'Beach 69' as it is. Keep it remote and make people walk in. That way, those who will respect the aina will come and it won't be ruined by over use. A few luas, showers, and opala dispensers would be good, but that's all we need.

Why spend millions of dollars to buy out the homes there. They give the area a good feeling. I see people raking the beach and cleaning it up. It's cleaner than Hapuna.

Spend the money on education, highways, bikeways, and the existing parks. North Kona Beach Park needs good luas, water, security and a better road.

Keep Wailea small; please don't spend my hard earned tax dollars unwisely.

Aloha,

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU HAWAII 96809
DEC 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Anonymous

Dear Sir or Madam:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 23, 1996, to the Office of Environmental Quality Control (OEQC), regarding the proposed Hapuna Beach State Recreation Area Expansion project.

As you may know, West Hawaii is one of the fastest growing regions on the island, and as a result, there is an associated strong demand for recreational facilities. Hapuna and Wailea Beaches are particularly suitable for improvement because of their popularity, accessibility, location and existing infrastructure.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

Our plans show that Wailea will be developed as a walk-in beach. Parking will be located away from the shoreline and beachgoers would have to walk more than 400 feet to the water. For the convenience of the public, a comfort station will be provided near the parking area. We do not intend to develop Wailea like Hapuna Beach. Wailea will continue to be a scaled-back, low-key recreational site within the park expansion area.

We appreciate your thoughts and comments on the proposed project.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

RECEIVED
96 AUG 30 A8:44
DIV. OF WATER & LAND DEVELOPMENT

August 28, 1996

Andy Mondan
DLNR, Land Division
1151 Punchbowl St., Room 227
Honolulu HI 96813

Dear Mr. Mondan,

I would like to make the following comments regarding the proposed Hapuna Beach project:

1. While I am all in favor of long range planning, I think it should be made clear that this is very long range planning. Considering the State's financial situation, it should be obvious that this proposal cannot be implemented anywhere in the near future, and the final EIS should make that explicitly clear.

2. On the other hand, some of the funds currently being expended toward carrying out this proposal should be spent instead in improving conditions in and around the subject area, especially long the beaches. We need heightened security, regular and thorough cleanup procedures, more (and more adequate restrooms) and a general upgrading of all the existing facilities.

3. I am also opposed to the proposed condemnations. For one thing, such a procedure seems unnecessary. I lived for several years in the North Cascades National Park Recreation Area, where there were many private homes and other properties which the Park Service wished to acquire. The policy was simply a "right to first refusal" one. That approach has been working, slowly but surely. As properties come up for sale, the Park Service has been able to acquire them for a relatively modest outlay of funds. I see no reason why the State could not adopt such a policy in this case and avoid a lot of bitterness by doing so.

4. The golf course needs little comment. I'm sure it was originally proposed at a very different time under very different conditions. Even the most cursory study of golf course viability and feasibility on the Big Island will demonstrate that this portion of the proposal is totally impractical, if not actually ludicrous.

I hope the above will be of some help in your final formulation of plans for an important and fragile area of the Hawaiian Islands.

John A. Broussard
59-148 Olomana Road
Kamuela HI 96743
880-1033

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  ENGINEERING BRANCH
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. John A. Broussard
59-148 Olomana Road
Kamuela, Hawaii 96743

Dear Mr. Broussard:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 28, 1996, regarding the proposed Hapuna Beach State Recreation Area Expansion project.

1. The DEIS states that the proposed project would be developed in phases over a 12 to 13 year period. The park expansion plan will serve as a development guide for the Hapuna Beach State Recreation Area, and implementation will be subject to funding by the State. Although funding appears to be tight at the moment, conditions may improve dramatically in the next 2 to 3 years, at which time, the State would like to be in the position to implement plans that have already been approved.

2. When funding becomes available, improvements will be made to existing maintenance and security at the park.

3. Implementation of improvement plans at Wailea may be more dependent on when the areas around the bay are opened to the public than the North Cascades National Park Recreation Area. The private parcels are situated directly behind the bay and the State's plan depends on the mauka land having direct and unobstructed access to the beach. We will, however, identify in the Final EIS the "right to first refusal: as an optional procedure for land acquisition by the State.

4. Although there are a number of existing and planned golf courses in West Hawaii, there are no public courses. Such a facility would provide a much needed amenity to this side of the island. Green fees at the new golf course would be affordable providing lower fees than the private golf course fees. This would be particularly beneficial to fixed-income residents, retirees, and junior golfers.

We trust our response adequately addresses your concerns.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

RECEIVED TIME SEP.20. 7:53AM PRINT TIME SEP.20. 7:54AM

143 Puako Beach Drive
Kamuela, HI 96743
Aug. 28, 1996

RECEIVED
96 SEP 24 9 03 AM '96
DIVISION OF WATER & LAND DEVELOPMENT

Andy Monden
HI Division of Parks
1151 Punchbowl St. Rm. 310
Honolulu

RECEIVED
DIVISION OF
STATE PARKS
Sep 3 3 51 PM '96

Dear Mr. Monden:

I am writing to register my comments regarding the EIS for Hapuna State Park expansion plans. As a homeowner, and visitor to the Puako-Waikoloa-Hapuna Beach area since 1981, I would like to encourage you to find ways to expand the state park which honor and retain the natural beauty and resources of the area.

I strongly believe that major, Hapuna-style development of Wailea Bay would be a mistake. I believe that lower scale development, including some protected camping, improved access, and appropriate sanitation facilities would serve both visitors and residents alike. Perhaps set-back parking with walk-in access to the beach as well as the camping would be best.

I have strong concerns that significant parking areas and/or a golf course too close to the beach area would have significant detrimental effects on the local ecology. Thank you for taking my comments into consideration.

Sincerely,

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. Andrew Condey
143 Puako Beach Drive
Kamuela, Hawaii 96743

Dear Mr. Condey:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 28, 1996 regarding the Draft Environmental Impact Statement (DEIS) for the proposed Hapuna Beach State Recreation Area Expansion project.

The proposed park expansion is being planned as a low-profile and environmentally sensitive development. As described in the Draft EIS, park improvements will be located away from the shoreline and primarily in the mauka land. Wailea is being planned as a walk-in beach with a very accessible comfort station. Drainageways and ravines will be avoided and camp sites will be in protected areas shielded from potential high winds. Significant archaeological sites will be preserved and, in most cases, incorporated in an interpretive program. Below the highway, the park expansion will comprise of improvements covering less than 28 percent of the project area. The rest of the land will be kept in its original form to retain much of the present natural beauty of the area.

The proposed golf course will be located above the Queen Kaauhumanu Highway approximately 3,100 feet from the shoreline. We do not anticipate any negative impact from the golf course on ocean resources.

We appreciate your thoughts and comments on the proposed project.

Sincerely,
Andrew M. Monden
ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

DAVID T. HOSBEIN

July 29, 1998.

Mr. Glen Kovama
Belt Collins Hawaii Ltd
680 Ala Moana Blvd., 1st Flr
Honolulu, HI 96813

RE: Draft Environmental Impact Statement for
Hapuna Beach State Recreation Area Expansion

Dear Mr. Kovama,

I appreciate having the opportunity to review the EIS statement regarding the Hapuna Beach Expansion. For over fifty years my family has owned several lots at the north end of Wailea Bay and we are understandably concerned specifically regarding the State's plans to develop the park at Wailea and also the State's plans to acquire all the privately-owned property at Wailea (Section 2.3.10, pp 2-23 of the EIS).

Developing the Park around Wailea, A "Walk-In" Park
My family and many of the people (both public and private) who have enjoyed Wailea Bay for many years were quite happy to see that the park planners have decided to develop a low-impact, walk-in park behind Wailea. This is the most sensible solution given the fragile quality of the beach (as evidenced in many of the letters included with the EIS) and should allow the public to fully enjoy the unique beauty of this beach without destroying it through over use or carelessness.

According to the sketch provided in the Master Plan (pp 2-13) a small parking lot and restrooms will be provided behind the beach, as well as a turnaround closer to the water. I looked in the EIS for a more detailed sketch showing the size of the planned parking lot and specifically the number of cars it would accommodate but I couldn't find one. If any additional information is available regarding these planned developments please forward them on to me at your convenience.

Wailea Bay Lot Acquisitions
The most disturbing aspect of the EIS for the private landowners at Wailea Bay is the ongoing lack of clarity regarding the State's plans to acquire all the privately-owned parcels behind Wailea Bay and the State's continuing insistence that this is the best way to develop the park at Wailea [illegible] acquisition plan may be a disservice not only to the private [illegible] Considering the admirable attention to detail shown in the [illegible] EIS, it is remarkable that no estimates are provided regarding the expense of acquiring the remaining 18 privately-owned parcels. Given the fact that two undeveloped parcels were acquired at a cost of $1.5 million (pp 3-52), and many of the remaining parcels have homes on them, it might conceivably cost the State about $18 million dollars ($1 million) to buy out the remaining landowners.

Is this a wise and prudent use of limited State funds (taxpayers' money)? The EIS states that "funding for the acquisition will require a separate legislative action" and consequently "budget estimates are not included with the project construction costs" (pp 2-23), but the most important question is not whether the money is available but whether this is an intelligent way to spend it. As a number of the letters from various concerned citizens indicate (e.g. Laura Beckvold, Patricia O'Kieffe) the cost of providing the simple amenities that have long been needed at Wailea is far less than the state has budgeted and could be accomplished far more quickly than the State has scheduled, and the expenditure of much larger sums for this purpose is wasteful and neglects other higher community priorities such as adequate school facilities.

An argument could be made that the State's earlier acquisition of the two shoreline parcels was a wasteful use of public funds because this money could have been used to develop Phase One of the park as early as 1992, which is currently budgeted at $1,531,750, and which is not scheduled to begin until sometime between "1998 and the year 2000" (Appendix A, pp 3-11). If the community of West Hawaii, whose members will pay for and benefit from the Hapuna Beach Expansion, were aware that their tax dollars may be similarly squandered as the State again attempts to buy out the remaining landowners at Wailea they might be strongly opposed to such a plan. Considering the course of development already demonstrated by the State in expanding the Hapuna Beach Recreation Area, many concerned citizens may decide to take action to prevent the planned park from costing even more money and taking even more years to finally be constructed.

Public and Private Cooperation
One sensible way to efficiently and effectively develop the Hapuna Beach Expansion behind Wailea Bay would be for the State to cooperate with the private landowners instead of trying to buy them out. My family, as well as many of the other private landowners at Wailea, want to be part of the planned park and do not want to be bought out. Given the nature of the existing development at Wailea, small scale (compared to the Hapuna Prince), tastefully designed, single-family beach homes, the park and the existing homeowners can easily coexist together in harmony. By working together the public and private interests can create a sensible, cost-effective, environmentally sound vision for the future development of Wailea Bay which can be achieved long before the year 2000.

My family's concern for Wailea Bay comes from a long history of enjoying what is truly a paradise on earth. My grandfather, Richard Talmage Treadwell, was a doctor on the Big Island from 1923 to 1941, and he acquired the property at Wailea when there was no overland access and the only way it could be reached was by boat. It was only a fishing shack when he bought it and over the years he expanded it to accommodate his wife and children. My mother enjoyed it as a child growing up and my brothers and sisters also enjoyed it as we grew up. In 1993 we built a larger beach house to accommodate our growing family and we hope to be able to share the experience of Lalamilo and Wailea Bay with our children and our children's children.

Ever since my grandfather acquired the land we have coexisted peacefully with any and all visitors (the public?) to the beach and have simply hoped that they would take care of Wailea Bay and its environment and share the same respect for it that we have always maintained.

Respectfully Yours,

David Hosbein

David Hosbein

421 West Channel Road
Santa Monica, CA 90402
310/573-9375

cc: Governor Benjamin J. Cayetano
Governor of the State of Hawaii

Mr. Gary Gill
Director: Office of Environmental Quality Control

Mr. Andy Mouden
Division of State Parks - Hawaii

Mr. Glen Koyama
Belt Collins Hawaii Ltd.

Dr. DJ Hosbein & Mrs. Florence Treadwell Hosbein
Dr. Lisa Hosbein
Mr. & Mrs. Tim & Katherine Hosbein-Inglis
Mr. & Mrs. Carlos & Anna Hosbein de Aliago
Mr. & Mrs. John & Eileen Hosbein

Mr. & Mrs. Richard Treadwell
Ms. Connie Treadwell
Mr. Allan Treadwell
Mr. Richard Treadwell
Mr. Paul Treadwell

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. David T. Hosbein
421 West Channel Road
Santa Monica, California 90402

Dear Mr. Hosbein:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 29, 1996, and your comments on the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project. Below is our response to your comments in the order they were presented in your letter.

Developing the Park around Wailea: A "Walk-In" Park

The Hapuna Beach State Recreation Area Master Plan is a conceptual plan showing proposed land uses and location. During the upcoming project design stage, the number and layout of parking stalls will be determined. It is expected the number of stalls will be designed to reflect Wailea Beach's size and anticipated use and will be located in an area away from the shoreline to promote a "walk-in" beach theme. This stage of the project occurs after the EIS review process and generally during the permitting stage.

Wailea Bay Lot Acquisitions

The State intends to acquire the rest of the private parcels at Wailea Bay as provided in the Hapuna Beach State Recreation Area Master Plan. An acquisition schedule has not yet been established because it will depend on the pace of development at the park, approval of acquisition funds by the State Legislature, and release of those funds by the Governor. Notably, funding for the acquisition may come from a separate source rather than the regular State CIP budget, such as a special acquisition fund. Timing of the funding would depend on current State priorities. The cost of the land purchases will be based on real estate values at the time of acquisition.

Although the cost of the project seems to stand out in the Draft EIS, the benefits, as described in Sections 2.2 and 3.11 of the document, are very positive and worth considering. The decision on what projects are more important or have a higher priority than others will be determined by legislators and administrators who are in office at the time the funds are approved and expended.

The proposed Hapuna Beach State Recreational Area Expansion Master Plan provides the State administration with an item for its "wish list" of public improvement projects. It is a fact of life that not all projects will be implemented on this list and that some will be implemented faster than others depending on State priorities at this.

We do not consider the advance acquisition of the two private parcels as wasteful and creating lost opportunities for phase II of the park development. Land acquisition and construction are coordinated and timed to provide the most practical means of project implementation. A major factor affecting implementation is the availability of funds for park improvements and land acquisition. Park improvement funds will come from the State's regular CIP budget, while land acquisition monies may come from a separate fund associated with a specific land acquisition legislation. If this is the case, each will involve a separate review and approval process and may affect the project's overall development schedule.

Public and Private Cooperation

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1); the State shall "acquire additional beach park and rights-of-way to remaining undeveloped shorelines, or acquire additional access to developed shorelines to provide increased capacity for future public recreation use". The policy's implementing action specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". The State is authorized to acquire lands for public purposes under government power of eminent domain.

The cherished beauty of this land as embraced by the private owners should be shared with the public. The proposed project will improve the opportunities for access to the site and offer greater appreciation of the area's natural resources. Park improvements will include management operations such as maintenance and security which have been major concerns of the neighborhood. We believe these improvements will have a more far-reaching benefit to the residents of Hawaii than the apparent short-term costs related to construction and land acquisition.

We trust our response adequate addresses you comments.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

511 West Main Street
Grass Valley, CA 95945
July 22, 1996

Belt Collins Hawaii Ltd.
680 Ala Moana Blvd., 1st Floor
Honolulu, Hawaii 96813
Attn: Mr. Glen Koyama

Dear Sir:

I was disheartened to see the Draft Environmental Impact Statement for Hapuna Beach State Recreation Area Expansion proposing acquisition of all privately held lots at Wailea Bay.

As has been repeated many times, Wailea is a fragile beach which can only accommodate a limited number of people. For a quarter of the year the big surf, the narrowness of the beach, and often, the lack of sand, make the beach unusable for families and swimming. Spending millions of dollars for complete control of this fragile strip is a waste of tax-payers money. To get more for the money by allowing more beach-goers, would endnager that delicate environment.

The acquisition of more private lots would not increase the narrow beach. The four lots condemned in the early '90ies, provide a large area, possibly for picnicing, and increased access. The state owns all the land to Queen Kaahumanu Highway, meaning unlimited acres for a parking lot (hopefully with limited parking spaces to limit the number of beach-goers) and restrooms. (For details of Wailea planning, please refer to my letter OF November 11, 1993)

The 15-20 home owners are an asset to the beach. They provide a greenbelt and maintain it. Besides their right to own property, they also pay taxes. Should the state condemn our properties, the taxpayers would lose income and gain a tax burden.

A partnership; between the state and the private sector; that would be the most sensible, the most honorable, and the most cost-effective plan. There is a public-private relationship with the resort hotels and the proposed golf course, why not with the private home-owners?

Speaking of the golf course, under "Alternatives", there is 1, 2, and 3, but no 4. I suggest a 4th alternative, and that is: "expansion of the park to include an 18 hole public golf course." The heart of the park, Hapuna Beach, is already in place, though is actually about 1/3 larger than pictured on your maps. All beaches are public and a large part of Hapuna Beach continues on in front of the Hapuna Prince Hotel. Therefore, the next important addition is the proposed golf course.

Thank you for inviting comment. I do hope you recognize the value of a government-private sector relationship, both monitarily and morally; the fragility and small size of Wailea beach; and the asset of the private owners.

Sincerely yours
Dr.-Mrs. D.J. Hosbein
Dr. and Mrs. D.J. Hosbein

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

MICHAEL D WILSON CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Dr. and Mrs. D. J. Hosbein
511 West Main Street
Grass Valley, California 95945

Dear Dr. and Mrs. Hosbein:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 22, 1996, regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

We acknowledge that Wailea is a dynamic and fragile beach which changes in size and character during the year. For this reason, no structures or ground improvements are planned directly on the shoreline. The number of parking stalls will be designed to reflect the beach's size and anticipated use and will be located at a distance from the shoreline to encourage the theme of a "walk-in" beach. Provisions, however, will be made to comply with the Americans with Disabilities Act (ADA) standards that provide drop-off areas and other facilities for handicapped persons.

Although the sand area of Wailea Beach may be limited in size at times, the bay itself and the adjoining shoreline are a wealth of natural, cultural, and scenic resources that are appreciated by more than just beach users. This area offers the public an abundance of recreational, historical, visual, and educational experiences.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

We acknowledge that the private property owners at Wailea Bay have been an important asset to the area. Their contributions and value to the beach are deeply appreciated, but the long-term value of the area to the community must also be considered. The land's cherished beauty as embraced by the private owners should be shared with others. We believe the proposed project will improve the opportunities for access to the site and offer greater appreciation for the area's natural resources. Park improvements will also include management operations such as maintenance and security which have been major neighborhood concerns. We also believe these improvements will have a more far-reaching benefit to the residents of Hawaii than the apparent loss of revenues from property taxes on the private parcels.

The current EIS review process provides a means for public input on the proposed project. In subsequent phases, the State will proceed through the permitting process where public hearings will be held and additional opportunities for public input are offered. During the operational stage of the project, park administrators will be available to receive resident concerns on park management and security and to discuss program ideas with the community.

A public golf course is proposed in Alternative A and is a part of the preferred master plan for the Hapuna Beach State Recreation Area Expansion. It will be constructed within the project's anticipated 12- to 13-year development timeframe.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

August 6, 1996

John Hosbein
1756 Columbia, Rd., NW #400
Washington, DC 20009

Mr. Gary Gill
Office of Environmental Quality Control
State of Hawaii
220 S. King Street, 4th Floor
Honolulu, HI 96813

Dear Mr. Gill:

I am a property owner at Wailea Bay and wish to comment on the Environmental Impact Statement dated July 7, 1996, regarding the Hapuna Beach State Recreation Area Expansion. This plan is of great interest to my family, as shown by our letters regarding earlier drafts of the plan and our recent letters in response the newest version of the EIS. I am happy to see that the State of Hawaii has adopted a "walk-in" beach as the appropriate way to develop Wailea. However, the State's continuing intention to purchase 18 privately owned lots at Wailea is not in the best interest of the public, not only will the cost of the project increase but also the time to complete it. I do not want to repeat the valid issues detailed in other letters by my family, therefore I will address only one: the opportunity for the State of Hawaii and the private landowners at Wailea to work in concert on this project.

Wailea is currently enjoyed by the public but lacks access, sanitation, and parking facilities needed to maintain the beauty and health of the beach. The State of Hawaii's primary objective should be to provide these services in a short time frame, cost effectively, and in a tasteful manner. These objectives could be met if the State chose to work with the landowners instead of buying them out.

The only argument for buying the 18 lots would be if their purchase was the most pressing public need in West Kohala. My rough estimate is that it would cost the State, at the very minimum, $20 million to buy the lots, not accounting for the labor costs State employees would incur working on the purchases. Seeing that the lots currently pose no obstacle to how the public enjoys Wailea Bay, I do not understand how the State could justify putting the purchases of the 18 lots ahead of schools, law enforcement, infrastructure, and other social services.

I do see, however, how the public suffers from lack of necessary facilities at the beach. This real and pressing problem can be remedied quickly and with much less expense than the EIS currently calls for by creating a plan that incorporates the private landowners.

Thank you for the opportunity to respond to the EIS and I look forward to working with the State of Hawaii in the future.

Sincerely,

John Hosbein

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. John Hosbein
1756 Columbia Road, NW #400
Washington, DC 20009

Dear Mr. Hosbein:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 6, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

The proposed improvements at Hapuna Beach State Recreation Area is part of a medium-range development plan for the area. Improvements are programmed to occur over a 12 to 13 year period to the year 2010.

The private parcels at Wailea are located in an area that will provide a direct connection between the mauka section of Hapuna where picnicking and camping are proposed and the shoreline area where the beach and ocean activities are planned. State Parks envisions this area to be entirely in open space and park use, with no visual obstructions created by homes, and with no obstructions to mauka-makai access along the length of the beach. This is essential for the Hapuna Beach State Recreation Area to provide the amenities of a passive regional park in conjunction with the natural resources of the shoreline.

It is acknowledged that acquisition of the private lots will be costly, but acquisition will occur gradually over the 12- to 13-year development period. We would hope this would make the cost of the project more manageable. There is also the possibility of implementing a lease-back plan that would allow the State to recover some of the purchase cost while the properties await development.

The proposed master plan for Hapuna is being prepared to provide a medium-range development guide for improvements at Hapuna. Giving priority to other public improvement projects will be in the hands of our State Legislature which has control over public policy and funding.

The Legislature will ultimately decide if more monies should be steered to education, crime prevention, capital improvement projects, and social services.

The EIS review process provides a means for public input on the proposed project: In subsequent phases, the State will proceed through the permitting process which will include public hearings and additional opportunities for public input. During the operational stage of the project, the community will be invited to offer suggestions on park programs and improvements.

We appreciate the time and effort it took for you to review the DEIS and your expressed support of the proposed park expansion.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Lisa Hosbein, M.D.
1562 Response Road, #3112
Sacramento, CALIF. 95815
July 24, 1996

Belt Collins Hawaii Ltd.
680 Ala Moana Blvd., 1st Floor
Honolulu, Hawaii 96813
Attn: Mr. Glen Koyama

Dear Sir:

In the Environmental Impact Statement of the proposed Hapuna Beach Expansion Project, acquiring private lots is one of the steps in the project. Please reconsider this step. As your map shows, the state already owns hundreds of acres of adjacent land mauka to the private lots. There is plenty of space for developing picnic areas and public facilities on this state land. As the map also shows, there is a large area for access to the beach without acquiring additional private lands. Not acquiring these homes would free several million dollars which could be used to develop and maintain public facilities and picnic areas.

There are definite advantages to the presence of private homes adjacent to this public beach. The private home-owners have a strong commitment to maintaining the beach as a natural, beautiful, clean and safe recreation area. This is exactly what the public and the state also want for Wailea Bay. The home-owners have day to day contact with the beach and are in an optimal position to monitor and follow-up on problems which may arise on the beach. The presence of private home-owners adjacent to the beach will greatly enhance the long-term preservation and maintenance of the beach at no cost to the public.

Sincerely yours,

Lisa Hosbein

Lisa Hosbein, M.D.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Lisa Hosbein, M.D.
1562 Response Road, #3112
Sacramento, California 95815

Dear Dr. Hosbein:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 24, 1996, regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

The private property owners at Wailea Bay have been an important asset to the area. Their contributions and value to the beach are deeply appreciated, but the long-term value of the area to the community must also be considered. The land's cherished beauty as embraced by the private owners should be shared with others. We believe the proposed project will improve the opportunities for access to the site and offer greater appreciation for the area's natural resources. Park improvements will also include management operations such as maintenance and security which have been major neighborhood concerns.

We also believe these improvements will have a more far-reaching benefit than the apparent short-term costs related to construction and land acquisition.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek

c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

July 30, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, 4th floor
Honolulu, Hawaii 96813
contact : Mr. Gary Gill

Re: Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion, Lalamilo, South Kohala, Hawaii, June 1996

To Whom it may concern,

For four generations our family has enjoyed and taken care of various parcels adjoining Wailea Bay. The coconut palm collection from around the world was planted by my grandfather starting in the early 1930's. It is recognized as one of the most complete collections of coconuts in existance. We do not view the potential condemnation of our properties "as an opportunity to relocate or to reinvest for other purposes" as stated on page 3-57,

Wailea Bay is a very special and fragile environment. We do not believe the severity of climate is fully appreciated in the E.I.S. On page 3-14,15 it is stated "cool breezes maintain a consistent level of comfort throughout the year." This is correct in the shade close to the water. However, as soon as you get back from the water it is hot, dry, and desolate. The E.I.S. also speaks of "gusty winds blowing through the saddle reaching the shoreline." These winds average 35-45 mph and have been recorded as high as 70mph. They can last from 15 minutes to days, weeks and even months on end. If this weather condition is not given serious consideration any facilities eventually built simply will not work:. Historically, every 8 to 10 years brings a locally heavy rain which creates runoff into the bay at two locations. The river in the middle of the bay would probably fill a ten to twelve foot culvert in my recollection. The location on the north end of the bay is much smaller, at probably four feet.

We would suggest there is a need for beaches like Wailea to stay just the way they are. Many families do not mind a short walk to enjoy a relaxed "off the beaten track" day at the beach. To cram 1,417 people into a marine wildlife sanctuary as is stated on page A-23 is not in the best interest of anyone.

We believe Wailea can be improved with parking, restrooms, and appropriate monitoring without condemning any further private property. We would like to request that the State look at the financial reality of the situation and withdraw this cloud over our heads of some possible future condemnation. It is unfair to longstanding residents to have to live with this uncertainty.

Sincerely,

Mike, Katie, Chester Emma Lowrey

Mike, Katie, Chester and Emma Lowrey

Dr. John and Katy Lowrey

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. Mike Lowrey and Family
Dr. and Mrs. John Lowrey
P.O. Box 6002
Kurtistown, Hawaii 96760

Dear Mr. Lowrey and Family and Dr. and Mrs. John Lowrey:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 30, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

We will describe in the Final EIS that weather conditions in South Kohala can vary from mild to extreme and last from a few hours to several weeks. The new park structures will be designed to meet building code requirements and include special structural provisions for adaptation to local conditions. It is noted that heavy rain can generate runoff that flows into the bay. Accordingly, a drainage study was conducted to assess the runoff conditions on the property, and recommendations were made on necessary drainage improvements. The County Public Works Department will be responsible for approving all drainage and flood control measures for the property during the project's design stage.

The beach capacity analysis, prepared by Pedersen Planning Consultants, was conducted for the fullest size of the beach to determine its potential use. We recognize that the beach varies in size during the year. In the winter when the surf is heaviest, the beach is smallest. Consequently, beachgoers would patronize other beaches where space is available. Our intent in conducting this capacity analysis was to obtain an idea of the current and potential use of the beach. It was not intended to determine a target population of beach users. The analysis along with field observations, information from residents, and literature review provided a comprehensive assessment of the area.

From the study, we found the beach to be generally underutilized. This could be due to a number of factors such as the condition of the beach access, quality of the beach, lack of facilities, general knowledge of the beach's existence and the quality of the overall beach atmosphere. The proposed park improvements are designed to improve on some, if not all, of these conditions.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy I-A(1); the State shall "acquire additional beach park and rights-of-way to remaining undeveloped shorelines, or acquire additional access to developed shorelines to provide increased capacity for future public recreation use". The policy's implementing action specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". The State is authorized to acquire lands for public purposes under government power of eminent domain.

It is acknowledged that acquisition of the private lots would be costly, but acquisition would occur gradually over a 12 to 13 year period. We believe this would make the cost more manageable to the State. There is also the possibility of implementing a lease-back plan that would allow the State to recover some of the purchase cost while the properties await development.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

MOOERS ENTERPRISES
P.O. Box 1101
KAMUELA, HAWAII 96743

August 22, 1996

Department of Land and Natural Resources
State Parks

Re: **Draft Environmental Assessment**
Hapuna Beach State Park

Dear Sirs or Madams:

I have reviewed the Draft EA for the proposed expansion of the Hapuna Beach State Park. I have the following comments I know that this is a long range plan and certain elements may take many years to realize, but it should still be a viable and realistic plan.

I am very concerned with the element of this plan that assumes that the State will acquire the private ocean front homes at Wailea Bay. This is an unfunded mandate by the State that makes no fiscal or land use sense at this time and will only continue to grow more absurd as the years pass and the value of these homes and property appreciate. There are countless better ways to use tens of millions of our tax dollars than do buy out million dollar properties to a shoreline that the public already owns and has unrestricted access to.

The State has miles of ocean front property in West Hawaii that either has no access or limited four-wheel drive access Access and maintenance of these properties is a far wiser use of our limited resources. There is no evidence that the existing homes or their use has jeopardized any coastal resources. The time to purchase these properties, if the State so desired, was decades ago not now or in the future. To continue to leave this element as part of the Hapuna Beach Plan is not sound planning and does a disservice to the public as a whole and to these property owners in particular.

If the State were to spend over a hundred million dollars to acquire these homes, what would they do with them? Tear them down or use them as camping cabins? Will the proposed uses of the lands behind the beach be hindered or enhanced by the change in use of these parcels? Is it good planning to develop a plan with such an unreasonable element at such a critical area within the plan? Since the State does not pay real property taxes, how will the County and our taxpayers replace the millions of dollars of lost property taxes over the years?

Planning for the future is admirable, but the plans need to be feasible and reflect sound fiscal as well as land use policies, the inclusion of this element in the plan is neither. I ask that in your review of this plan that you eliminate this concept now and forever.

Sincerely,

Gregory R. Mooers
President

PHONE (808) 885-6839
FAX (808) 885-1574

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  EROSION CONTROL BRANCH
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. Gregory R. Mooers
Mooers Enterprises
P.O. Box 1101
Kamuela, Hawaii 96743

Dear Mr. Mooers:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 22, 1996, regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

We acknowledge that the cost of acquiring the private lots at Wailea will be substantial; however, efforts will be made to minimize the expense during the project implementation stage. Some ideas that we have developed or have come from the community include the acquisition of properties in increments to spread the purchase cost over time (as well as to hold acquisition cost down during inflationary periods) and the arrangement of a lease-back plan that would allow the State to recover some of the purchase cost while the properties await development.

We anticipate the lost of property tax revenues from the acquisition of the private properties, but the gain in qualitative project benefits would be significant. Providing expanded park amenities will help to meet the growing recreational demand for new camping sites, picnicking grounds, adventure trails and other leisure activities. This is part of the State's Comprehensive Outdoor Recreation Plan objectives which also identify Hapuna as a major recreation area for West Hawaii. Appendix A of the DEIS provides a financial analysis of the project and how the proposed project would be economically feasible.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
cc: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

ENCLOSURE NO. 1

Ref. Hapuna Draft EIS

Benjamin B. Moore, Trustee

Benjamin Moore Foundation (non-profit)

A Planetarium Inspiring Man to perceive Himself Within The Timeless, Ageless Infinite

'96 SEP -3 P3:21

August 26, 1996

OFC. OF QUALITY

Warren Harrison Assoc.
Fax. #732-9476
Honolulu, Hi.

Dear Mr. Harrison,

May I suggest that you contact Richard Burton at 6624 Thomas Dr., North Highland, Calif. 95660, Phone (916) 338-3399. He Took over the late Congressman Philip Burton and his wife's work on the Golden Gate National Park, in San Francisco, Calif., and he expanded the recreational preservation to include the entire Monterey Coast.

The Hapuna preservation only needs to focus on shore-line amenities and safety, north and south from State Parcel 31. To design an oasis away from the shore-line in a hostile environment, away from the water and sea breezes, should be left to Disney Inc.

It is necessary that I ask you to officially list Benjamin B. Moore as a consulted party. For the past ten years I have been unable to read or write with out the assistance from another person. My disability is cause for special consideration to my comments forwarded under separate cover. Additionally I am the oldest surviving resident of Waialea Bay, (since 1941) and resided there for the last 25 years. During that time I stood for the safety of children and youth activities, being a former chief life guard for Southern California beaches. (see enclosed). The undersigned invites further inquiry.

Benjamin Moore

Benjamin B. Moore
P O Box 986
Kamuela, Hi. 96743
Phone (808) 885-4646

Enclosures
BBM/bp

cc Richard Burton
Governor's Quality Control Office

A Non-Profit Corporation dedicated to demonstrating West Hawaii's Leadership in the "Pacific Century"

Jon Lomberg
Planetarium Director

Benjamin Moore
Trustee

BENJAMIN MOORE FOUNDATION

A PLANETARIUM INSPIRING MAN TO PERCEIVE HIMSELF WITHIN THE TIMELESS, AGELESS INFINITE

SILENCING THE PEOPLE, NOT THE NOISE

> Increased vehicular traffic and park use would increase noise levels in the vicinity. These elevated noise levels would probably be most noticed by Wailea Bay homeowners. Correspondence and informal discussions with Wailea Bay residents indicate a concern about the consequences of increased public use at Wailea Bay, e.g., uncontrolled public behavior and loss of privacy in the secluded residential enclave.
>
> 2.4.2.3

By their own admission, the political machine formed by the Waia'lea tax payers worked closely with the Hapuna committee. They engineered the $4 million acquisition of a northern Waia'lea lot in order that their subdivision would be left out of the park design.

The above EIS words validate the privacy of their secluded enclave while the record shows the public needs protection from them. They have stopped at nothing to intimidate beach users. Their mischievous actions are the cause of "uncontrolled public behavior.' Beach 69 has been a park model - clean, safe and meeting the needs of Big Island families and their friends. It is better that you leave political influence out of the EIS and consider children of the next generation (see Political Letter from Kohala Coast Resort Association dated 8/30/96).

> 3.2.2 Beach 68
>
> "Beach 68" is a 150-foot-wide by 35-foot-deep beach that is accessible from the old Kawaihae-Puako Road (some residents indicate that "Beach 68" is "Beach 69"). Lava outcrops occupy a portion of the beach leaving a usable area of approximately 100 feet by 35 feet. On either side of the beach, the shoreline is lined by sea cliffs ranging in height from 35 to 50 feet above mean sea level.
>
> the term "Beach 68" is derived from the number posted on a telephone pole along the old Kawaihae-Puako Road. Access to the beach is provided by a jeep trail from the old road. At the end of the jeep trail is a dirt parking area and a walking trail to the shoreline. Beach 68 is popular for nude sunbathing, overnight camping and swimming, and adjoins a unique cove immediately to the northwest. There are no public facilities at this beach.

E-1

All EIS maps show a Beach 68 with no reference to Beach 69. Your subject caption Beach 68 (3.2.2) was intended to record a pseudo reference that the innocent and uninformed would accept it as legitimate. It was a subtle political influence of the land owners to eliminate the legality of Beach 69. "*some residents indicate*" gives substance to a lie. There never was a Beach 68 and nudity prevails on all beaches today. Such innuendoes given prominent space suggest that you are repeating past mistakes of history. The privileged few nor the government collusion can alter the cultural relationship of Beach 69 in the minds of Big Islanders.

To see what happens, read Dr. Starhawk's research, "*Dreaming in the Dark.*" Ph.D.

Governor of the State of Hawaii

c/o Office of Environmental Quality Control

220 S. King Street, fourth floor

Honolulu, HI 96813

It is either a compliment to a participant's wisdom or to render him ineffective to expect a definitive report in a 45 day review. The Wailea and Puako Bay lots are in a natural recreational area right or wrong. Failure of a strong boundary commitment that "took them in" (protecting them with life tenancy) enabled them to encroach on public rights.

The Wailea Taxpayers Association is now a formidable influence using Orange County political savvy of Irvine heir, William T. White III. Their cozy political chicanery influenced the Hapuna " Expansion " to withdraw their enclave to be dealt with in 2010.

Your draft accepts a boundary to Puako Bay which repeats the mistake that caused the present problem. The natural recreational appropriate land use requires a strong boundary commitment to Puako Point (owners protected by life tenancy). We can mitigate past mistakes by developing parcel 31 as the park hub. Designating the 40 foot road reserve through the subdivision to the main beach. The land owners were essentially given control of Wailea Beach by the present design and the draft supports it. Without public rights as the premise for design = wealth and power will spread its lethal influence as " Fiat Accompli ". The main beach southern section of Wailea Bay Known

as Beach 69 (handed to) and governed by the will of lot owners undermines youngsters of all ages and contributes to their delinquency.

The draft indirectly allows William T. White III to abuse keiki proclivity to a sea shore experience of their mental development by discovery and exploration. They understand natures classroom close to the waters edge and it's ever changing solace. Their little tent and campfire dreams shape the world to come. This is a "trade off" of basic youth social activities traditionally and culturally part of the main beach. The lot owners have their enclave, but why allow them to psychologically create behavior patterns and attitudes that alienates and erodes the youngsters faith in government? Failure to preserve children's dreams as the premise of the recreational design, outlined above, scatters and confuses youngsters.

In conclusion the astute document ostensibly meets all the EIS requirements without "standing for children." History has taught children the right way to be close to the sea shore and they expect their parents to stand for their rights to use Beach 69 as they did. Weakening of children's attitude is a weakening of their character. Such objective circumstances conveyed by the draft unintentionally creates attitudes in correlation to social problems.

cc: Mr. Gary Gill
Andrew Monden
Belt Collins Hawaii Ltd.
Glen Koyama

Excluded From The Hapuna EIS?

The design now implimented by the Hapuna Committee was politically influenced to restrict public use of Wailea Bay "Beach 69". The design actually uses parcel 31 to isolate the southern exposed historic access, instead of incorporating it into the park expansion. This restriction essentially limits the use of the main sandy beach fronting the subdivision.

The design thereby relocates the traditional cultural family social activities enjoyed for generations to a less desirable location. Over the past the public has forged a bond with "Beach 69" making it an important part of the foundation of our social activities. The park must have access through parcel 31 (instead of the subdivision) for balanced park design and community stability.

Jon Lomberg
Planetarium Director

Benjamin Moore
Trustee

BENJAMIN MOORE FOUNDATION *(non-profit)*

A PLANETARIUM INSPIRING MAN TO PERCEIVE HIMSELF WITHIN THE TIMELESS/AGELESS INFINITE

PERSONAL

May 1, 1996

Ben Cayetano - Governor
State of Hawaii
Executive Chambers

Dear Governor:

Our Foundation is working fervently to demonstrate West Hawaii's leadership in the "Pacific Century". A major Planetarium Research Civic Center in Waimea is being given consideration along with two alternative locations. Through one of our director's, our Foundation loaned the Visitors Center at the summit their largest telescope. As a private non-profit 501 (c) (b) Corporation, we are an extension of the Joint Astronomy Group array of observatories and essentially an international "think tank" consortium for a sustainable world.

All of us sympathize with the demands put on you for personal responses, and the necessity for relying on information from deputy assistance must be used. Our Foundation opens its ten years of experience, and its founder who is the oldest surviving resident of the "subject caption" to supply your deputies with correct information. Our courtesy letter to you dated March 13th, was misinterpreted by your deputies in your April 3rd, response. Our long-term investment coordinates and involves all of humanity; but is dependent on and related to our community stability. We have reached a point of "no return" by an irreversible "sell out" of our "back yard". Unfortunately, the bureaucracy of D.L.N.R. joined the privileged few manipulating the policy decisions of its Hapuna so called "*expansion*". Experience with the past two administrations has convinced me that powerful political special interests will never recognize public interest unless our Governor Ben Cayetano reverses it by executive order.

A simple public use of state parcel 31 would reopen the historic south access to main beach "69". A mauka alignment seals off this panorama and our cultural traditions forever. This political selectivity totally violates both the Olmstead Coastal & Urban Development Law and traditional land use. "Supreme court upholds traditional land use". The makai alignment was not a personal suggestion, far from it. It was approved by the 1972 legislature; it is a part of our social activities, the foundation of keiki education; teen age character building class room, and the expected tourist naturescape (promised by the H.V.B.)

Please preserve our present and next generations culture by an executive write-off of D.L.N.R.'s political commitment which weighs heavily as a mortgage on our future. Our trust is placed in you to inaugurate the scenic shoreline drive, re-opening the beach to everyone.

In perfect confidence,

Benjamin Moore

cc: Clarence Mills
Kona Hawaii Civic Club
Lemarcy Dematta
Hawaiian Voyaging Society
Boys & Girls Clubs
Hanna Springer

Enclosures

"Setting Up" Children To Fail

This attached ruling conflicts with the principles of our new Governor Ben Cayetano and is incompatable with his record of correcting past mistakes regardless of politics.

Governor Cayetano would never have approved of such blind political patronage at any time, and certainly not against children. This blanket ruling overtly eliminates family cultural recreational use by associating innuendoes with illegal homeless activities. This "edict" was one of a series of alleged strategies of sub-division developer William T. White III's cozy political chicanery, which arrogantly influenced the Hapuna Committee.

Pre-School keiki's historically prepare for their formal education in Hawaii by instinctively discovering environmental harmony in beach camp-outs. Children are inherently equipped for mental development and "Beach 69" Waia'lea Bay has been their classroom for generations. This natural affinity development is a required sequence to formal education, and for Government to interfere dredges the bottom of social intolerance. Government may not stand for children but standing in the way of families who do, "sets children up" to fail. Without dreams around an overnight campfire at "their" beach, they identify with wrong things.

It is the ruthless selfishness of the privileged few that object to overnight campout experiences at the expense of lowering the goals of children, their morals, and willingness to learn and weakens their resistance to lurking temptations.

"Beach 69" Wailea Bay has been recognized for generations by Big Island families and the International Youth Hostel as the safest, cleanest, and friendliest overnight beach camping in the islands, and it is unconscionable that their campfire could be put out by one man's elitism.

Let the Governor stand up for children and revoke this ludicrous ruling against future generations and launch a thorough investigation of the Hapuna recreational tragedy.

BLANKET INJUSTICE
DANGEROUS TO FREEDOM

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF LAND MANAGEMENT

IIA-90:163

NOTICE TO VACATE

To Whom it May Concern:

This is to inform you that the area commonly known as Beach 67, Beach 69, and/or Wailea Bay is a portion of the government lands of Laiamilo, South Kohala, Hawaii, further identified as parcel 31 of Tax Map Key 6-6-02, and is owned by the State of Hawaii.

Anyone placing any structures to include but not limited to a dwelling, lean-to, shed, tent, campsite; anyone occupying, camping and/or residing on said land without the written authorization of the Board of Land and Natural Resources is in violation of Chapter 171, Hawaii Revised Statutes, and shall be subject to a fine of up to $500 per day, plus charges for administrative costs incurred by the Department of Land and Natural Resources and for payment of damages.

NOTICE TO VACATE is hereby given to all persons occupying, camping and/or residing on said lands and that you must vacate said lands immediately and remove all structures, vehicles and personal belongings placed thereon.

ANY AND ALL PERSONS FOUND OCCUPYING, CAMPING AND/OR RESIDING ON SAID LANDS AFTER 6:30 A.M., June 10, 1991, SHALL BE SUBJECT TO A FINE UP TO $500 PER DAY PLUS ADMINISTRATIVE COSTS FOR VIOLATIONS OF THE PROVISIONS OF CHAPTER 171, HAWAII REVISED STATUTES.

FURTHER, ANY AND ALL FIXTURES, EQUIPMENT, STRUCTURES, VEHICLES AND PERSONAL BELONGINGS PLACED, MAINTAINED AND/OR FOUND ON SAID LANDS AFTER 6:30 A.M., June 10, 1991, SHALL BE CONSIDERED ABANDONED AND SHALL BE DISPOSED BY THE STATE OF HAWAII AT THE FORMER OWNER'S COST AND EXPENSE.

DATED: Honolulu, Hawaii, 4th day of June, 1991.

WILLIAM W. PATY
Chairperson
Board of Land and Natural Resources

De facto sandy beach camping at Wailea Bay has been the established pre-school DISCOVERY AND EXPLORATION LEARNING on which formal education can build.
Our state yielded to the GREEDY INFLUENCE of the Wailea speculators to kill the cultural balance of education and the social progress of our community.

Exhibit

A preschool student taught to have a willingness for discovery does more for education than money

By allowing the destruction of our freedom to seashore camping our children are being deprived of forming obedience to the moral and spiritual foundation on which education can build. *DLNR declares historic camping experience for keiki at Wailea Bay a crime.*



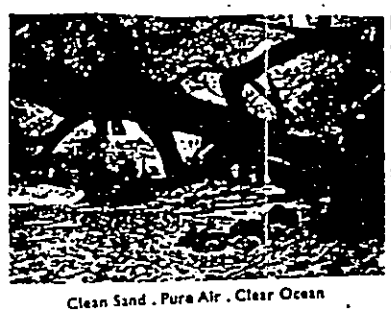
Nature teaches grand lessons. Without it education as survival is for the lucky ones. The defacto (generations old) family campfire at Waia'lea Beach 69 has been a Big Island cultural pre-school mental development that equips each child with a basic core level that blends all ethnic backgrounds equally into the educational system.

E-5

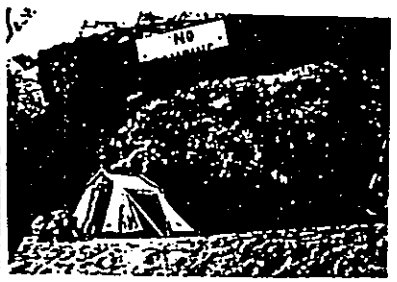
THE CENTER OF WAILEA BEACH ACTIVITY


TRADITIONAL LAND USE

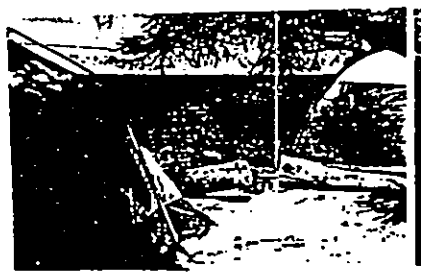
Sub-division Politics Vs. Keikis



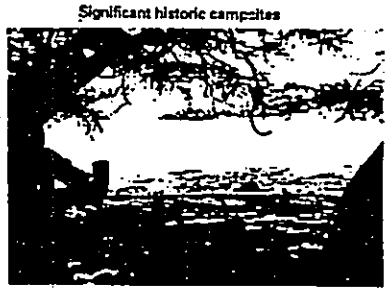
Clean Sand . Pure Air . Clear Ocean



Significant historic campsites



Salvation from Hilo rain



Spiritual repose



Traditional family camping



Finding ones ownself

Exhibit

Jon Lomberg
Planetarium Director

Benjamin Moore
Trustee

BENJAMIN MOORE FOUNDATION (non-profit)
A PLANETARIUM DISPERSING MAN TO PERCEIVE HIMSELF WITHIN THE TWIRLING ENLARGEMENT OF DATE

Personal

The Honorable John Waihee
Governor, State of Hawaii
235 S. Beretania Street
Honolulu, HI 96813

Dear Governor Waihee,

Thank you for your invitation to the King of Norway remembering his 25th year of marriage. It helped to make my subsequent (yearly) phone call a good one. His nostalgic words expressed hope to find again the seclusion and privacy that he had for the three weeks he was here with me. He said that he would like to once again visit Wailea Bay and experience the freedom of walking the shoreline; particularly to show his family the area (there) where around the campfire his marriage began—never to end.

Preservation of our traditional and cultural historically significant camp sites at Wailea and Puako Bays is the purpose of the beautification route. (See the enclosures.) It will draw new tourists and bring old ones back. It has 99% community support, and yet the fine people in your administration act according to their personal position; favoring special interests. It is not their fault, but as Governor *it is* your obligation to point out their clouded vision and short sightedness. Political conformity and staff loyalties have come under the subtle influence of your liaison, Mr. George Robertson, using the "million-a-month" Irvine fortune and the "feudal" Wishard land enclave. Mr. John Keppler joined this special interest for power resulting in sealing off the Wailea subdivision and encroaching on public rights. (See Mr. Kepplers' letter enclosed.) From here the overt plan spreads into a complex miasma that will adversely affect not only education and tourism, but the standards and values of life in the Hawaiian Islands.

Hopefully,

Benjamin Moore

Benjamin Moore

E-6

DOCUMENT CAPTURED AS RECEIVED

DOCUMENT CAPTURED AS RECEIVED

STATE OF HAWAII
REQUISITION & PURCHASE ORDER.

PARTMENT OF LAND AND NATURAL RESOURCES — Land Management
ORGANIZATION — FUNCTION AND ACTIVITY

NOTICE TO VENDORS
Conditions of purchase are listed on the back side of this purchase order. Please read carefully. Payments may be delayed if all steps are not followed.

BEN MOORE ASSOCIATES
P.O. Box 986
Kamuela, HI 96743

The State of Hawaii is an EQUAL EMPLOYMENT OPPORTUNITY and AFFIRMATIVE ACTION employer. We encourage the participation of women and minorities in all phases of employment.

PURCHASE ORDER NO. C31597
Date 041493
Deliver Before

DELIVERY ADDRESS
Dept. Land & Natural Resources
Division of Land Management
75 Aupuni Street, Room 204
Hilo, HI 96720

BILLING ADDRESS
Dept. Land & Natural Resources
Division of Land Management
P.O. Box 936
Hilo, HI 96721-0936

QUAN.	UNIT	DESCRIPTION	OBJECT	UNIT PRICE	AMOUNT
		Trash Collection Services			
		3/16/93 to 4/16/93			$200.00
		Wailea Bay, South Kohala, HI			8.00
					$208.00

WAILEA BAY RESIDENT PARK RANGER SHOWING THE PUBLIC THAT EVERYONE BENEFITS BY "MOTHERING" MOTHER NATURE PRESERVING THE SPIRIT OF HAWAII'S ENVIRONMENTALLY FRIENDLY IMAGE. A SHOWCASE OF ISLAND CAMPING.

REQUISITION NO. 00129695



The First Successful Pilot Drug Free
Volunteer Historic Public Family
Camping Area in The State of Hawaii

Benjamin Moore
Trustee

Planetarium Director

BENJAMIN MOORE FOUNDATION

A PLANETARIUM INSPIRING MAN TO PERCEIVE HIMSELF WITHIN THE TIMELESS, AGELESS INFINITE

March 21, 1996

Land Management Div. of DLNR.
Attention: Eric Lelong

Dear Mr. Lelong:

We are certainly willing to help you and the Governor meet his budgetary constraints. Your letter of 3-13-96 therefore has been passed to sub-contractors Environmental Separators, Inc., part of Recycle Hawaii Company and the State Litter Control Office with a thirty day contractual termination. I assume this is to sever their educational program in order to save the state $50.00 per week? See "thank you" public preamble and state requisition attached.

It was fifty years ago, I helped Kenneth Bond finish building his cottage while on furlough and rest (WWII), in 1941. During these years, I worked with state forestry developing communities of flora and fauna for seedlings that were endangered. These beds were preserved until a D.O.C.A.R.E. official cleaned them out. It was an insipid way of helping his new wealthy neighbors eliminate camp fire fuel. A D.L.N.R. (edict) instigated by investors, made overnight camping a crime. Their innuendo's, rumors, lies, and political savvy influenced a wrongful use of "eminent domain"(not a public need). It was the result of an investors plan to separate "their" enclave and control "their" beach. Their powerful political support reached all levels of the Hapuna Master Plan Committee. (An alternate plan that would have served the public interest was condemned prior to investigation). It was alleged that political favoritism was a "fait accompli" by malfeasance involving (+/-) seven million dollars in special interests.

"Teaching your kids the ways of the world requires the proper classroom" (taken from a national teachers publication). Generations of pre-school children had discovered and explored for mental development that equipped each child with a basic core knowledge giving each one equal educational opportunity. Participation by the public in physical and bioitic endangered species preservation, taught them lessons of nature. With more of these basic lessons in nature being taken away, our children are becoming disoriented to whom to obey and what to do with their time. Children are our future and their camping experience at Waia'lea "Beach 69" is not only the foundation of education, but forms an early obedience to moral and spiritual values.

It is with all the courage remaining in my 83 years, to question the blindness of the D.L.N.R.'s "edict" declaring Hawaii's cultural pursuit of our quality of life a crime. Because of the action of state officals, all healthy and educational activities for all ages have ceased at Waia'lea Bay and in their place, all ages are now exposed to drugs and idleness. An extension of our lives has been severed causing instability within our community. Beach "69" built an international reputation of Hawaii's "Aloha" and it has been essentially transformed into an imported culture.

The writer invites further inquiry and until then, am I to be retired into uselessness also?

Benjamin Moore

Benjamin Moore

.cc: Governor Cayetano, Mason Young, William Paty, Mike Wilson

DOCUMENT CAPTURED AS RECEIVED

EXHIBIT 13

THANK YOU

AMBASSADORS OF ALOHA

Individual Self-esteem Guides and Influences
Social Interaction of Public Behavior
Not The Laws

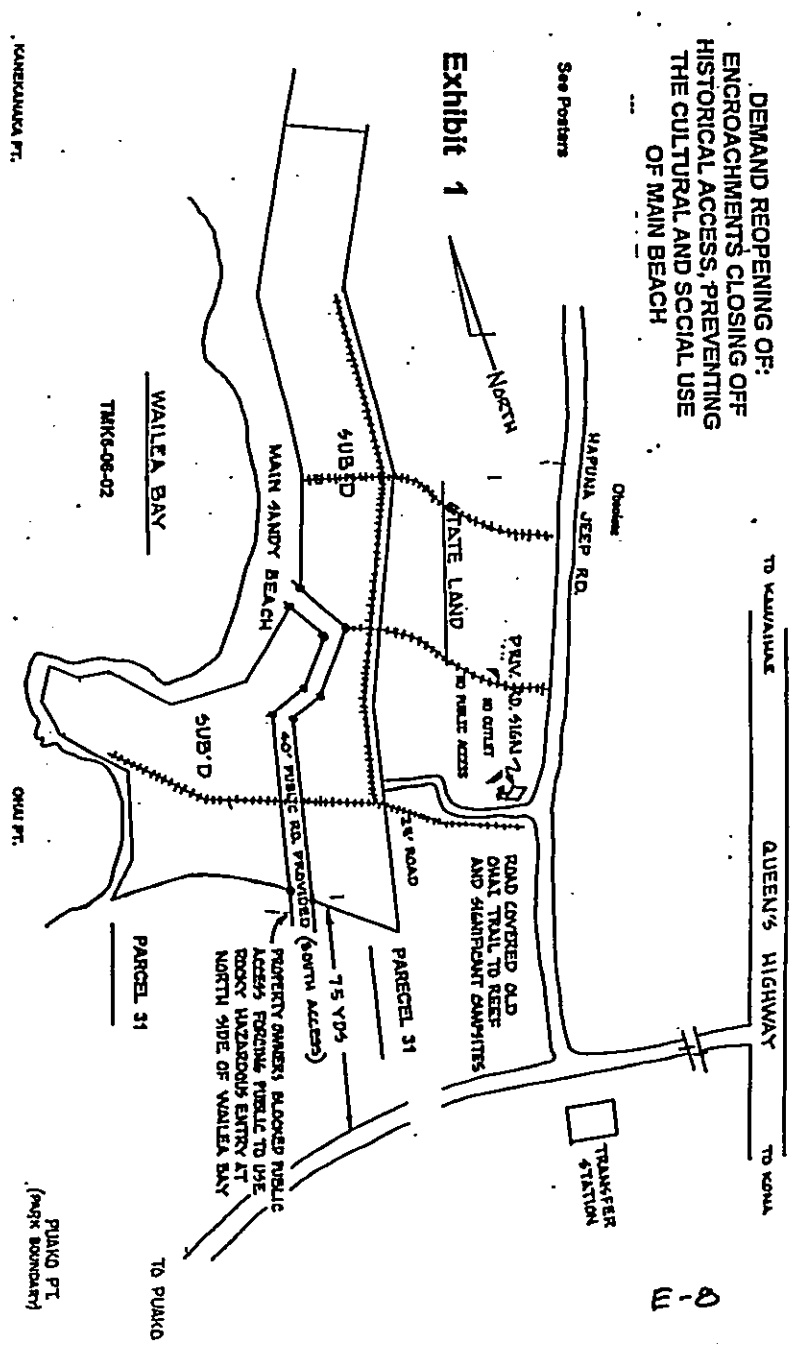
For making Wailea Bay safe
For looking out for each other
For self-governing yourselves
For volunteering drug free
For being an example to each other
For "mothering" Mother Nature
For seeking naturescape freedom
For informing the public too
For a welcome to Wailea Bay
For the peace and hope of spiritual repose
Forever in the sky
a thank you for finding yourselves
as themselves - created equal.

The First Successful Pilot Drug Free
Volunteer Historic Public Family
Camping Area In The State of Hawaii

Beach 69 Crime Stoppers

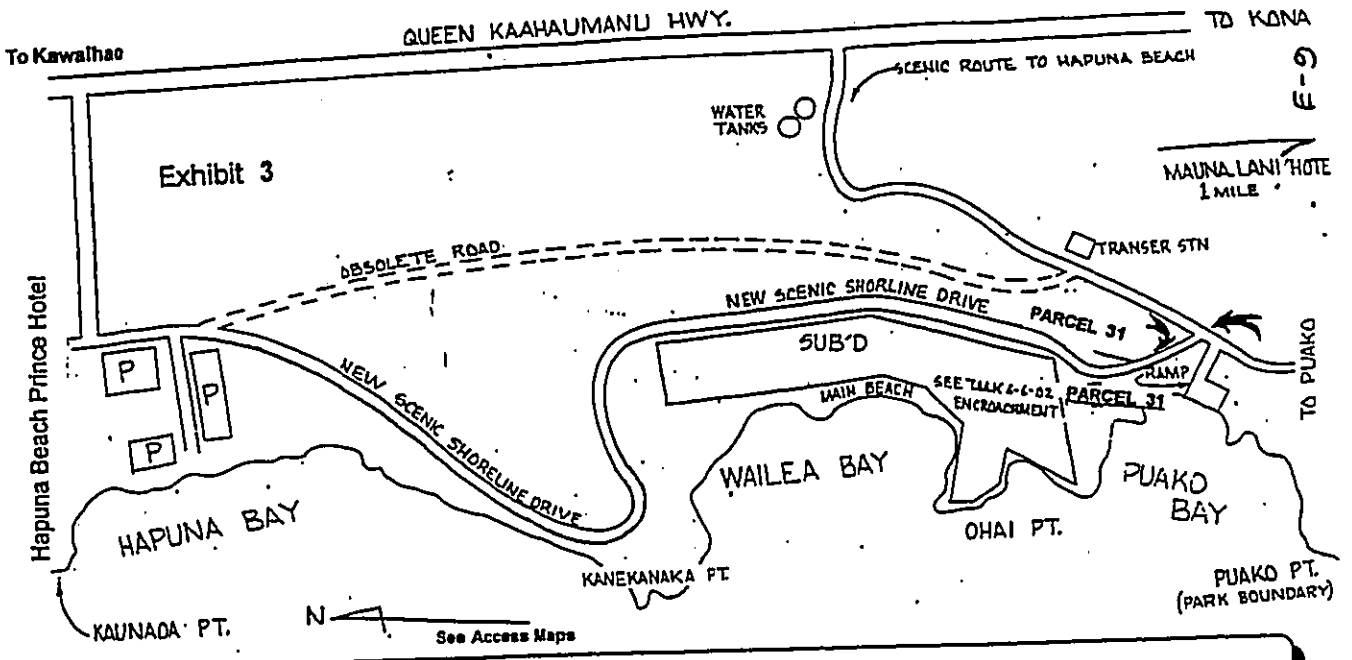
DEMAND REOPENING OF:
ENCROACHMENTS CLOSING OFF
HISTORICAL ACCESS, PREVENTING
THE CULTURAL AND SCCIAL USE
OF MAIN BEACH

Exhibit 1



E-8

DOCUMENT CAPTURED AS RECEIVED



PROOF OF PARADISE

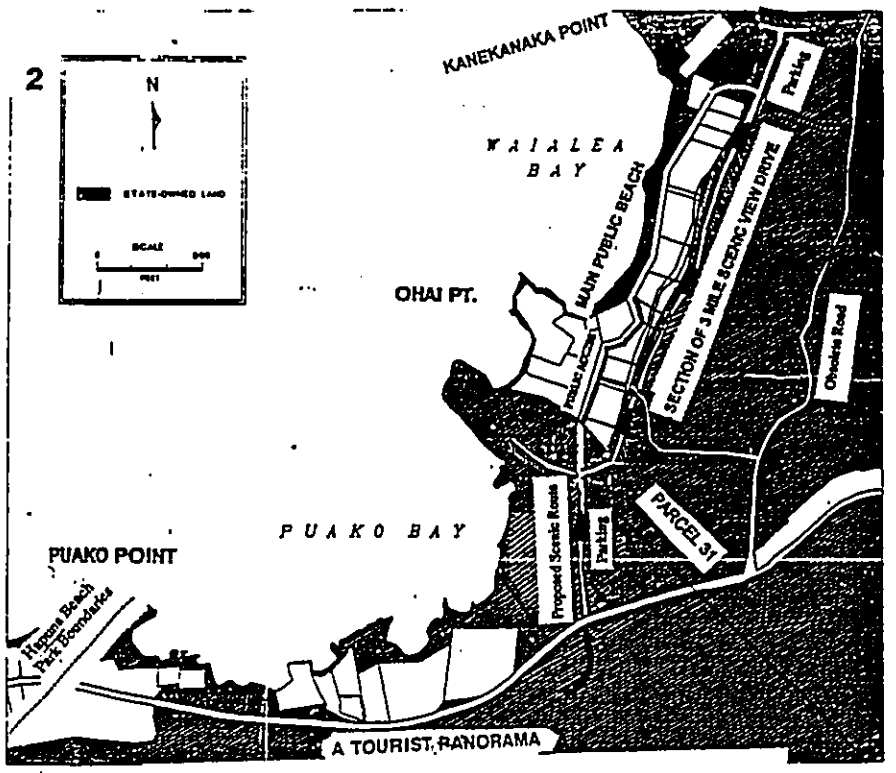
Hawaii's National Scenic Shore Line Drive would be a renewal of tourism public relations. A panorama with access to cultural Aloha between the grand lobbies of luxury hotels. **Advertising at its Best.**

Exhibit 2

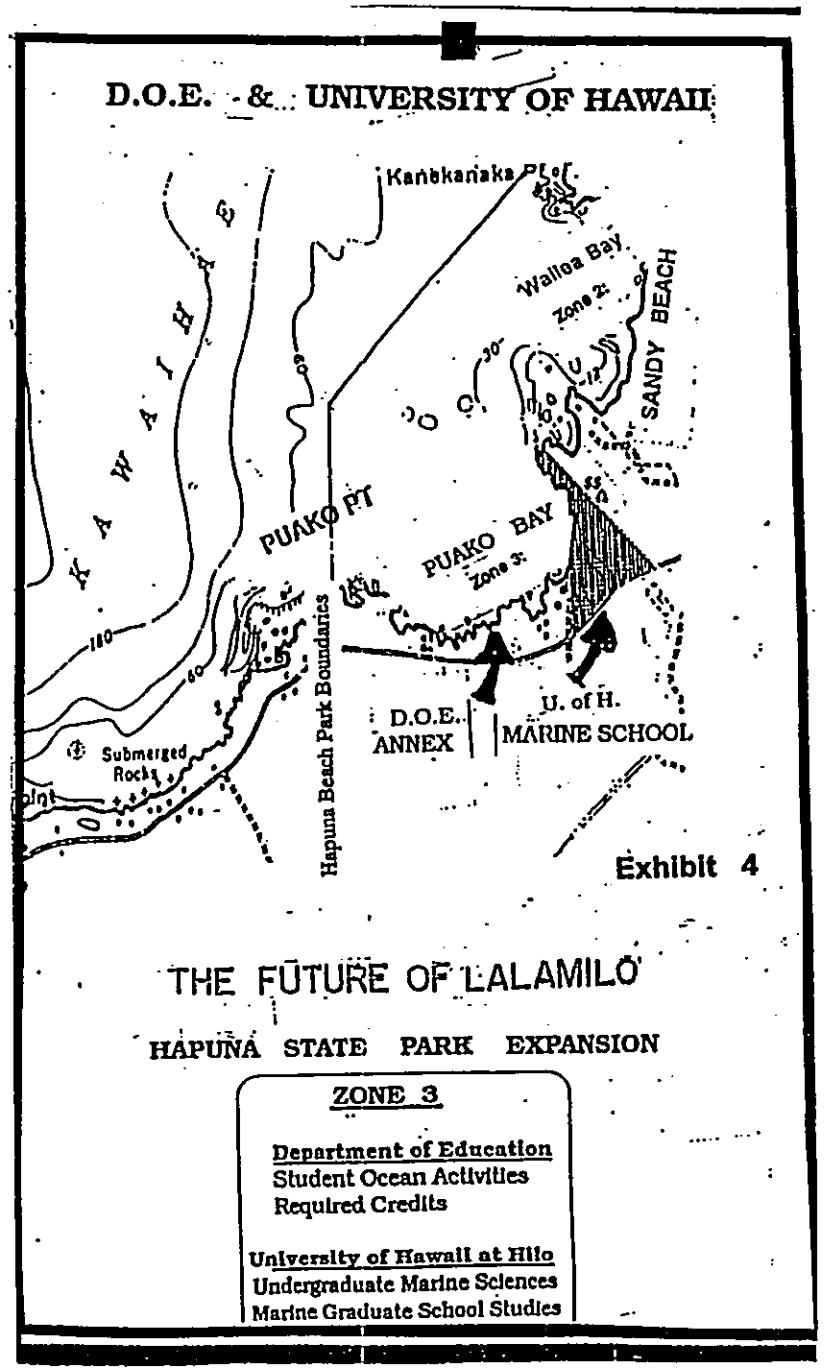
Protect: Private property rights with life tannacy

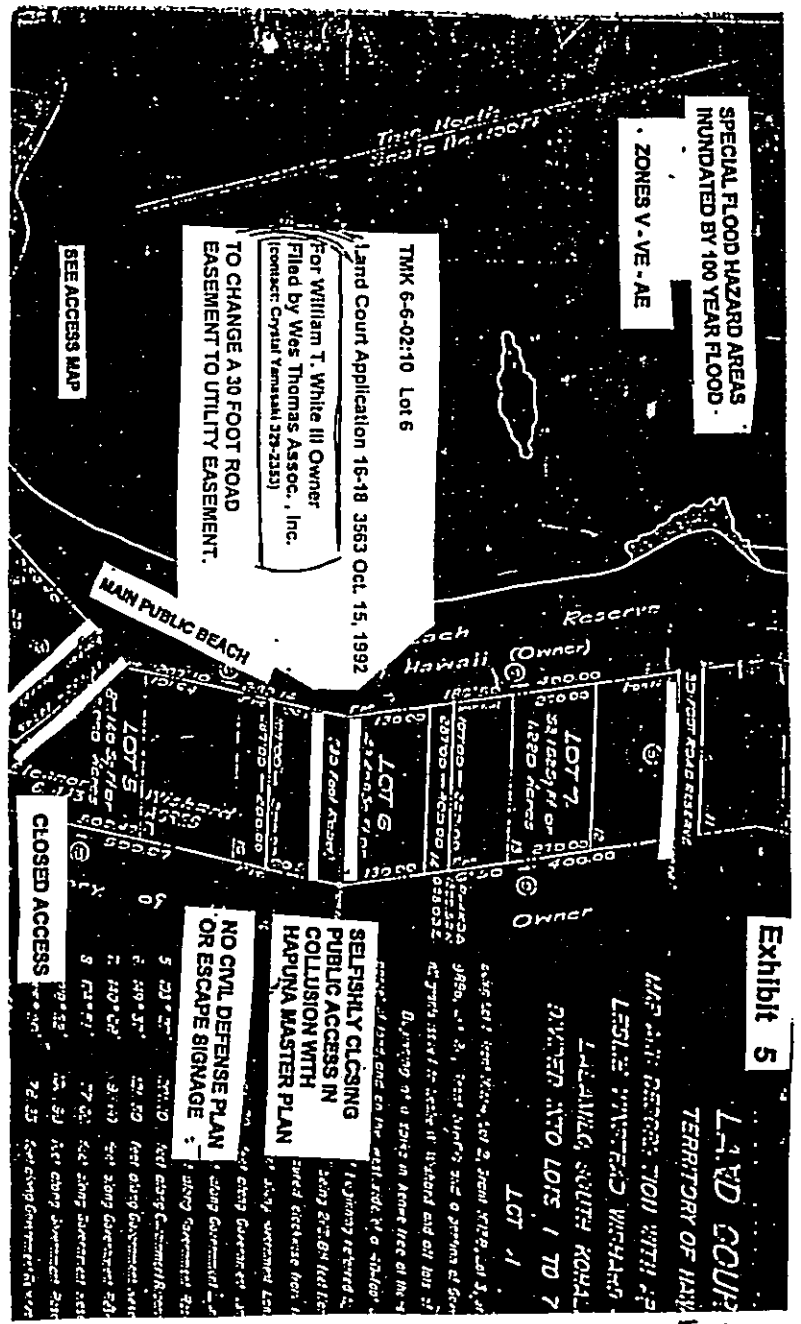
Provide: Public inheritance of all lots within the natural recreational boundry

Avoid: Historys mistakes of private monopoly of public land



DOCUMENT CAPTURED AS RECEIVED





DOCUMENT CAPTURED AS RECEIVED

EXHIBIT 6

The Wai'lea Bay Taxpayers Association Drew Lines to Keep the Public Out

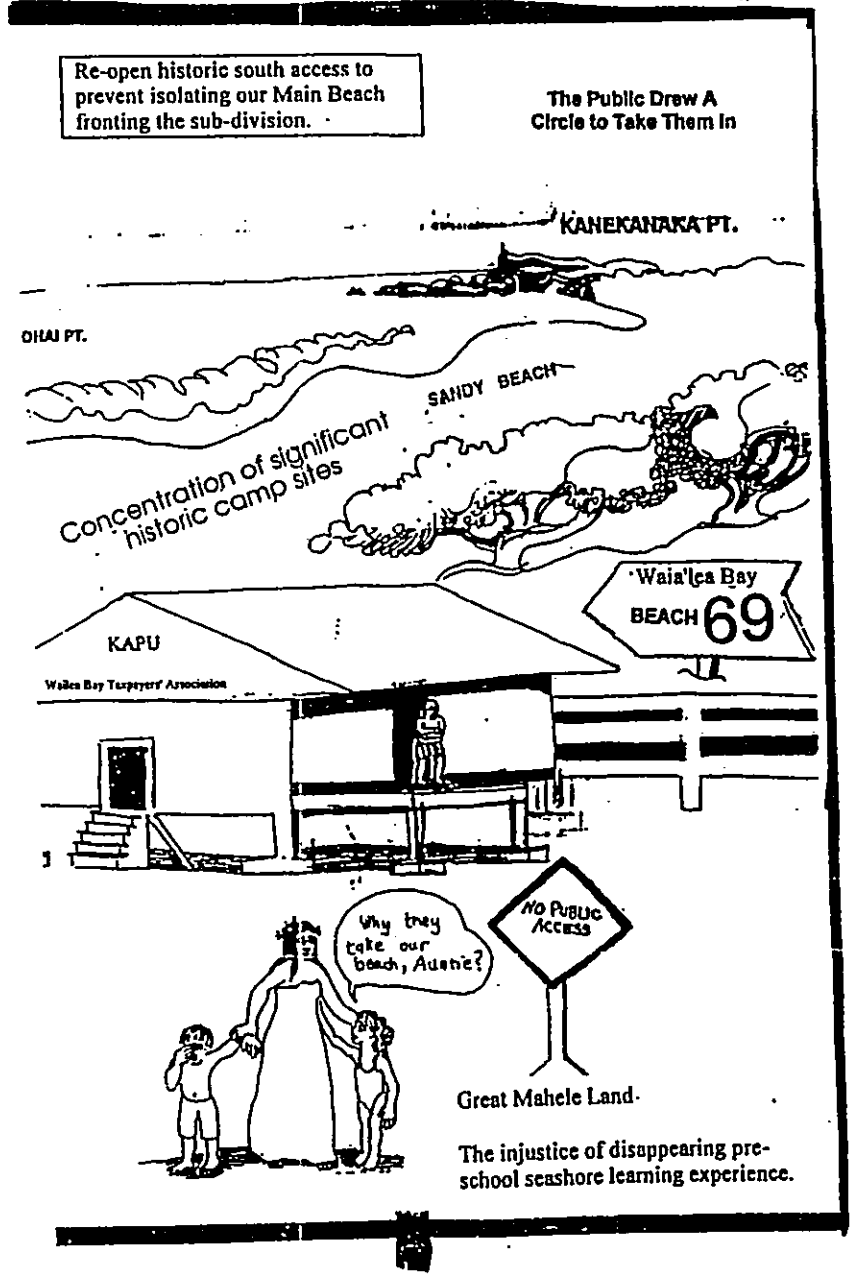


Exhibit 7
Exhibit 8
Exhibit 9
Exhibit 10

COVER PAGE

These maps are to show the advantage of flood lots located next door to the proposed acquisition to Hapuna. It was submitted in mid 1992 as a long-range alternative. This lot held the key to having unification. It met every general information survey requirement; environmentally matched to cultural traditions with direct savings of 3 million, an indirect savings of expenditure of 4 million for a total savings in excess of 7 million dollars (see fiscal '93-94 report).

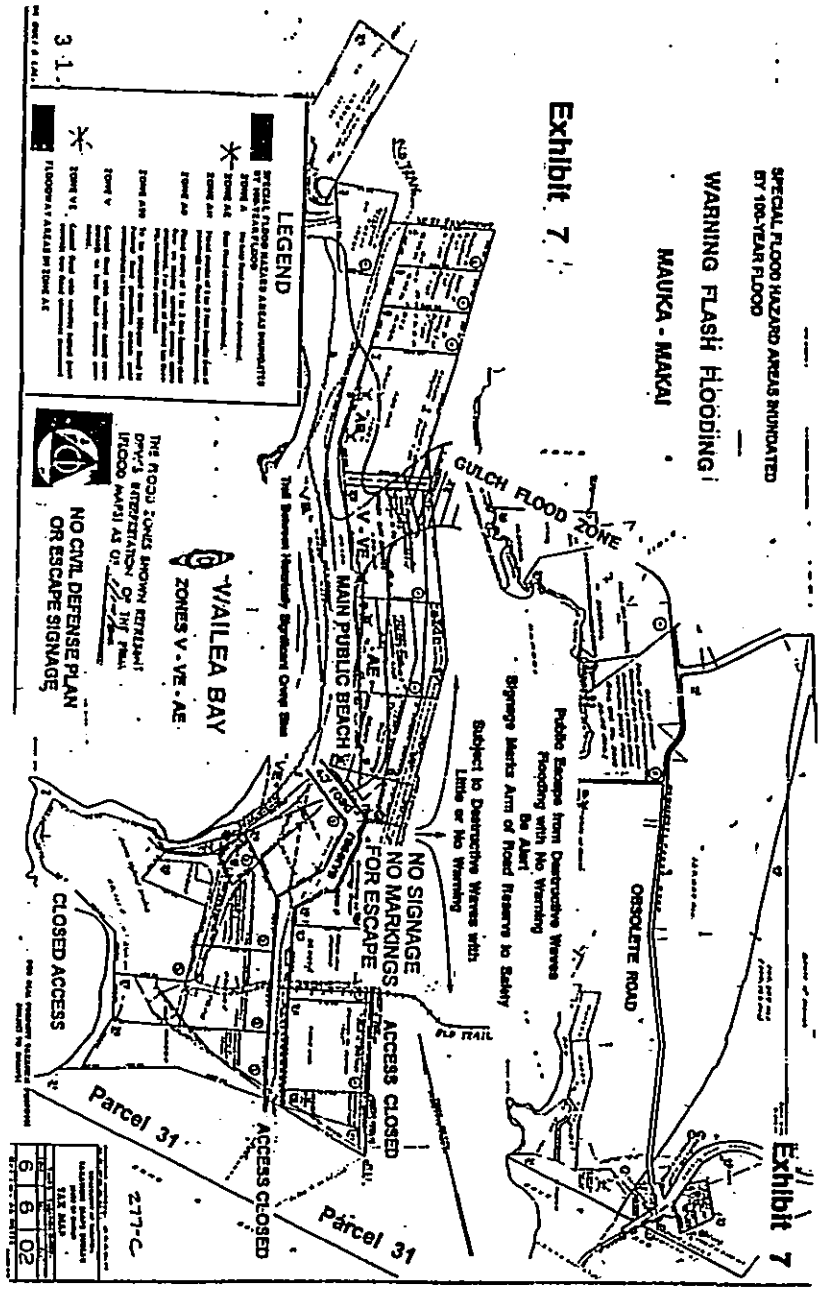
The Hapuna committee yielded to the division of Wailea Beach 69 which was overtly planned and influenced by landowners. Every government agency was influenced by them. The attorney general, Edwin P. Watson, filed ex parte under pressure from the land owners to finalize the acquisition they wanted prior to any investigation of the alternative. The Attorney General used ex parte to leapfrog the prima facie use of HRS 101-29 (1) 2 and 3, also the Planning Department and E.I.S. This acquisition was announced by the State as "expanding" Hapuna which had been delayed since legislature approval in 1972. This announcement was intentionally stated to mislead the public into believing that DLNR was finally following the legislative mandate In fact, it established subdivision sovereignty. *

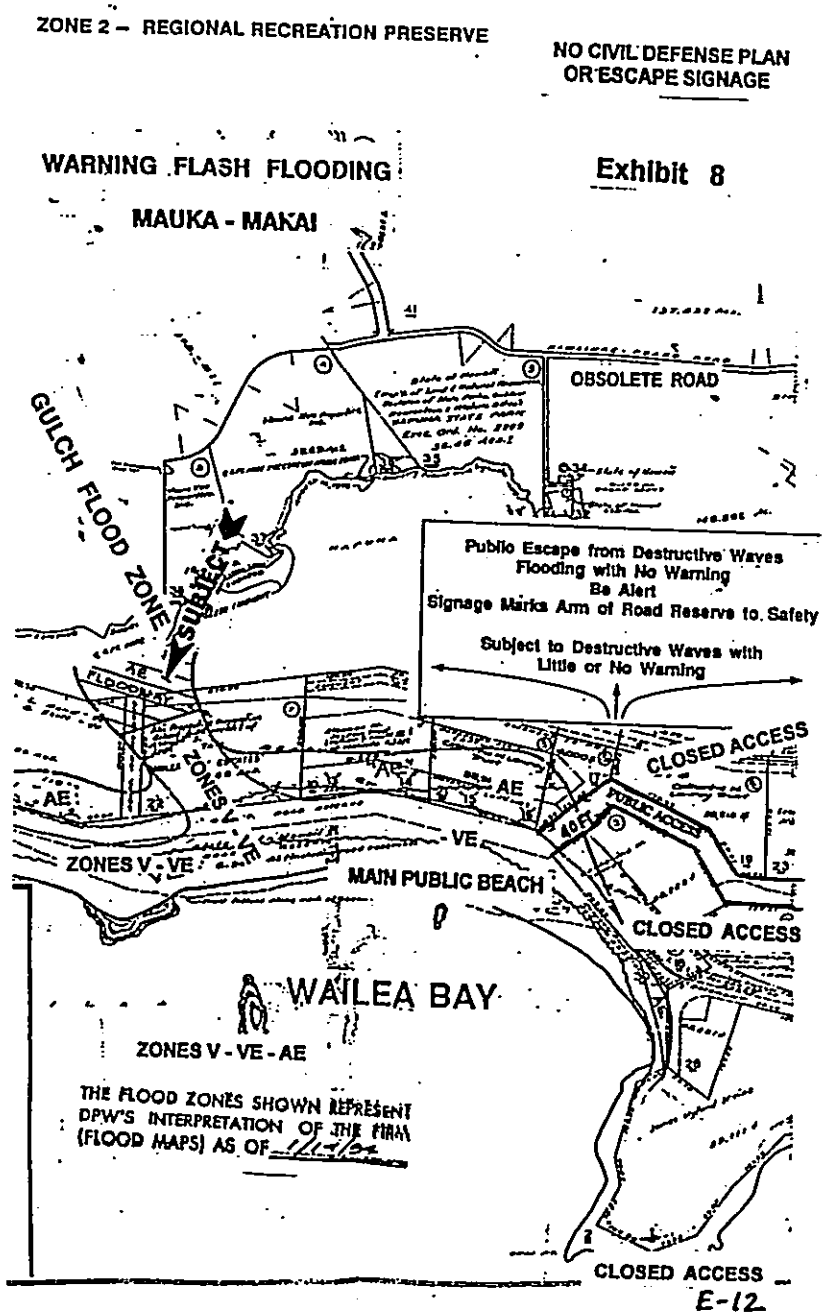
Hawaii's future quality of life depends on the ability of the public to demand the reunification of Wailea Beach 69 historically for - home and rest. A fire of hot coals with fish laid there on (see color photos of traditional land use)

A fine place for feasting if only one is poor enough to appreciate it.

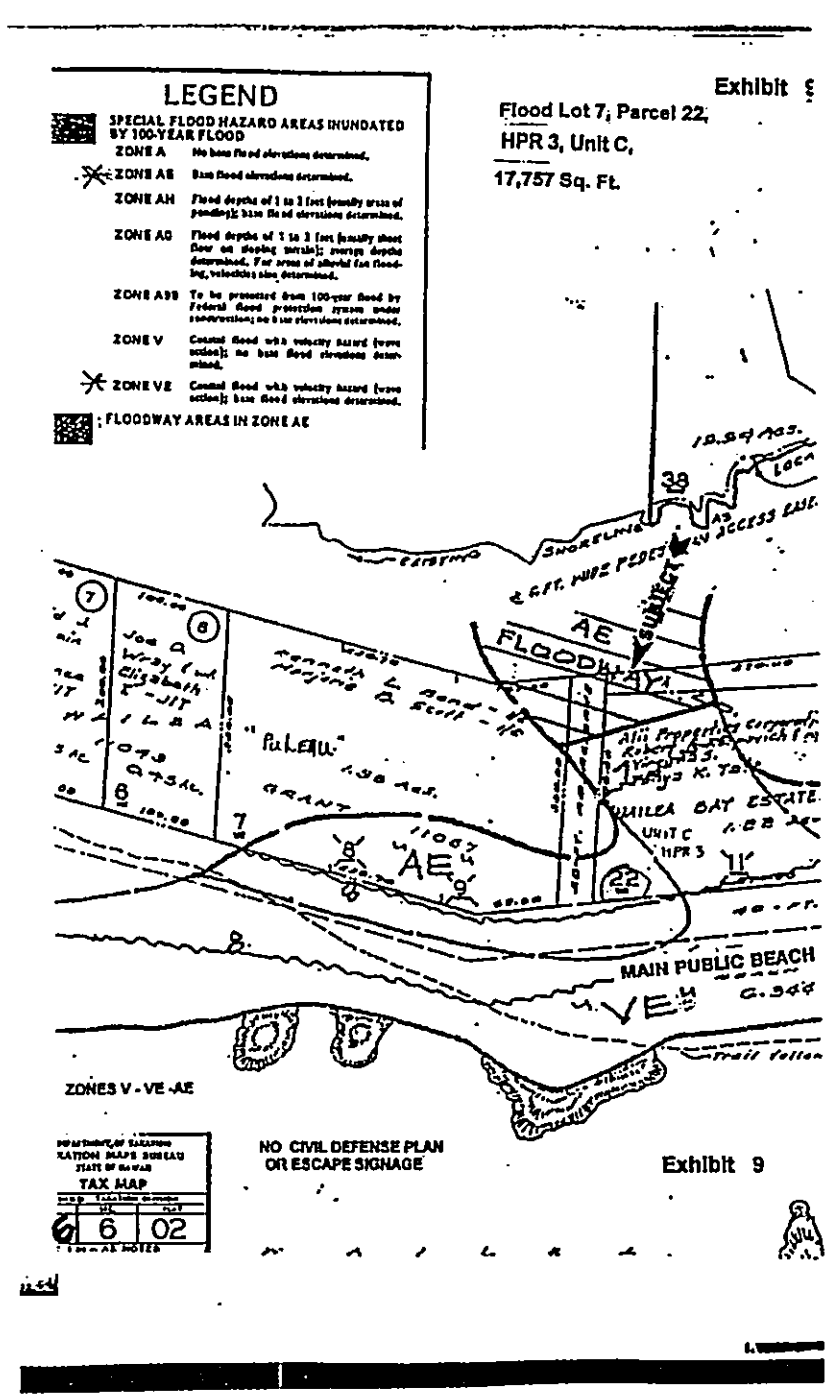
*** With both the State Government officials and the Waia'lea lot owners sitting together on the same side of the judiciary facing the public on the opposite side, wrongfully used "eminent domain" to meet their special interests rather than public interests. An investigation will support the allegation of misuse of public service.**

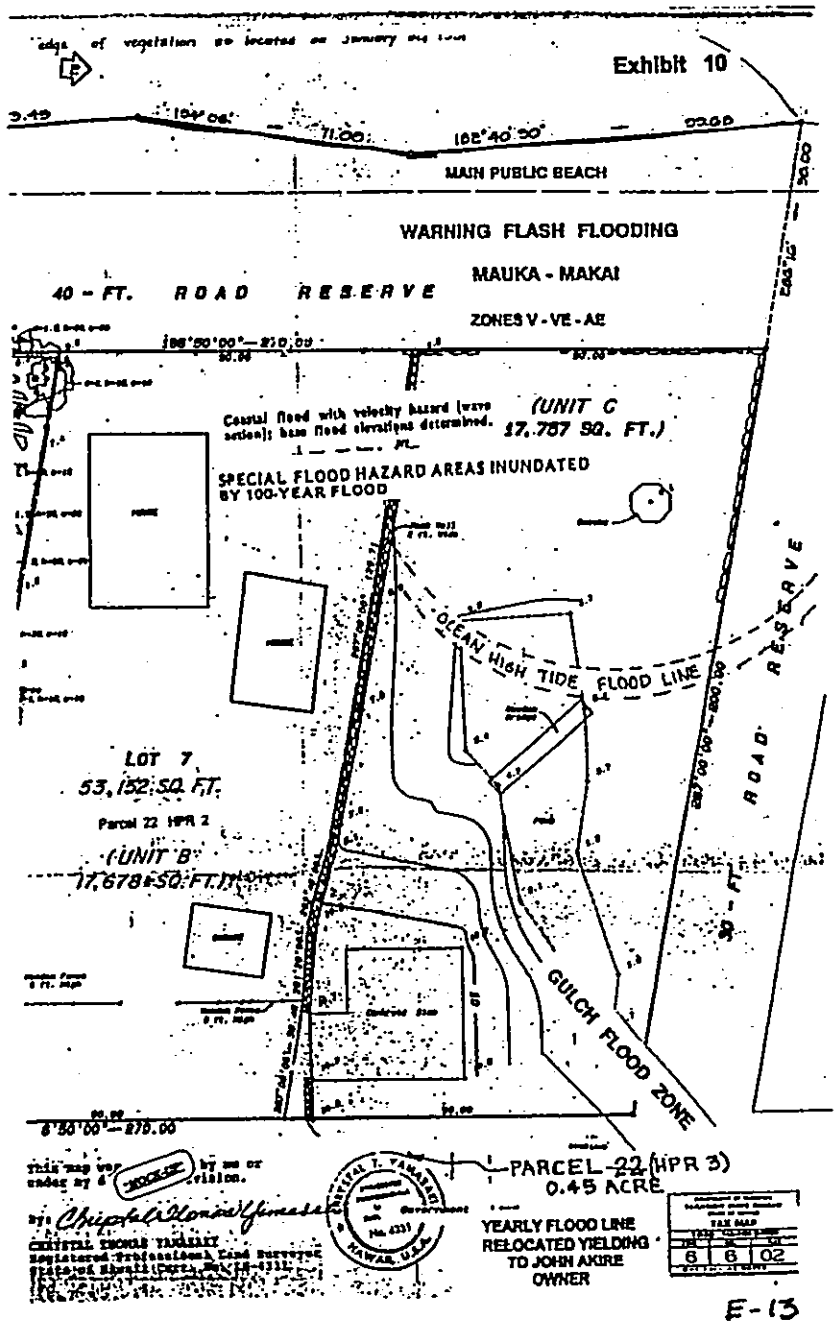
DOCUMENT CAPTURED AS RECEIVED





DOCUMENT CAPTURED AS RECEIVED



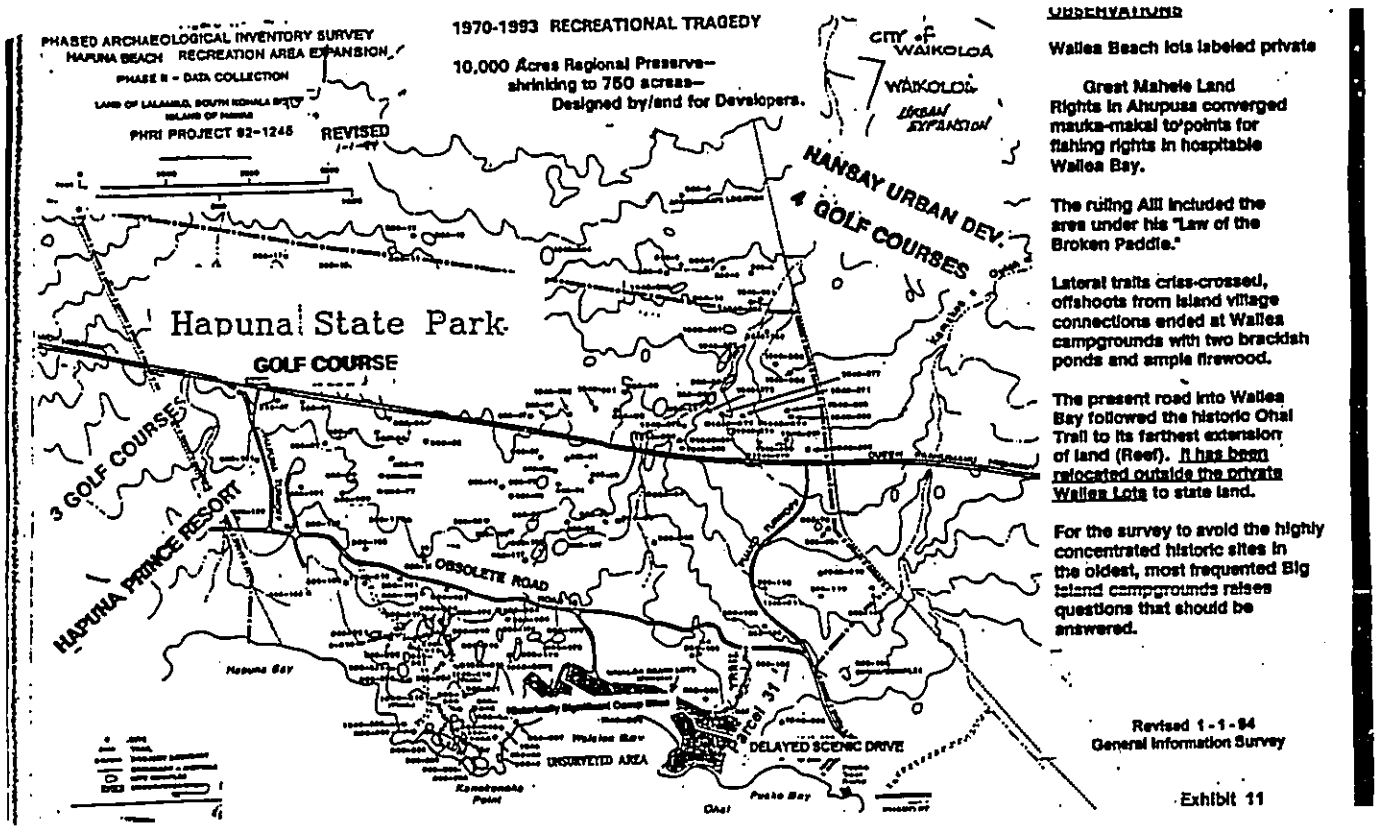


DOCUMENT CAPTURED AS RECEIVED

PHASED ARCHAEOLOGICAL INVENTORY SURVEY
HAPUNA BEACH RECREATION AREA EXPANSION
PHASE II - DATA COLLECTION
LAND OF LALAMILO, SOUTH KOHALA DIST.
ISLAND OF HAWAII
PHRI PROJECT 92-1245 REVISED

1970-1993 RECREATIONAL TRAGEDY

10,000 Acres Regional Preserve—
shrinking to 750 acres—
Designed by/and for Developers.



OBSERVATIONS

Wailea Beach lots labeled private

Great Mahele Land Rights in Ahupuaa converged mauka-makai to points for fishing rights in hospitable Wailea Bay.

The ruling Alii included the area under his "Law of the Broken Paddle."

Lateral trails criss-crossed, offshoots from island village connections ended at Wailea campgrounds with two brackish ponds and ample firewood.

The present road into Wailea Bay followed the historic Ohai Trail to its farthest extension of land (Reef). It has been relocated outside the private Wailea Lots to state land.

For the survey to avoid the highly concentrated historic sites in the oldest, most frequented Big Island campgrounds raises questions that should be answered.

Revised 1-1-94
General Information Survey

Exhibit 11

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

GILBERT S. COLOMA-AGARAN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

JAMES T. KARELO
DEPUTY DIRECTOR

LAWRENCE T. MIKASOLA
DEPUTY DIRECTOR FOR
THE COMMISSION ON WATER
RESOURCE MANAGEMENT

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

JUN -8 2001

Mr. Benjamin B. Moore
Benjamin Moore Foundation
P.O. Box 986
Kamuela, Hawaii 96743

Dear Mr. Moore:

Final Environmental Impact Statement for the
Proposed Hapuna Beach State Recreation Area Expansion

The Division of State Parks has completed its revisions to the Final Environmental Impact Statement (EIS) for the proposed Hapuna Beach State Recreation Area Expansion, and anticipates publication of this document in June 2001. In preparing for publication, the Department staff and the consultant reviewed all comment letters with the Office of Environmental Quality Control (OEQC) and found that in addition to your letter of August 26, 1996, OEQC had received additional attachments that staff and the consultant had not received. We are, therefore, responding to your park-related comments expressed in the attachments to your letter.

Land Acquisition for Park Purposes

The Division of State Parks purchased the two parcels at the northern end of Wailea Bay - the Scott-Bond parcel and the Wray parcel - because these adjacent parcels, together, provide the widest beach frontage for public access and use. It should be noted that the Scott-Bond parcel was purchased for $ 1,425,000, and the Wray parcel for $ 950,000. The total cost to the State was $ 2,400,000.

You have suggested that the park be expanded to include Puako Point. Extension of the park to Puako Point would require additional studies of resources and values to be protected, and if appropriate for acquisition, additional funding.

Public Access

The public access will be provided in a number of ways, however the park plan does not include the scenic shoreline drive you have suggested. Instead, the plan calls for a system of internal park roads, unimproved roads, and trails, such as those shown on the attached Master Plan drawing. For example, fishermen, and hikers, will be able to drive out onto Kanekanaka Point on unimproved park roads (shown in orange on the attached plan drawing) and park at designated areas. Park users will then able to fish from the shore, or hike on coastal trails (highlighted in blue on the attached plan drawing).

Public access to Wailea Beach will be located within parcel 31, as you have suggested, and cross over the former Scott-Bond and Wray parcels. The attached plan drawing shows the location of the Wailea Beach access, highlighted in green.

Shoreline Amenities and Public Safety

You indicated that Hapuna preservation should focus on shoreline amenities and safety. The Division of State Parks will construct a comfort station at the former Scott-Bond property to provide basic park amenities. In addition, the emergency road access gate will be replaced and beach users will park along the mauka side of the former Scott-Bond parcel and walk through the parcel to access the beach. Beach users will now have toilets, running water, an emergency telephone, and parking with a designated Americans with Disabilities (ADA) parking space at Wailea Beach.

Family and Group Camping

You note that camping provides an essential childhood experience. The park plan designates areas for family campgrounds with comfort stations and for group camping facilities. Family and group campgrounds will be connected to Wailea Beach and Bay by roads and trails, and families and organized groups will be able to enjoy the walk to the beach, and fully explore Wailea Beach and Bay.

Interpretive and Marine Education Programs

You have also noted that exploring and learning from nature is an essential childhood experience and that Wailea Beach and Bay can offer such experiences. The Division of State Parks is considering offering interpretive and marine education programs at Wailea Beach and Bay and at other State Park sites along the Kona-Kohala coast, such as Mahai'ula at Kekaha Kai State Park, and perhaps at Kiholo Bay in the future. Wailea Beach seems particularly well suited to marine education because Wailea Bay has been designated as a Marine Life Conservation District, and public access is relatively easy.

Beach 68 vs. Beach 69

It is our understanding that the source of the term "Beach 68" is the telephone pole located along the Kawaihae-Puako Road. We realize that the term "Beach 69" is also in use, and that the public recognizes this term as well. Our explanation in the text was for the purpose of accurately and fully disclosing information about this beach.

EIS 45-Day Review Periods

You indicated that the Draft EIS 45-day review period was not an adequate time period for reviewing this document. The Hapuna Draft EIS was a substantial document that may have taken more than several weeks to review, however, the 45-day EIS review period is set out in Chapter 343, Hawaii Revised Statutes, and in the Department of Health Administrative Rule Title 11, Chapter 200, and both the reviewer and the proposing agency must comply with the statute and rule.

DOCUMENT CAPTURED AS RECEIVED

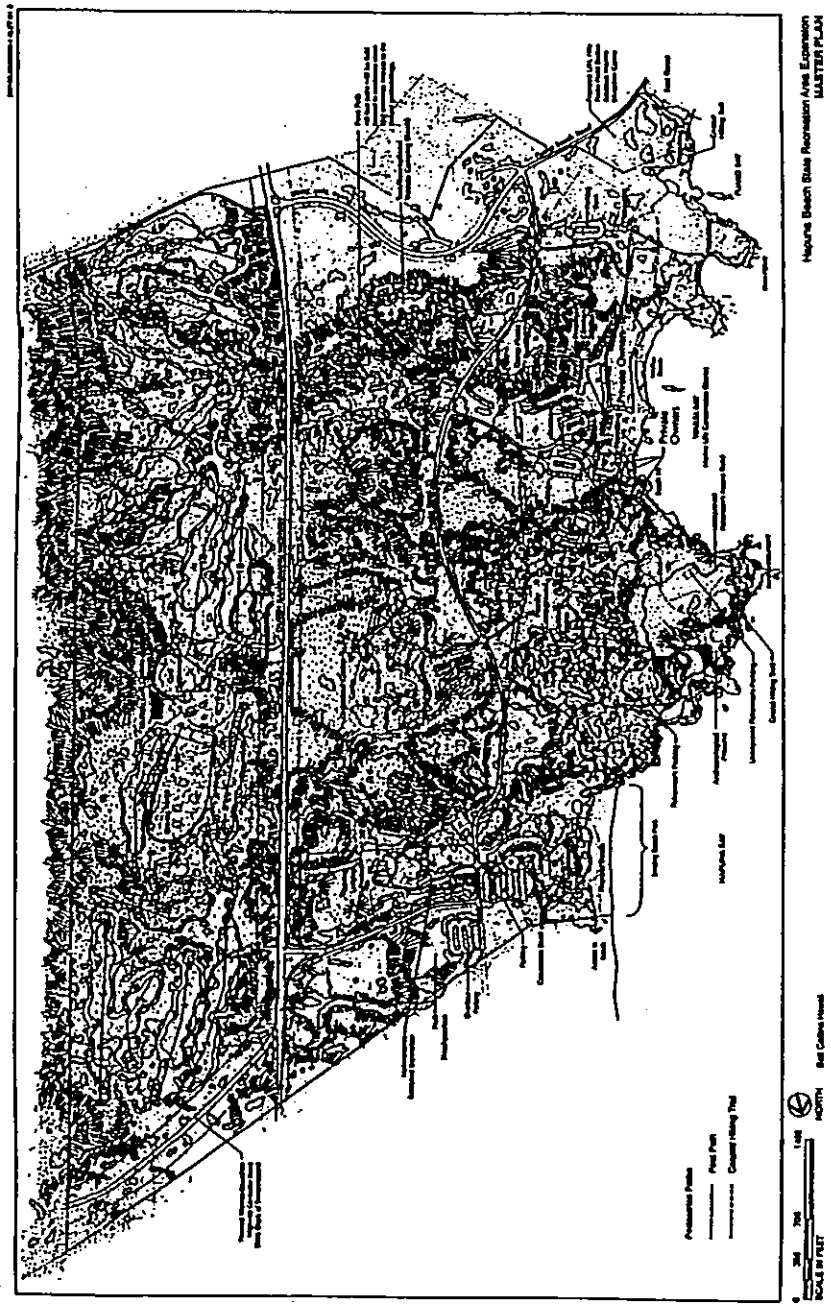
Over the years, you have been a kind and generous ambassador of good will at Wailea and have often assisted State Parks as a volunteer in maintaining this area. You have taught us the benefits of your philosophy of "mothering" mother nature at Wailea Beach. We sincerely appreciate all that you have done to make Wailea Beach a comfortable family beach to be enjoyed by all who visit the area. We hope to continue your good work. We will keep you informed of our progress at Wailea. Again, many thanks for your comments and for your volunteer work.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

Attachment: Master Plan Drawing



Ana Nawahine-Kahoopii
PO Box 1395
Kapaau, Hawaii 96755
Phone / Fax (808) 884-5031

August 13, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii
220 King Street 4th floor
Honolulu, Hawaii 96813

Subject: EIS / Hapuna Beach State Recreation Area Expansion
South Kohala Hawaii Island

Mr. Gary Gill:

I have several concerns and questions re: the this project;

1) Two hundred and fifty nine archeological sites have been noted. The survey was done by the infamous Paul Rosendahl an alleged archeologist. His "work" is well known among the Kanaka Maoli Community. We have "worked" with him in North Kohala and it took our Kapuna and several other knowlegable Native People months to REDO his survey. Mr. Rosendahl missed an entire village complex spanning acres of lands designated for development. He also missed a magnificent navigational Heiau, the only one known to exist at this time. It is still functional and is used by the Polynesian Voyaging Society and other groups of navigators. His sacrilegious treatment of the graves of our ancestors in Maui is another outrage we had to tolerate as a people. He is paid millions of dollars to desecrate the culture of the indigenous Peoples of these islands. If not for our Kapuna these sites would be lost to us. Mr. Rosendahls miserable track record is testimony to his total incompetence. How do you regulate these alleged professionals? The State dept. of Historical Preservation has no mechanisms in place to monitor the conduct / integrity of these "archeologists"? In essence the State of Hawaii has allowed Paul Rosendahl and others like him to run roughshod over the Hawaiian People. He is not even required to have a license to do it! Why didn't the State of Hawaii consult with the Hawaiian People re: the choice of a suitable archeologist to conduct this survey? SHAME ON YOU FOR HIRING HIM!!!.
Is a plan in place for local Kapuna and other residents to "survey" Mr. Rosendahls work?
The EIS states that only two of the sites are to be preserved. That is outrageous!!
Since the State of Hawaii refuses to monitor the work of Mr. Rosendahl, then it is the burden of the community to police him.
A community board of Kapuna / cultural experts needs to be convened immediately to review / correct Mr. Rosendahls "work". They also need to receive compensation, since essentially they are doing the work that the Sate of Hawaii is responsible for.

2) The planned golf course is scheduled to be put on ceded lands. How do you justify this? Have you consulted with the Office of Hawaiian Affairs? Why not? How do you propose to protect the traditional and customary rights of the Kanaka Maoli Peoples on these and other lands within this projects boundaries? Why has this issue been omitted from this study?

3) The EIS mentions the development of water wells, with no mention of the water rights of the Kanaka Maoli People. How do you plan to address this issue?

4) How on earth does the State intend to pay for this? The cost has escalated from the original $15 million to $25.2 million. This estimate is not accurate since it will cost the State this estimated $25.2 million just to condemn the Wailea properties. How can the State justify spending this amount of money when we have so many other more urgent needs, such as upgrading our classrooms, cleaning up our environment, cleaning up corruption in public office, taking care of our poor and needy etc. etc. etc. I for one resent the implementation of such poorly conceived projects in this current economic crisis.

5) If this plan is allowed to develop as outlined in this EIS you will be violating the rights of the Kanaka Maoli Peoples, rights that are protected by the Hawaii State Constitution, as well as statutory, case and international law. How do you account for the omission of these rights in this EIS? How do you propose to remedy this issue?

In closing I would like to point out that it is common knowledge that the overthrow of the Hawaiian Nation in 1893 was illegal, this has been recognized by your own government in the Apology Bill (Public Law 103-150). All the "laws and acts" that came after that have been implemented by your government and violated by your government, to this day. As public officials you are personally responsible to MAINTAIN THE INTEGRITY OF THE LAWS YOU CREATE AND WORK WITHIN. As a Kanaka Maoli woman I resent the CONTINUAL abuse of our rights, I am tired of policing public officials who are in office to uphold the law, and never do when it concerns the protection of the rights of the Kanaka Maoli People. And to add insult to injury I have to pay for these abuses in tax dollars !!!

I advise that you stop any further action on this project, don't waste any more of our precious natural resources or hard earned money.

Malama Pono,

Ana Nawahine-Kahoopii

CC: Paul Rosendahl
Div. of State Parks
Belt Collins Hawaii Ltd.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Ana Nawahine-Kahoopii
P.O. Box 1395
Kapaau, Hawaii 96755

Dear Ms. Nawahine-Kahoopii:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 13, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

The archaeological survey for the project area is included in the DEIS which has been distributed to the public including the Office of Hawaiian Affairs, Kona Hawaiian Civic Club, National Association of Hawaiian Civic Clubs, National Land Committee (Ka Lahui Hawaii), Waimea Hawaiian Civic Club, Na Ala Hele Hawaii Island Advisory Council, Life of the Land (Big Island Chapter), Sierra Club (Moku Loa Group), and local libraries. The State Historic Preservation Division (SHPD) is currently reviewing the archaeological study and will make comments or recommendations, if any, on mitigation measures, monitoring work during construction, as well as preservation or interpretive development. If you have concerns on the study, you may contact SHPD and review your thoughts with that agency which has the responsibility of approving the study.

The Office of Hawaiian Affairs is aware of the park expansion plan. In August of this year, a representative of that office attended a public informational meeting on the project. The ceded lands question was not specifically discussed at the public gathering but is addressed in Section 3.11.2 of the DEIS.

In Section 3.11.2 of the DEIS, we indicated the State will respect water rights of those who have resided prior to and during the development of the park and who have developed a water collection infrastructure on the property. Additionally, all access rights will be maintained. The proposed park does not intend to disturb or remove existing accesses through the area.

The Hapuna Beach State Recreation Area Expansion project is a long-range plan for the development of Hapuna-Wailea. Its financing will be spread over a number of years in order to make the cost more manageable. Acquisition of the private lots at Wailea will be substantial; however, efforts will be definitely made to minimize this expense during the project implementation stage. Some ideas that have been developed by the State or have come from the community include the acquisition of properties in increments, similar to the planned financing methodology for the park, and the arrangement of a lease-back plan that would allow the State to recover some of the purchase cost while the properties await development.

The proposed project will be one of a number of State programs that would be implemented depending on the priorities of our State Legislature and government officials. The programs mentioned by you may be on the high priority list and implemented prior to our proposed park improvements.

With regard to your reference to the rights of the Kanaka Maoli Peoples, if you are referring again to ceded lands, water rights, and access, they are addressed above and in the DEIS.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Ticia O'Kieffe P.O.Box 1569 Akala Kuahiwi Rd. Kamuela, HI 96743
Ph: 808-885-7489 Fax: 808-885-4986

RECEIVED
'96 AUG 29 P2:08
OFC. OF ENVIRONMENTAL QUALITY CONTROL

August 21, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813
Contact: Mr. Gary Gill

RE: Hapuna Beach Park Expansion Plan

To Whom It May Concern:

Thank you for the opportunity to address the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion, June 1996.

I am greatly concerned about the proposed $39,886,195 in capital costs. This amount, according to the EIS draft is based on 1993 dollars, including an inflation rate of 3.5% per annum. This proposal, without any improvement yet having taken place, already reflects a 60% increase over the $25,000,000 that was the projected cost in 1993.

I question the State's choice to provide funding of an estimated $16,595,750 to build an additional golf course at a time when fiscal cutbacks have made the private sector feel it necessary to supplement State funds for our children's basic classroom needs through the Support Our Schools program, known as SOS.

Recently the State told us that they would have to pull back from their financial commitment to the state insurance program, Quest, which was started in 1990 and was supposed to make insurance available to everyone. In July Governor Cayetano, in referring to the Quest program, is quoted as saying "That's a lot of money. You could dream a lot of dreams, but the reality is we cannot do everything we wanted to do,". In light of the Governor's remarks and the insurance dilemma facing residents of Hawaii it would seem that the choice to budget more than $39 million,, as suggested by the EIS draft, is unrealistic. In addition to $39 million the EIS Draft suggests that approximately $35 million more will be necessary for operations and maintenance which would increase the projected cost to $76,757,357 by the year 2015.

It would appear that even that projected cost is inaccurate as the EIS Draft estimate does not appear to include any costs for purchase of the 18 privately owned lots at Wailea though they are shown as part of the Expansion Plan. For the State to make it's intent to purchase these properties public in the EIS Draft without disclosing a cost is capricious and further misrepresents the true financial burden that this plan would be to the taxpayers.

It is distressing to those of us who love Hapuna and Wailea to know that our beaches are being uncared for today due to lack of financial commitment by the State. The State has consistently refused written offers by the Wailea Property Association to install, at their own expense, sanitation and parking facilities at Wailea. At present beach-goers are finding both their health and safety increasingly more at risk due to lack of basic improvements. If the State is unable to maintain and keep Wailea clean and safe today how will they manage to do so in the future?

The latest Draft shows that maintenance costs are expected to run between $1.5 and $5 million annually. If the State does fund such an expenditure will it be at the cost of our education system. Will Waimea never have a High School because the State decided it was more important to have another golf course instead? Will we risk getting hepatitis from swimming in unsanitary waters while finding ourselves uninsured because the State is spending more on Parks than they are on our insurance crisis?

Let's be realistic about our choices; which is more important, health care and education or another golf course and a dramatically expanded Beach Park? When will the State honor the commitments it has already made to the people and children of Hawaii instead of spending our tax dollars on studies for unrealistic dreams for which there is no funding in sight. As the Governor says; "You can dream a lot of dreams but the reality is you can't do everything."

Sincerely,

Patricia S. O'Kieffe

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Patricia S. O'Kieffe
P.O. Box 1569
Kamuela, Hawaii 96743

Dear Ms. O'Kieffe:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 21, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

We believe the State's tight financial situation will soon be over and the State will again begin addressing its commitments. In the near future, we hope to move forward with the planned park expansion to meet the continuing demand for additional park space. West Hawaii, as you may know, is one of the fastest growing regions in the state, and the proposed improvements will help meet the residents' demand for more recreational opportunities.

Development of the park expansion is part of a medium-range plan that would be implemented over a 12 to 13 year period. The project's estimated construction cost would be spread over this period which should make the project expenses a little more manageable. Additionally, there is a possibility that the golf course portion of the project would be co-sponsored with a private interest which could reduce the cost of development by more than 50 percent.

We acknowledge the large expense that will be required to acquire the private lots at Wailea and are prepared to implement this process on an as-needed basis. Establishing a value on these lots now would be meaningless considering acquisition is not scheduled for several years and that property values have the potential to vary significantly over this period.

Efforts will be definitely made to minimize the acquisition cost during the project implementation stage. Some ideas that have come from our consultants as well as from the community include the acquisition of properties in increments to spread the purchase cost over time (as well as to hold the cost down during inflationary periods) and the arrangement of a lease-back plan that would allow the State to recover some of the purchase cost while the properties await development.

Wailea Beach is not considered an official state park. It is state-owned land which we maintain as the property owner. Thus, the provision of parking and sanitation facilities is not a prerequisite of a non-park state property. Once Wailea is included in the Hapuna Beach State Recreation Area, it becomes an official state park and will contain the necessary facilities to accommodate park users.

The master plan for the Hapuna Beach State Recreation Area expansion will serve as a medium-range development guide for the area. Implementation will be dependent on a number of factors including existing government policies, public programs, current State priorities and State legislative appropriations.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Kelly Pomeroy (Ms.)
59-148 Olomana Rd.
Kamuela HI 96743
96 SEP -3 AM 8:5
August 28, 1996

Andy Monden
DLNR, Land Division
1151 Punchbowl St., Room 227
Honolulu HI 96813

Re: DEIS for the Hapuna Beach State Recreation Area Expansion

Dear Mr. Monden,

The greatest shortcoming of this DEIS is its failure to consider any recreational option other than golf for the mauka project area. This is puzzling because:

1. Both the responses to the EISPN and public input at the August 22nd hearing I attended in Waimea show considerable concern by a wide variety of citizens over inclusion of the golf course, and very little public support for it. Why has this public sentiment been ignored?

2. Though separated by the highway, the mauka project area is close enough to the shore that it should be oriented toward beach and ocean activities. There are many, many places that a golf course can be located, but beaches of the quality of Hapuna are almost nonexistent on this island, and any development associated with such a scarce and valuable resource should be designed to maximize enjoyment of its unique features. Golfers wishing to play by the ocean can make use of the many superior opportunities--including affordable ones--at existing facilities at the resorts. It is *not* the State's responsibility to provide low-cost near-shore golf at all tee times and all seasons of the year.

3. In fact, it doesn't appear that the State needs to get involved in golf development at all. There is no existing need for additional affordable golf in this area, and the proposed course would only hurt the private facilities that are offering affordable play at the present time. The course at Waikoloa Village--which is situated within the nearest population center of any size, and very accessible to the second nearest--offers greens fee plus cart for $35. In fact, kama'ainas can buy 10-play booklets that bring the price down to $25, or they can play for that price anytime after 1 pm. This is a desirable professional course with very reasonable fees year-round, yet it has capacity that is going begging. Why does the DEIS not address the economic impacts a public course would have on the Waikoloa Village course and the Waimea Country Club, if not the more expensive courses serving area residents? How can the glowing financial analysis of golf course benefits not point out that much of the income generated by the public facility would be diverted from other nearby courses--or other uses--and therefore not represent additional cash flow into the local economy, as implied? What is the justification for State resources being used to compete with private enterprises that are already doing a good job of meeting the need?

4. There is no reason to assume a shortage of affordable golf in the future, either. There are many other existing and proposed golf facilities in the region. The County can require whatever supply of desirable and affordable play may be needed to meet future demand. This is not arbitrary. It is resort development that largely fuels population growth here, and in recognition of this fact, developers are subject to a variety of impact fees and other requirements to meet public needs. In fact, the County is forbidden by its zoning code from granting any rezoning unless there is a compelling public interest in doing so. A number of other governmental documents reiterate this theme that private development must serve the public interest. And affordable golf is not an unmitigated burden to resort owners. It represents an additional source of income and helps them to use their facilities most efficiently. In some cases, usage of a golf course is less important a consideration in its existence than its role in enhancing surrounding property values.

5. If the Waikoloa Village course, which requires no water development or other capital investment to become functional, and doesn't have to pay 20% to OHA, is hurting already, how can we have any confidence that the proposed new course would be financially viable? Why was the payment to OHA left out of the financial analysis?

6. The discussion of water resources doesn't mention the total capacity of the aquifer or the other demands upon it. One of the assertions made at the public meeting I attended was that the entire capacity of the aquifer is already spoken for. If this is the case, then withdrawal of an additional 650,000 gpd probably cannot be accomplished with impunity, even if only brackish water is taken. I gather, also, that the estimate of water usage for the golf course is based on theoretical considerations that have never been tested in Hawaii. If something has been overlooked in the calculations, the water need--based on what all the other courses in the area consume--could be almost half a million gallons greater than indicated.

7. What there *is* a shortage of is affordable group camping facilities and other overnight accommodations. I would recommend using the mauka project area for this purpose. A characteristic of group facilities that has been overlooked in the DEIS is noise. Church and cultural groups will account for a significant portion of the demand for such facilities, and music, singing and dancing are very likely to be a central part of their activities. Other groups will include noise-generating recreational activities as well. This represents a very real potential for disturbing other park users. Moving the organizational campground above the highway would help solve this problem. It would also allow two or three such facilities, which I believe there is a great need for. This would have far more effect in drawing people to the Big Island from elsewhere in the State--and from out of state--than one more golf course, no matter what the rates. And it would leave more room below the highway to space out the campsites or to put in more campsites or cabins in the future, if that seems warranted.

It would be desirable to have a pedestrian connection between the two sections of the park. Perhaps bicycles and electric carts could also be accommodated, to give easier shoreline access to mauka campers. What would it cost to excavate under the highway, keeping in mind that costs could be minimized by also using the resulting tunnels for the new electrical conduits that are planned to go under the highway? Would it be feasible to adapt any of the drainage culverts for this purpose?

Conclusion: Because there is so little sound rationale for the golf course portion of this proposal, and so much public concern over it, one wonders if its inclusion might point to a hidden agenda. Is someone figuring on eventually putting condos on State land mauka of the golf course, with some more or less affordable housing somewhere else to make it sound like a public benefit? Or are the owners of the properties to the north and south agitating for this because it would enhance their property values? Even if there is no such motive, isn't it possible that if the golf course is not able to make a go of it financially, the State would decide to allow condos to be built around it as a way of bailing it out?

If the answers to these questions are "no", would the State be willing to make a binding commitment that if there *is* a golf course, the nearby mauka lands will not be made available for housing? Or if the land is made available for housing, all units on and near the golf course must be truly and permanently affordable?

• • •

I would briefly like to comment on several other aspects of the DEIS. First, I believe that the plan should definitely include acquisition of the private properties around Wailea Bay, but that does not have to happen in the near future. A compromise I suggested at the meeting in Waimea was to allow owners to sell to the State but retain a lifetime interest. They would get to live there for the rest of their lives, which would make the whole thing more palatable to many of them, and it would cost the State less than buying the land outright. It would also allow owners to improve their properties as much as they want without increasing the price the State would have to pay. Otherwise, the State should prohibit owners from adding significantly to the value of their property unless there are extenuating circumstances. Another possibility would be to give the State right of first refusal whenever a property is about to change ownership.

Secondly, I wish the DEIS said more about the State's long-range park development plans and how this element fits into them. There is need for a linear park that links up all the public beaches and provides for shoreline users to spread out and thus diffuse impacts.

The State Legislature has passed resolutions to protect the leeward North Kohala coastline from development makai of the highway, for instance. In furtherance of that aim, acquisition of certain parcels should be undertaken. I'm sure the same is true to the south. I would much rather see moneys put into permanently protecting coastal lands outside of the resort nodes than in spiffying up facilities on lands already owned by the

State. The time to acquire undeveloped lands is now, while they are still available. Later, when there are no further good prospects for acquisition, all of the monies can be put into appropriately developing and refurbishing what we already have. Twenty years ago, there were only a few shacks at Wailea Bay. The private land could have been acquired then relatively cheaply, if only we had been sufficiently foresighted.

If we spend a lot of money on developing existing public lands, instead of acquiring new lands, we will simply be stimulating usage, and thus increasing demand, with nowhere to expand in the future. The DEIS should consider the option of deferring park expansion within State lands and diverting funds instead to increasing the inventory of developable park lands to meet future needs on a much longer-term basis.

• • •

Regardless of what happens with this proposal right now, park planners should begin discussions with DOT for realignment of the planned (and misnamed) "Waimea-Kawaihae Connector Road" to come down the south side of the State land above the highway, rather than the north side. It doesn't make sense to run all the southbound traffic through the park area. People going to the park from Waimea will be adequately served with such a realignment; and those going to points north of that can use the existing road. All others will be better served if they can avoid adding to congestion at park intersections, and park users will have a better experience if through traffic is minimized.

It is proposed to string a new overhead electric line halfway across the project area. Although this would be an extension of an existing line along the highway, its visual impacts are of more concern in a park. Was an analysis done comparing the costs of undergrounding vs. putting in new poles? If so, how were aesthetic values weighted? Please include a cost comparison in the EIS.

No mention is made of fire hydrants. What is the plan for this important bit of infrastructure?

There is no reason why the baseyard should be near the ocean or the park users. It should be hidden in the mauka section, and the makai section should be kept as open, accessible and aesthetically pleasing as possible.

The conference room should have an outside door, so it can be used for interpretive programs for the public, and possibly for organizational use. (How can I arrange to be consulted about other design considerations I have in mind when the appropriate time comes?)

According to Section 2.4.2.4, fees from cabin rentals and concessions would go to the park's interpretive program. Is there some legal requirement for this? I support interpretive programs (in fact, I suggest we add astronomy), but this seems rather inflexible. With two superintendents and three managers, plus the possibility of volunteer

help with interpretation, how much more is needed for this function? If any of those funds can be made available for acquisition of future park lands, that should have a high priority, even if the amounts seem modest compared to the need. This is so important, that I implore those responsible for making the rules and the allocations to rise above politics, kuleana, "turf", and encourage all to work toward this end.

Thank you for extending the deadline for comments. I was unaware of the DEIS in time to respond by the original date.

Sincerely,

Kelly Pomeroy

Kelly Pomeroy

cc: OEQC
Glen Koyama, Belt Collins

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Kelly Pomeroy
59-148 Olomana Road
Kamuela, Hawaii 96743

Dear Ms. Pomeroy:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 28, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

1) We do not want to draw any definitive conclusion from the community meeting that there is no support for a golf course at Hapuna. Only a few people spoke against the golf course proposal. Also, the meeting attendees represent a small number and limited segment of area residents who obviously do not comprise a consensus of the community. Studies in our DEIS show there is a need for a public golf course in West Hawaii where none currently exists.

2) We do not agree the area above the highway provides a similar experience as the area makai of the highway or that there will still be a sense of connection between the mauka land and beach land. The highway is a strong barrier especially when there is no direct access between the two areas. For this reason, the proposed golf course could make use of this isolated section of the park, and the remaining area below the highway could be developed for uses which are directly associated with the beach and shoreline.

3) Appendix B of the DEIS presents data that an affordable public golf course in Kohala has a potential market for some 400 golfers per day on the weekdays and 300 golfers on the weekends. The proposed public course is expected to have green fees comparable to the municipal course in Hilo. This rate has more appeal than the kamaaina rates offered at private courses and should bring out some of the pent up demand for affordable golf in the region.

4) We anticipate the new public golf course will have little impact on existing resort golf courses. The resort courses are unique and have their own characteristics and appeal. Public golf courses are popular with certain sectors of the community that do not mind playing a particular course over and over again. This sector of the community is generally comprised of retirees, and limited-income residents as well as junior golfers.

The State cannot depend on future golf course plans by private developers. There are too many uncertainties which could affect implementation. The State would have to take a pro-active role to assure the needs of the community are met in a timely manner.

5) Our financial analysis (Appendix A of the DEIS) discusses the conditions which would make the proposed public golf course viable. The use of a private developer in partnership with the State and the establishment of a reasonable green fee schedule would be major factors in the project's feasibility. Also, revenues from ceded land were not included in the financial analysis because the issue of ceded land payments is being reviewed by our government. In any event, payment of ceded land revenues will abide by State policies as established by the State administration and legislature.

6) The assertion you are referencing may be the wells that are currently operating. The supply from these wells is already spoken for, but the aquifer in the Kohala region is enormous and has a sustainable yield of over 54 MGD. It is more than adequate to serve the region's current and future demands. Notably, it is the development of this source that is presently limiting the supply. The proposed park expansion includes the development of a new well in a proven well field at the 1,200-foot elevation of the Lalamilo land tract. The proposed golf course will use two new on-site wells to supplement an existing well to draw brackish water beneath the site as its source for irrigation.

7) Your suggestion for group camping above the highway is an interesting concept and would have merit as a solution to isolate from the rest of the park noise generated by this activity. We do not believe, however, that people engaged in this activity would enjoy the experience of a beach park if they were separated by a major highway and located more than 3,100 feet from the shoreline. It should be noted it is important to have direct and uninterfered access from the campsites to the beach especially when children (with chaperones) travel between these areas.

The golf course is designed to use the developable portion of the project site. The remaining areas are in gulches and ravines and are not desirable for homes. These lands have never been planned nor are they being considered for residential development. Moreover, the State does not feel there is a need to show its intent for in the area with a binding agreement. The State's intention is already reflected in the 1995 State Plan, State Recreation Functional Plan, and State land use law.

We appreciate hearing another perspective on how the private properties behind Wailea can be acquired. This would be included in the Final EIS as an alternative measure for implementation. As you may know, the 1990 State Recreation Functional Plan provides general guidelines for acquiring new park lands based on interviews with community leaders, agencies, and various resource persons. The functional plan specifically recommends Wailea, among others, as additional lands for acquisition.

Cost was probably a factor in the selection of the existing alignment for the Waimea-Kawaihae Connector Road. It is the shortest route on State property connecting Queen Kaahumanu Highway with the planned Waimea - Kawaihae Highway Realignment.

The new power line along Queen Kaahumanu Highway is a high voltage transmission cable that would cost approximately seven times more to place it underground than to install it overhead. The aesthetic value of the region would be enhanced with underground installation, but the project cost would be prohibitive.

On Figure 3-14 of the DEIS, a new water line is shown along the old Kawaihae-Puako Road. Fire hydrants will be installed along this line as well as on some feeder lines to the comfort stations in the camping and picnicking areas.

The proposed base yard, located in a remote section of the park grounds, will not interfere with any park use. It will be landscaped on the perimeter to provide a visual screen from park users. The location is suitable for providing easy and ready access to areas that require maintenance. This is particularly advantageous when park maintenance equipment, such as tractors and grass mowers, are used and would be better off not having to cross the high-speed Queen Kaahumanu Highway.

We acknowledge your comment on the conference door and if you wish to make further comments on the park headquarters design, you are welcome to provide further input during the project's permitting and design stages. Chapter 4 and Section 1.7 of the DEIS describes this stage of the project in detail.

Fee revenues generated from park users are specifically earmarked for interpretive programs under Chapter 184, HRS. These programs would benefit not only Hapuna but other state park facilities. The revenues collected from user fees cannot be used for land acquisition.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

RECEIVED
'96 SEP -4 P 1:55
[illegible] HAWAII

July 23, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813

Attention: Mr. Gary Gill

RE: Hapuna Beach Park
Expansion Plan

Dear Sir:

I am aware of your plan to expand the Hapuna Park to 'Beach 69'.

Please do not use my hard earned tax dollars to buy additional property we do not need. I can get to Wailea Bay just fine with no hastle.

All we need is a couple of luas, showers, picnic tables and barbeques and it will be the best place on the Big Island.

I bet there's a lot of folks who would live there at no charge just to pick-up and dump the opala.

Please re-think your $40 million dollar plan, and use that money for education, roads, and for places that really need it.

Aloha,

Maraya Rice

bc: Susan Rutka

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  BOUNDARIES BRANCH
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Morage Rice
Kamuela, Hawaii 96743

Dear Ms. Rice:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 23, 1996, to the Office of Environmental Quality Control (OEQC), regarding the proposed Hapuna Beach State Recreation Area Expansion project.

As you may know, West Hawaii is one of the fastest growing regions on the island, and as a result, there is an associated strong demand for recreational facilities. Hapuna and Wailea Beaches are particularly suitable for improvement because of their popularity, accessibility, location and existing infrastructure.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

Development of the park expansion is part of a medium-range plan which would be implemented over a 12 to13 year period. The project's estimated construction cost would be spread over this period which should make the expense a little more manageable. Additionally, the State is exploring the possibility of joint-sponsoring the development of the proposed golf course with a private interest which should decrease the public cost of the project.

We appreciate your comments on the proposed park expansion.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

RECEIVED

1996 SEP -4 P 1:43

FT. COLLINS, HAWAII

July 23, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813

Attention: Mr. Gary Gill

RE: Hapuna Beach Park
Expansion Plan

Dear Sir:

I am aware of your plan to expand the Hapuna Park to 'Beach 69'.

Please do not use my hard earned tax dollars to buy additional property we do not need. I can get to Wailea Bay just fine with no hastle.

All we need is a couple of luas, showers, picnic tables and barbeques and it will be the best place on the Big Island.

I bet there's a lot of folks who would live there at no charge just to pick-up and dump the opala.

Please re-think your $40 million dollar plan, and use that money for education, roads, and for places that really need it.

Aloha,

Zanya Schutte

bc: SUSAN RUTKA

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Zanya Schutte
Kamuela, Hawaii 96743

Dear Ms. Schutte:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 23, 1996, to the Office of Environmental Quality Control (OEQC), regarding the proposed Hapuna Beach State Recreation Area Expansion project.

As you may know, West Hawaii is one of the fastest growing regions on the island, and as a result, there is an associated strong demand for recreational facilities. Hapuna and Wailea Beaches are particularly suitable for improvement because of their popularity, accessibility, location and existing infrastructure.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

Development of the park expansion is part of a medium-range plan which would be implemented over a 12 to 13 year period. The project's estimated construction cost would be spread over this period which should make the expense a little more manageable. Additionally, the State is exploring the possibility of joint-sponsoring the development of the proposed golf course with a private interest which should decrease the public cost of the project.

We appreciate your comments on the proposed park expansion.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Mary Hugh Scott
P.O. Box A
Aspen, CO 81612

RECEIVED
'96 AUG 26 P1:52
OFC. OF ...
QUALITY CONTROL

August 20, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 South King St., Fourth Floor
Honolulu, Hawaii 96813
Contact: Mr. Gary Gill:

Re: Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion, Lalamilo, South Kohala, Hawaii, June 1996

Dear Sirs:

Thank you for giving me the opportunity to respond to the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion dated June, 1996.

As a landowner of Wailea Bay, I appreciate its unique beauty. I am concerned that development of the extensiveness discussed could irreversibly damage the environment of the area. I also, however, support development of limited public improvements such as public access, restroom facilities, and area maintenance.

Please consider the following regarding the proposed project's impact on Wailea Bay:

- Would not a single access to this low-impact walk-in park best serve the needs of visitors, law enforcement and lifeguarding.

- Density and capacity measurements need to be reassessed. These measurements greatly overstate the size and capacity of the beach.

- Enforcement and sanitation must be addressed. It is important that a full-time, live-in enforcement position be funded prior to development.

- I object to the portion of the plan that contemplates condemnation of our home and all privately owned parcels fronting Wailea Bay, and feel that it is not necessary or appropriate.

- Drainage and runoff issues need to be carefully and more fully addressed.

- I question the need for another golf course in the area and the accompanying destruction of the natural landscape.

Thank you for the opportunity to comment on the EIS draft. I look forward to the development of a plan which will protect and preserve the natural beauty of Wailea for years to come.

Sincerely,

Mary Hugh Scott

Mary Hugh Scott

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONSTRUCTION
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  BOUNDARIES BRANCH
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Mary Hugh Scott
P.O. Box A
Aspen, Colorado 81612

Dear Ms. Scott:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 20, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

A single primary access is being planned for Wailea Beach. This access will approach the beach from the northern central section of the bay and include a parking area and comfort station. A secondary access will be provided to approach the lengthy beach from the southern side of the bay. The distance between these accesses is approximately 875 feet. Notably, the secondary access will be needed more for access to the picnic grounds around Ohai Cove and Puako Bay.

Our descriptions of Hapuna and Wailea Beaches are provided in Section 3.2 of the DEIS and includes estimates of the beach dimensions in the summer as well as the high surf or winter months. The sources of these measurements are aerial photographs, U.S. Geological Survey Maps, and observations of Wailea Bay residents.

Our estimate of the capacity of the beach is taken from the projected largest beach size in an effort to estimate the potential full use of the area. This information would provide a useful tool for planning further improvements.

An increase in park staff and establishment of a headquarters building will be included with the park expansion. As identified in the DEIS, park managers, groundskeepers, lifeguards, and security personnel are recommended for the park. Specific as well as general staff assignments would be made to cover Wailea Bay.

West Hawaii is one of the fastest growing regions on the island, and as a result, there is an associated increasing demand for recreational facilities. Hapuna and Wailea Beaches are particularly suitable for improvement because of their popularity, accessibility, location and existing infrastructure.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

Regarding your concerns on drainage, in Section 3.5 of the Draft EIS, we have discussed in detail the characteristics of the site's surface runoff, anticipated project-generated impacts, and possible mitigation measures.

Existing golf courses in the area are resort-oriented and privately operated. Green fees are relatively high and public play is controlled by a priority system. The proposed golf course will be a public facility with lower green fees. As you may know, there are no public courses in West Hawaii.

The new golf course is expected to enhance the area's visual environment. The site is presently occupied by dry vegetation and deadwood (a potential source for brush fire). In the proposed plan, a large portion of the existing vegetation would be replaced by healthy lush landscape vegetation that will be regularly irrigated and maintained. Indigenous trees compatible with the surrounding environment will be used as much as possible. Additionally, all existing major drainageways and ravines will be respected and essentially kept intact. The new golf course should reduce the flow of surface runoff and consequently reduce potential downstream flooding. All view corridors to the ocean and mountains will be preserved.

We thank you for your comments and suggestions regarding the DEIS.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Dr. Allan Treadwell
3157 Serra Way
Sacramento, CA 95816

Mr. Gary Gill
Office of Environmental Quality Control
State of Hawaii
220 S. King Street, 4th floor
Honolulu, Hawaii 96813

August 1, 1996

Dear Mr. Gill:

As a third generation property owner at Wailea Bay, I appreciate the chance to review and respond to the Draft Environmental Impact Statement report for the proposed Hapuna Beach park expansion.

Given the fact that I have a full time job it was virtually impossible to digest in detail such an overwhelming sheaf of paper; however, several key points seem to be reiterated time and again and seem to be concerns shared by all interested parties:

1) COST

Cost is, of course, of paramount importance. It seems that the projected cost of the proposal in its most full-blown incarnation has risen from an original estimate of approximately $15 million to a most recent estimate of over $44 million. If we were to continue to extrapolate these figures, throw in a few extra percentage points for inflation, and then add the cost of acquiring private property the final sum could more realistically approach twice the given amount, a staggering amount of public funds in any budget. Remember, too, the ongoing cost of maintaining such a park, including extra law enforcement officers, caretakers, and basic maintenance costs such as water and trash removal, and the cost goes even higher.

As a taxpayer in the State of Hawaii I am both shocked and dismayed that such an inordinate percentage of public funding would be squandered needlessly, leaving schools, public health and safety, and other community issues to go begging. It is especially irksome to realize that such costs are even being contemplated when the existing park, " without a sizable expenditure of public funds . . . has considerable land capacity to meet anticipated demand to at least the year 2010." (EIS, p.2-30)

It would seem at best irresponsible and at worst knowingly negligent for elected public servants to ignore the more urgent, and, frankly, more essential needs of the community in such a huge expenditure of tax dollars.

2) WAILEA BAY

Wailea Bay can be recognized by anyone who visits as an extremely fragile locale. It does not take an Environmental Impact Study to realize that opening the beach to an inordinate number of visitors would be unwise and would destroy the very nature of the environment it was undertaken to protect. In the rush to develop a park it would be tragic if such a pristine and delicately beautiful beach were to become unclean and unsafe from overuse.

The beach has essentially been a walk-in park for decades and has managed to survive fairly well, despite three devastating fires, two sparked by careless campers (a risk that certainly needs to be considered when evaluating increased use). This is, in fact, the most demonstrative environmental impact study one could imagine -- decades of walk-in use -- and has illustrated amply the immediate needs for such a contemplated park, specifically: improved sanitation, caretaking, and law enforcement, all of which can be acheived without tremendous expenditure or acquistion of private lots. Clearly a low-impact walk-in park would be the most logical, low-cost, environmentally protective and acceptable option for all involved.

3) GOLF COURSE

Does anyone believe we really need another golf course?

Wailea Bay runs the risk of being loved to death. Only thoughtful, careful decision making will prevent that from happening, with honest, open-handed cooperation among all parties, public or private.

Sincerely,

Allan S. Treadwell

cc: Governor Benjamin J. Cayetano
Governor of the State of Hawaii

Mr. Gary Gill
Director, Office of Environmental Quality Control

Mr. Andy Monden
Division of State Parks, Hawaii

Mr. Glen Koyama
Belt Collins Hawaii Ltd.

Mr. and Mrs. Richard R. Treadwell
Ms. Connie Treadwell
Mr. Richard B. Treadwell
Mr. Paul Treadwell

Dr. DJ Hosbein and Mrs. Florence Treadwell Hosbein
Dr. Lisa Hosbein
Mr. David Hosbein
Mr. and Mrs. Tim Hosbein
Mr. and Mrs. Anna and Carlos Hosbein de Aliaga
Mr. and Mrs. John Hosbein

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Dr. Allan S. Treadwell
3157 Serra Way
Sacramento, California 95816

Dear Dr. Treadwell:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 1, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

Cost

The proposed park expansion will be developed in four increments over a 12 to13 year period. The $40 million construction cost includes an inflation factor so if it were discounted to today's cost, the price tag for the proposed improvements would be much less.

Wailea Bay

Although the existing park still has some residual capacity, during the peak summer periods, the park is quite full. The proposed park expansion will provide new recreational opportunities for the area, especially camping facilities that are lacking in the North/South Kohala Districts.

Care will be taken to protect Wailea Beach from overcrowding. The master plan has been revised to show parking away from the beach so Wailea would be a "walk-in" facility. In the final design, parking would be sized to limit the number of stalls available for beachgoers. With park expansion, park staffing will be improved to provide adequate maintenance and security.

Golf Course

The proposed golf course will be a public facility. Such a facility presently does not exist on the west side of the island. Other golf courses in West Hawaii are of the privately-owned or "resort" type which have green fees that are $5 to $15 more (even with kamaaina rates) than the anticipated fees of the proposed public course. For golfers who are on a limited budget, a public golf course will be a welcome amenity.

The environmental review process, as provided in Chapter 343, HRS, offers opportunities for public input at two stages during the EIS preparation: once during the "preparation notice" phase and once during the Draft EIS stage. The State also held two public informational meetings on the project. The last meeting was held in Waimea on August 22, 1996.

Additional public input will be received during the permitting stage when the State applies for a Conservation District Use Permit and Special Management Area Use Permit. During the operational stage of the project, the community will be invited to offer suggestions on park programs and improvements.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

P.O. Box 1017
Ross, Ca. 94957

July 25, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control,
State of Hawaii, 220 S. King St., Fourth Floor
Honolulu, Hawaii 96813

Attn: Mr. Gary Gill

Re: Draft Environmental Impact Statement
for the Hapuna Beach State Recreation
Area Expansion, Lalamilo, South Kohala,
Hawaii, June 1996

Sir:

The above-cited document, in addition to a mind-numbing amount of information relating to the proposed expansion of Hapuna Beach State Park, contains many letters from concerned members of the public as well as from the owners of private property at Wailea which point out again that any extensive development of the Wailea Bay area, including the acquisition of the private properties there, would have an extremely negative impact, financially for the State and environmentally for the land and beach.

The above DEIS itself states that, quote, " a two-week survey of recreational participation and a capacity analysis — suggest that the existing park has considerable land capacity to meet anticipated demand to at least the year 2010." Given this fact, the State can afford to move cautiously and deliberately in coming to a decision regarding the development of the Wailea Bay area.

In its desire and intent to make the beach at Wailea more easily accessible to the public, the State should make paramount in its development decision the size and fragility of this beach. All parking and other public facilities should be placed at least one quarter mauka of the beach making Wailea a "walk-in" beach.

The situation at Wailea presents an ideal opportunity to employ the concept of the public and private interests working together for the common good and to the benefit of both parties. The State should work with the private property owners at Wailea to develop a plan which would achieve the objectives of the Hapuna Beach State Recreation Area Expansion Project without the condemnation of additional private property.

I appreciate the opportunity of presenting these comments and suggestions and request that I continue to be a consulted party.

Yours truly,

Richard R. Treadwell,
Trustee of the Richard
T. Treadwell Trusts

cc: Div. of State Parks, c/o Land Div.
State of Hawaii Attn: Mr. Andy Monden

Belt Collins Hawaii Ltd.
Attn: Mr. Glen Koyama

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. Richard R. Treadwell
Trustee of the Richard T. Treadwell Trusts
P.O. Box 1017
Ross, California 94957

Dear Mr. Treadwell:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 25, 1996, to the Office of Environmental Quality Control (OEQC) regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project.

The development of the Hapuna Beach State Recreation Area Expansion will occur gradually over a 12 to 13 year period. During this time, it is anticipated the park expansion plan will undergo modification and/or enhancement to adjust to changing conditions.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1); the State shall "acquire additional beach park and rights-of-way to remaining undeveloped shorelines, or acquire additional access to developed shorelines to provide increased capacity for future public recreation use". The policy's implementing action specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". The State is authorized to acquire lands for public purposes under government power of eminent domain.

We acknowledge that Wailea is a dynamic and fragile beach which changes in size and character during the year. For this reason, no structures or ground improvements are planned directly on the shoreline. The number of parking stalls will be designed to reflect the beach's size and anticipated use and will be located at a distance (though not one quarter-mile) from the shoreline to encourage the theme of a "walk-in" beach. Provisions, however, will be made to comply with the Americans with Disabilities Act (ADA) standards that provide drop-off areas and other facilities for handicapped persons.

The current EIS review process provides a means for public input on the proposed project. In subsequent phases, the State will proceed through the permitting process where public hearings will be held and additional opportunities for public input are offered. During the operational stage of the project, park administrators will be available to receive resident concerns on park management and security and to discuss program ideas with the community.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

187-C Hokulani St.
Hilo HI 96720

August 4, 1996

Land Division
Department of Land and Natural Resources
1151 Punchbowl St., Room 227
Honolulu HI 96813

Dear Sir or Madam:

Re: Draft EIS for Hapuna Beach State Recreation Area Expansion

I would like to offer the following comments on this document:

A. Inclusion of Golf Course

The preferred alternative involves construction and operation of a golf course on state land mauka of Queen Ka'ahumanu Highway. I do not believe that information provided in the document supports the decision to develop a golf course. Rather, it would appear, just from what is available in the document, that this would greatly add to the cost of the project, while benefiting only two classes of people: (a) those who own, operate, or work for the golf course concessionaire, and (b) that 1.4 percent of the resident population who will, on the best day, avail themselves of this facility. (See Appendix A, page 9.)

Moreover, the draft EIS does not address at all the matter of how the proposed golf course stands in light of many other golf courses that have already been approved for construction in West Hawai'i but which, for various reasons, have not yet been built. Should these anticipated golf courses be built, would that not affect dramatically the market position of the Hapuna Beach State Recreation Area golf course?

There is discussion in the Pederson report (Appendix A) of the need for "affordable" play. However, the rates proposed for the Hapuna golf course are not significantly less expensive than those now available on private courses in the area which are open for public play. For example, the Pederson report states (p. 3-7) that a round of golf will cost $15, exclusive of a golf cart fee. Use of a golf cart would cost an additional $15 per golfer (or $30 per cart shared by two golfers). That brings the cost per round of golf to $30. At the Waimea Country Club, kama'aina rates are as low as $25, which includes use of a motorized cart. At Makalei Country Club, the highest rate for kama'aina play is $45 (inclusive of cart), with a number of special play times available for $30 a round (again, including cart).

Before the state embarks on construction of a golf course, I believe the draft EIS should take a thorough look at the golf courses proposed for the West Hawai'i area, determine why there has been a failure to develop so many of them, and in light of that discussion, reconsider the recommendation for Alternative A (the expansion including a golf course).

B. Costs

Chapter Two of the DEIS presents a discussion of the three alternatives considered. This includes a discussion of their costs. Alternative A is said to cost $40 million, with 40 percent of this ($16 million) going to park improvements and $26 million to go for the golf course.

In discussion of Alternative B, however, which is the park improvements without the golf course, the cost is placed at $23.3 million. There is no explanation of why the park improvement component costs $7.3 million more than the cost provided in the discussion of Alternative A. Comparing the two maps (figures 2-11 and 2-12), I see no difference whatsoever in the park improvements proposed for Alternative A and Alternative B.

From this passage, a reader is led to believe that the cost differential between Alternative A and Alternative B is on the order of $16.7 million, whereas it would appear from all other information in the DEIS (including Table 3-8 in Appendix A) that the real differential cost is between $24 million and $27 million.

C. Water Use

Missing from this DEIS is any hydrological study that supports the all-too-brief discussion (at 3.12.2.1) of water demands. The only mention of this issue occurs in one paragraph in Appendix C (Geotechnical Consultation, by Harding Lawson Associates.) What are the characteristics of the aquifer system from which both the fresh water and the irrigation water are to be drawn? Can it support development of additional wells?

The existing use, according to the DEIS, is 15,000 gpd on weekdays and 57,000 gpd on weekends. The proposed park improvements, it goes on to say, "will generate an average daily water demand of approximately 28,800 gpd on weekdays and 52,650 gpd on weekends." Is this in addition to existing use? I suppose so, but would like to see some specific total for all park use (exclusive of golf course) included in the final tally.

For a full comparison of the benefits of Alternative B as opposed to Alternative A, there does need to be some way of gauging the relative strain on natural resources entailed by each. For this, we need to know what the water demand of the park improvements alone would be, as opposed to the stand-alone water demand of the golf course. As it is, the DEIS does not allow such comparisons.

D. Nearshore Impacts

The DEIS states that no impacts to near-shore water quality are expected from the proposed developments. Yet there is no discussion of what effect chemical applications on the golf course might have on the underground springs or other subsurface water flows that apparently lace the area (according to the Harding Lawson report). Presumably, these seeps, springs, and other flows enter the nearshore waters in the area fronting the park. Thus, despite the contrary assertions in the DEIS, there is a real possibility of nutrient loading in Wailea Bay. Mention is made in the Murdoch and Green study (Appendix E) of a finding that monitoring of nearshore waters adjoining the Mauna Kea Resort Golf Course has "shown no apparent increase in nitrogen levels... after 23 years of golf course fertilization." Without knowing more about this study (who conducted it, what methods were used) and without knowing how the construction of the proposed golf course compares with construction of the Mauna Kea Resort golf course (i.e., is the latter underlain by a layer of packed earth, which prevents seepage of chemicals and water?), it is hard to know how this finding has application to the proposed golf course.

E. Full Public Use

Time and again, the DEIS steps daintily around the fact that a large chunk of the land proposed for the Hapuna State Park is occupied by private landowners. Most of these landowners bought their land and built their homes long after the state had announced plans to turn the area into a state park eventually. Thus, it makes no sense whatsoever for the DEIS to give deference to their desire to maintain their area as a "secluded residential enclave" or to give greater weight to their desire for privacy than it does for the need of the public to get maximum enjoyment out of a resource that it has a legitimate claim to.

In particular, the DEIS makes no mention of the fact that the inholders use state-owned land for access to their property and the fact that a state-owned road cuts through their "enclave" and leads directly to the southern area of the Wailea Bay beach.

It may be years, if ever, before the state gets enough money to purchase these inholdings. In the meantime, however, the state should and must exploit fully what resources it has -- including these public roads. This will allow full utilization of a beach that is now, for all intents and purposes, one of the best private beaches in the state of Hawai'i. The DEIS should be revised to indicate the full extent of public holdings in and among the private inholdings (including roads, easements, and trails). It should include a plain to incorporate these holdings in an overall public access component.

Elsewhere in the state (e.g., Lanikai, Kahala, Kailua, Hanalei, Kihei), private residential areas have co-existed in harmony with public beach users for years. There is no reason to believe that such harmony could not be obtained in the southern end of Wailea Bay as well. Indeed, there is every right to expect it. Yet so long as extra special consideration is given to the privacy rights of these landowners, the public will come up short. This is an outrageous precedent, and must not be allowed to stand.

Thank you for your consideration of my comments.

Yours truly,

Patricia Tummons

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Patricia Tummons
187-C Hokulani Street
Hilo, Hawaii 96720

Dear Ms. Tummons:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 4, 1996, to the State Land Division regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion project. Our response to your comments is as follows:

Inclusion of Golf Course

There is only one public golf course on the island, located in Hilo over 70 miles from the Kohala coast. As described in the Pedersen Planning Consultants study (Appendix B of DEIS), there is a strong demand for a public golf course in West Hawaii based on a per capita analysis and interviews with people in the industry. Acknowledging the population growth trends in the Kona and Kohala Districts, this demand for a public golf course will continue to increase.

Construction of the golf course will require substantial funding. As described in the DEIS, the alternative of having a private developer involved in the golf course construction would provide significant savings to the State. Furthermore, Pedersen's feasibility study demonstrates that a golf course developed and operated by a private entity could be a viable venture within four or five years of opening.

We are aware of the planned golf courses in West Hawaii and the recent slow-down in golf course development. From our long experience in this region, we believe the slow-down is due to economic, marketing, political, and environmental factors, as well as government processing requirements. No one reason is responsible for this latest trend. Some of these planned courses may not be built at all.

Although the development of privately-funded golf courses has slowed in recent years, there is still a need for at least one public golf course on the west side. With more and more people on fixed incomes residing in the region and looking for affordable golf, the need for a public course becomes more evident. With rates of $5 to $15 per round less than privately-owned golf courses with kamaaina rates, the savings on public courses would be significant, especially when a golfer plays four to six times a month. The proposed public golf course would give golfers the option of playing without a cart which would result in a green fee of about $15. The Waimea Country Club and Makalei Hawaii Country Club require players to use a cart and therefore pay a higher fee.

Opening of a public course in West Hawaii may also encourage individuals who normally would not take up the sport to participate in the recreation if it were affordable. Although the facility may serve only a small portion of the population, like any other recreational amenity (such as County rifle ranges, hiking trails, camping sites), it will be part of a package of recreational opportunities to serve the various needs of our community.

An immediate benefit of the golf course is the direct employment generated and user fees or revenues that are collected. Also beneficial are the secondary effects accrued when the golf course purchases goods and services to maintain its operations and when golf course employees spend their income in the local community. As provided in the Pedersen study, this could result in an added benefit of $2.2 million per year to the state's economy by the year 2015.

It should be noted the benefits of a golf course are not only economic. A well-maintained facility will provide a lush green environment that would enhance the visual and ecological character of the area. It would also preserve the area in permanent open space. These long-term benefits do not have any monetary value, but they do provide visual and psychological comfort.

Costs

Development of Alternative A includes the cost of off-site infrastructure. This is required whether the entire property or only a portion of the property is developed. Thus, Alternative B which comprises only a portion of Alternative A, namely the park area, would still require extensive off-site improvements such as water, sewer, highway improvements, telephone, and electricity.

Water Use

Information on groundwater in South Kohala is scarce and not precise, particularly because there is a lack of available hydrological data. A December 1991 draft of the Hawaii County Water Use and Development Plan prepared for the Department of Water Supply, County of Hawaii estimated that the groundwater aquifer in South Kohala, which comprises the Waimea and Anaehoomalu hydrological sectors, has a sustainable yield of 54 mgd. This aquifer includes the areas of

Waimea, Kawaihae, Waikoloa, Puako, South Kohala resorts, and west slopes of Mauna Kea and northwest slopes of Mauna Loa. The current usage in this area is about 6.3 mgd (1995 State Water Commission records) which indicates that there is still a large reserve of water in the region.

The best available hydrological information for the project area is the data compiled from the existing potable wells at the 1,200-foot elevation of the Lalamilo land tract. These wells have been the most successful and have provided the best feasible option for additional source development in South Kohala. Each of the three largest wells in this area is capable of producing approximately 1.4 million gallons per day.

Better hydrological information for the project would come from test drilling for potable water. Test drilling, however, is typically done when a project is in the latter stages of planning and in the design process. It would be premature to incur the high costs of test drilling a well during the present phase in the absence of entitlements for the park improvements.

Irrigation water is currently obtained from a brackish well (Elevation 244') above Queen Kaahumanu Highway. It is anticipated that additional wells at this elevation would produce similar results. As an alternative, better quality water may be obtained at higher elevations within the same State land tract, however transmission of the water to the project site would then become a consideration. Use of higher quality water may be an advantage if excessive use of sources of water at lower elevations invite higher potential of salt water intrusion.

We estimate that demand for potable water at the new golf clubhouse would be approximately 13,000 gallons per day (gpd), and approximately 39,500 gpd for the proposed park expansion during the peak days of the week. Approximately 600,000 gpd of irrigation water would be required for the golf course landscaping and 50,000 gpd for the park landscaping.

Nearshore Impacts

The Murdoch and Green study has indicated that chemical applications from fertilizers, herbicides, and pesticides would be stringently used. Most of the Ms. chemicals stick to the highest surface layers of the soil. Those that do penetrate are unlikely to go deep enough to enter any springs, especially at the golf course site which is located more than 3,100 feet from the shoreline.

The reference study cited by Murdoch and Green, entitled "Evaluation of the Impact of Agricultural Chemicals on Shoreline Waters by Movement in Groundwater", was prepared in 1987. This study indicated that the shoreline at the project site is typical and similar in characteristics to the coastline from Kawaihae to points south of Anaehoomalu Bay. What should be noted, however, is that the proposed golf course will be located more than 3,100 feet from the water. The adjacent Mauna Kea Beach Hotel golf course is situated on the shoreline and its impacts on the coastal waters would be immediately noticed if they occurred; according to the study, there have been no impacts.

Full Public Use

As long as private parties own the Wailea Beach lots, they are entitled to all property rights and considerations. Once these properties are placed under the control of the State, the public will have full use of the land. Information on State-owned lands and public easements and accesses are described in Sections 3.1, 3.2 and 3.12.1 of the Draft EIS.

We trust our response adequately addresses your concerns.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

July 23, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813

Attention: Mr. Gary Gill

RE: Hapuna Beach Park
Expansion Plan

Dear Sir:

I am aware of your plan to expand the Hapuna Beach Park to Wailea Bay.

I go to Hapuna Beach and Wailea Bay all the time. There is a big difference between the two locations. Hapuna is big, lots of folks, good volleyball, all sand beach break, and all the State Beach amenities. Wailea is small, local, a preserve, trees, good snorkeling, laid-back, fast tubular waves over a shallow reef.

Why not leave 'Beach 69' as it is. Keep it remote and make people walk in. That way, those who will respect the aina will come and it won't be ruined by over use. A few luas, showers, and opala dispensers would be good, but that's all we need.

Why spend millions of dollars to buy out the homes there. They give the area a good feeling. I see people raking the beach and cleaning it up. It's cleaner than Hapuna.

Spend the money on education, highways, bikeways, and the existing parks. North Kona Beach Park needs good luas, water, security and a better road.

Keep Wailea small; please don't spend my hard earned tax dollars unwisely.

Aloha,

bc: Susan Rutka

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. H. Visser
Kailua-Kona, Hawaii 96743

Dear Ms. Visser:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 23, 1996, to the Office of Environmental Quality Control (OEQC), regarding the proposed Hapuna Beach State Recreation Area Expansion project.

As you may know, West Hawaii is one of the fastest growing regions on the island, and as a result, there is an associated strong demand for recreational facilities. Hapuna and Wailea Beaches are particularly suitable for improvement because of their popularity, accessibility, location and existing infrastructure.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

Our plans show that Wailea will be developed as a walk-in beach. Parking will be located away from the shoreline and beachgoers would have to walk more than 400 feet to the water. For the convenience of the public, a comfort station will be provided near the parking area.

We do not intend to develop Wailea like Hapuna Beach. Wailea will continue to be a scaled-back, low-key recreational site within the park expansion area.

We appreciate your thoughts and comments on the proposed project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

CADES SCHUTTE FLEMING & WRIGHT
ATTORNEYS AT LAW

KAHUA NOHA, HAWAII OFFICE
SUITE B-303
HUALALAI CENTER
75-170 HUALALAI ROAD
KAILUA-KONA, HAWAII 96740-1737
TELECOPIER (808) 326-1175
TELEPHONE (808) 326-5811

August 6, 1996

Land Division
Department of Land and
Natural Resources
1151 Punchbowl St., Rm. 227
Honolulu, Hawaii 96813

ATTENTION: Andy Monden

Re: Comment on Draft Environmental Impact Statement
Hapuna Beach State Recreation Area Expansion
Lalamilo, South Kohala, Hawaii

This office represents several property owners in the Wailea Bay area affected by the State's proposed Hapuna Beach State Recreation Area Expansion. The scope of our representation includes the property owners' concern over the State's apparent intention to condemn private properties for public purpose.

These property owners' consistent position has been that the November 20, 1987 "authorization" from the Board of Land and Natural Resources to acquire private properties in Wailea Bay area is stale, outdated, and no longer serves as valid authorization to condemn private property. The property owners did not have adequate notice of the Board's intention to consider condemnation and have not been given a meaningful opportunity to be heard.

Further, the Draft EIS does not adequately assess the impacts of taking private properties. The Draft EIS does not assess the impacts on families involved, many of whom have owned these properties for generations. The displacement of residents deserves more careful assessment under the requirements of Hawaii Revised Statutes, Chapter 343. It is also inappropriate for the environmental assessment to be performed nearly nine (9) years after the purported governmental action authorizing condemnation.

HONOLULU HAWAII OFFICE • PO BOX 939 1000 BISHOP STREET HONOLULU HI 96808-0939 TELECOPIER (808) 531-8738 TELEPHONE (808) 521-9200

This in and of itself underscores one of the problems with the November, 1987 Board action.

If you have any questions or require additional information please call me at 521-9345 or 329-5811.

Very truly yours,

Roy A. Vitousek III
for
CADES SCHUTTE FLEMING & WRIGHT

RAV/bah
cc: Belt Collins Hawaii
Governor, State of Hawaii
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809
DEC - 3 1996

Roy A. Vitousek III, Esq.
Cades Schutte Fleming & Wright
Hualalai Center
75-170 Hualalai Road, Suite B-303
Kailua-Kona, Hawaii 96740-1737

Dear Mr. Vitousek:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 6, 1996, to the State Land Division regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

The Board of Land and Natural Resources' authorization to acquire private properties in Wailea Bay is binding until the Board rules otherwise. Board meetings are advertised in the daily newspapers and open to the general public.

Section 3.11.2.2 of the DEIS identifies the possible effects of land acquisition including property values changes and potential stress that may be experienced by property owners at Wailea. This stress particularly would involve the anxiety of not knowing the State's land acquisition schedule. Other property owners may view the land acquisition as an opportunity to relocate or reinvest from the transaction proceedings.

The State Housing Finance and Development Corporation (HFDC) has indicated that a relocation plan should be submitted to the agency for review. In accordance with Chapter 111, HRS, we will prepare and submit a relocation plan to HFDC prior to parcel acquisition at Wailea. A basic concept of the relocation will be described in the Final EIS and details will be provided in the final document to be submitted to and reviewed by the HFDC.

Preparation of a master plan for Hapuna was authorized in 1990 prior to the preparation of the current EIS. With higher priority public programs moving forward, the Hapuna project was placed on an extended schedule. The acquisition of the parcels is part of a 12 to 13 year development program for the area. Acquisition will probably proceed at a moderate pace as funding becomes available.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collin Hawaii
State Parks Division, DLNR

Arthur von Wiesenberger
Post Office Box 5658
Santa Barbara, California 93150
Tel: (805) 969-3371
Fax: (805) 969-6641
E-Mail: Nipperino@AOL.com

RECEIVED
96 AUG 13 P1:50
OFC. OF ENVIRONMENTAL QUALITY CONTROL

August 7, 1996

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, Forth Floor
Honolulu, Hawaii 96813
Attn.: Mr. Gary Gill

To Whom It May Concern:

re: Hapuna Beach Park Expansion Plan

I was sitting on the beach at Wailea Bay several weeks ago under the shade of kiawe tree reading the Draft Environmental Impact Statement for Hapuna Beach State Recreation Area Expansion, June 1966.

As I read the plan I wondered about the true impact of the proposed development on such a fragile, natural environment. The study says "state park focuses on managing and conserving natural, cultural, scenic, coastal, and wildlife resources" and yet to accomplish the beach size indicated in the report the very trees that provide shade, prevent beach erosion and offer a habitat to birds and other wildlife would be removed.

Wailea Bay offers an alternative to the adjacent Hapuna Beach. In its rustic and pristine setting, Wailea Bay is what Hawaii once was and what development, even well intended, can sadly destroy forever.

An older gentleman came up to me at Wailea Bay the other day, tears in his eyes and said, "I can't believe that Wishard Bay is still the same". He went on to explain that he use to visit Wailea Bay over 40 years ago when the Wishards owned most of the private property around the bay and most locals refered to it by that name. He said that it was so hard to find a place that still had the sense of old Hawaii and he was thrilled to see that the bay and surrounding area had not been developed.

The plan involves enormous costs for something which is better left as it is. Those funds could be better used to improve existing park facilities in West Hawaii such as North Kona and Spencer.

The private lots around Wailea Bay should not be purchased. Such a condemnation represents an enormous expenditure of taxpayer dollars. It also displaces property owners who enhance Wailea Bay with landscaping which reduces the effects of high winds on the beach, provide flood control, fire prevention, and security.

In my opinion, the plan needs to be revised to protect and not develop Wailea Bay. Wailea Bay should continue to be a limited use park where walk-in access minimizes the effects of vehicles. Low impact will provide an environment that offers family recreation, solitude and a place to truly savor the natural beauty of Hawaii.

Sincerely,

Arthur von Wiesenberger

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. Arthur von Wiesenberger
P.O. Box 5658
Santa Barbara, California 93150

Dear Mr. von Wiesenberger:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of August 7, 1996, to the Office of Environmental Quality Control (OEQC), regarding the Draft Environmental Impact Statement (DEIS) for the Hapuna Beach State Recreation Area Expansion project.

As you may know, West Hawaii is one of the fastest growing regions on the island, and as a result, there is an associated strong demand for recreational facilities. Hapuna and Wailea Beaches are particularly suitable for improvement because of their popularity, accessibility, location and existing infrastructure.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

We acknowledge that the cost of acquiring the private lots at Wailea will be substantial; however, efforts will be made to minimize the expense during the project implementation stage. Some ideas that we have developed or have come from the community include the acquisition of properties in increments to spread the purchase cost over time (as well as to hold acquisition cost down during inflationary periods) and the arrangement of a lease-back plan that would allow the State to recover some of the purchase cost while the properties await development.

Our plans show that Wailea will be developed as a walk-in beach. Parking will be located away from the shoreline and beachgoers would have to walk more than 400 feet to the water. For the convenience of the public, a comfort station will be provided near the parking area. We do not intend to develop Wailea like Hapuna Beach. Wailea will continue to be a scaled-back, low-key recreational site within the park expansion area.

We appreciate your comments and suggestions on the DEIS.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

RECEIVED

July 23, 1996

'96 AUG 13 P2:01

OFC. OF ENVIRONMENTAL QUALITY CONTROL

Governor of the State of Hawaii
c/o Office of Environmental Quality Control
State of Hawaii, 220 S. King Street, Fourth Floor
Honolulu, Hawaii 96813

Attention: Mr. Gary Gill

RE: Hapuna Beach Park
Expansion Plan

Dear Sir:

I am aware of your plan to expand the Hapuna Park to 'Beach 69'.

Please do not use my hard earned tax dollars to buy additional property we do not need. I can get to Wailea Bay just fine with no hastle.

All we need is a couple of luas, showers, picnic tables and barbeques and it will be the best place on the Big Island.

I bet there's a lot of folks who would live there at no charge just to pick-up and dump the opala.

Please re-think your $40 million dollar plan, and use that money for education, roads, and for places that really need it.

Aloha,

Marcia A. Yardley

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Marcia S. Yardey

Dear Ms. Yardey:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for your letter of July 23, 1996, to the Office of Environmental Quality Control (OEQC), regarding the proposed Hapuna Beach State Recreation Area Expansion project.

As you may know, West Hawaii is one of the fastest growing regions on the island, and as a result, there is an associated strong demand for recreational facilities. Hapuna and Wailea Beaches are particularly suitable for improvement because of their popularity, accessibility, location and existing infrastructure.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

Development of the park expansion is part of a medium-range plan which would be implemented over a 12- to 13-year period. The project's estimated construction cost would be spread over this period which should make the expense a little more manageable. Additionally, the State is exploring the possibility of joint-sponsoring the development of the proposed golf course with a private interest which should decrease the public cost of the project.

We appreciate your comments on the proposed park expansion.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: OEQC
Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

NO ACTION! - this consideration is absolutely ridiculous! We have too many golf courses already! DO NOT Condemn ANY PRIVATE property

Signed: Carla Beard
Date: 8-27-96

Name and address (please print): Carla Beard
P.O. Box 6012
Kamuela, HI 96743
885-4552

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809
DEC 3 1996

Ms. Carla Beard
P.O. Box 6012
Kamuela, Hawaii 96743

Dear Ms. Beard:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion plan.

We appreciate hearing your thoughts and concerns on the project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

VOTE FOR NO ACTION!

This is late but I was away when I received word of this. Owners at Puako as well as Waikoloa are very concerned about this. And why is all this money being spent for EIS etc when the State cannot afford it?

Signed: [illegible]
Date: Sept 6 1996

Name and address (please print): MARTHA M. BLACK
[illegible] OF
150 PUAKO BCH DR.
KAMUELA HI 96743

4846-1 KILAUEA AVE
HONOLULU HI 96816

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL G. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Martha M. Black
4846-1 Kilauea Avenue
Honolulu, Hawaii 96816

Dear Ms. Black:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project.

The proposal that was presented at the meeting in Waimea is a medium-range development plan for the expansion of the Hapuna Beach State Recreation Area. Funding for the project will be sought from the State Legislature over a 12 to13 year period. By stretching implementation of the project over this length of time, the cost of development would be more manageable. Additionally, as an option for implementation, the State may joint-sponsor the golf course development with a private interest. This would substantially reduce the expense of the project construction.

We appreciate hearing your thoughts and concerns on the project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

DOCUMENT CAPTURED AS RECEIVED

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

THE ACQUISITION OF THE 18 PRIVATELY OWNED LOTS AT WAILEA BAY IS TOTALLY UNACCEPTABLE.

Signed: R C M Devine
Date: 8/28/96

Name and address (please print): RICHARD M. DEVINE
P.O.Box 455
Hilo, HI 96721

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
- MAHY
GILBERT COLOMA-AGARAN
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. Richard M. Devine
P.O. Box 455
Hilo, Hawaii 96721

Dear Mr. Devine:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion plan.

We appreciate hearing your thoughts on the project.

Sincerely,
Andrew M. Monden
ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

Public Comment Mail-In Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

This is rediculous!! No Action! Do not condemn the private property!! This is morally wrong!

Signed: [signature]
Date: 8/28/96

Name and address (please print): Holly K. Fredrickson
P.O. Box 6554
Kamuela, HI 96743

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Holly K. Fredrickson
P.O. Box 6554
Kamuela, Hawaii 96743

Dear Ms. Fredrickson:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion plan.

We appreciate hearing your thoughts on the project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Public Comment Mail-In Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

The proposed expansion is excessive, extravagant, ill-conceived and most untimely. Given the current impacts of a poor economy, severe state and county budget cutbacks and consequent reduction in necessary services such as police, ambulance and park maintenance/supervision, among others, this choice of alternatives by DSP and DNLR is both unacceptable and unconscionable.

While improvements at Hapuna to date have increased comfort and convenience to park users, there has also been a clear increase in criminal and offensive activity. It is not a safe park. If 62 improved acres cannot be managed adequately now, how can 846 acres be managed responsibly? Police and ambulance services in West Hawaii have never been consistently adequate and reliable. Current cutbacks have reduced the gains made in the last several years and it seems that recovery to a fully adequate level will take considerable time and funding.

Of the existing public parks on the Big Island, I know of none which can boast high safety, cleanliness and adequate supervision by park and other staff. Without a better demonstration by DSP showing that it can manage its current roster better, I cannot assume it could do so with one which would increase over 13-fold.

I submit, therefore, that no further action be taken on expansion of Hapuna. Rather, improving management of the present park should be of first priority. Indeed, why not make such an effort a model project? There would be much which could be learned and the credibility of the responsible state agencies enhanced significantly.

Signed: Dorothy N. Gulbrandsen

Date: August 29, 1996

Name and address (please print):

Dorothy N. Gulbrandsen
276 Ulua St.
Honolulu, HI 96821-2134

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Dorothy N. Gulbrandsen
276 Ulua Street
Honolulu, Hawaii 96821-2134

Dear Ms. Gulbrandsen:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project.

We acknowledge your concerns regarding the management and maintenance conditions at the existing park. In response, we will look at ways to improve those conditions. We believe the State's tight financial situation will soon be over and the maintenance and security at the park will improve. Additionally, we hope, in the near future, to move forward with the planned park expansion and meet the continuing demand for more park space. West Hawaii, as you may know, is one of the fastest growing regions in the state in terms of population. The proposed improvements are intended to meet the residents' demand for more recreational opportunities.

With the expansion of the existing park, management, maintenance and security staffing will also increase. Section 3.11.1 of the Draft EIS provides an estimate of park personnel that would be required. Funding for this staff is expected to be included in the State's regular operating budget when CIP funds are requested and approved for the construction of the park improvements.

We appreciate your thoughts and concerns on the proposed project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

I VOTE FOR NO ACTION on the Hapuna - Wailea Beach Expansion Plan !

I found it interesting that in your general project description you say there are "18 privately-owned lots which are proposed for acquisition by the State". Privately owned lots !!!! I beg your pardon, but these are million dollar homes which generate a minimum $50,000 in county tax revenue, each year. In addition, there are thousands and thousands of dollars paid to the State, annually, in the form of income tax and general excise tax by these owners ! It would cost the taxpayers at least $40 million to purchase these homes and another $20 million to destroy them...what a horrible, horrible idea !

* camping parks are needed all over the island
* better access & facilities are needed to ALL existing West Hawaii beaches
* have golf development costs been studied ?
* have adequate fishery studies been done?
* the boat ramp use is inaccurate in the EIS...it is used much more heavily
* in the EIS, the state has measured the beach inaccurately...and probably in the summer,not winter.
* don't condemn any private property !
* How can the State manage a huge park like that, when then can't manage what they have now !
* Resolve the issue of the homeowners first
* The picnic and camping areas get too much wind
* The state spent 2.8 million for the 2 properties already condemned and have done nothing.
* Prefer minimal impact park with health, sanitation and safety as primary concerns
* Work with the owners; provide security to the owners.
* The $50,000 per year taxes that the owners pay are a resource !
* Traffic study needed for additional cars per day coming on to Puako Road
* Impact on the Puako Community of the extra cars and people could be very detrimental
* Count of fish and impact on the turtles needed
* Priority should be completion of other parks
* Leave it as it is and make it safe and sanitary, take care of what is there
* Ceded lands and the 20% to OHA was not mentioned in the EIS
* Spend our tax dollars on EDUCATION !

Deborah Harkins
P.O. Box 2959
Kamuela, HI 96743
885-8856

Deborah Harkins
8/29/96

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

MICHAEL D WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Deborah Harkins
P.O. Box 2959
Kamuela, Hawaii 96743

Dear Ms. Harkins:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project. We have consolidated your comments by topics and are providing our response accordingly.

Wailea Lot Acquisition

- *I found it interesting that in your general project description you say there are "18 privately-owned lots which are proposed for acquisition by the State". Privately-owned lots!!! I beg your pardon, but these are million dollar homes which generate a minimum $50,000 in county tax revenue, each year. In addition, there are thousands and thousands of dollars paid to the State, annually, in the form of income tax and general excise tax by these owners! It would cost the taxpayers at least $40 million to purchase these homes and another $20 million to destroy them. . . what a horrible, horrible idea!*

- *The $50,000 per year taxes that the owners pay are a resource!*
- *The state spent $2.8 million for the 2 properties already condemned and have done nothing.*
- *Spend our tax dollars on EDUCATION!*
- *Resolve the issue of the homeowners first.*
- *Don't condemn any private land!*
- *Work with the owners; provide security to the owners.*

We acknowledge the cost of acquiring the private lots at Wailea will be substantial (including secondary costs such as lost government revenues from property taxes); however, efforts definitely will be made to minimize the expense during project implementation. An announcement of our intentions to purchase the private parcels was made in 1987.

Interestingly, in recent years, many owners at Wailea have continued to make improvements as well as construct large homes.

Immediate acquisition of these lots after the announcement would have been desirable to keep the cost down, but funding was limited at the time and only two parcels were acquired. Acquisition of the remainder of the properties should coincide with the development of the park expansion, but ultimately will be dependent more on funding allocations from the State Legislature and its priorities on other programs such as education and crime prevention.

The State's objective for Wailea is to provide opportunities for park users to appreciate in a coastal setting direct physical and visual access to the sea. This would allow a mixture of land-based coastal recreation activities, such as picnicking, camping, and relaxation, along with beach and nearshore recreation activities.

The private properties at Wailea Bay are located within the proposed park expansion. These properties would serve the public best if they were converted to open space for park use and allow a better connection between the mauka land and beach land with its ocean resources.

As stated in the State Recreation Functional Plan, Policy 1-A(1), the State shall "acquire additional beach park land and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreation use". The action policy of this plan specifically provides that the State shall "acquire beaches in the following areas: (for the Big Island) Wailea Bay, Anaeho'omalu Bay to Ka'upulehu, and Kua Bay". To implement this policy, the State is authorized to acquire lands for public purposes under its government power of eminent domain.

Recreational Priorities

- *Camping parks are needed all over the island.*
- *Better access & facilities are needed to ALL existing West Hawaii beaches.*
- *Priority should be completion of other parks.*

We concur that more camping parks and beach accesses are needed around the island, but the Hapuna Beach State Recreation Area is a suitable site for immediate improvements considering its popularity, excellent white sand beaches, existing infrastructure, and ideal location.

Existing Park and Proposed Expansion

- How can the State manage a huge park like that, when they (sic) can't manage what they have now!
- *Leave it as it is and make it safe and sanitary, take care of what is there.*
- *Prefer minimal impact park with health, sanitation and safety as primary concerns.*
- *The picnic and camping areas get too much wind.*

We acknowledge your concerns regarding the current management and maintenance conditions of the existing park. In response, we are looking at ways to improve those conditions. We believe the State's tight financial situation will soon be over and maintenance and security conditions at the park will improve.

In the near future, we hope to move forward with the planned park expansion to meet the continuing demand for additional park space. West Hawaii, as you may know, is one of the fastest growing regions in the state, and the proposed improvements will help meet the residents' demand for more recreational opportunities.

Activities in the park expansion will be quite spread out. Most of the areas will be in their natural condition. Less than 28 percent of the park area below the highway will contain picnicking, camping, parking, access driveway, and beach land activities.

Staffing will be increased to maintain the expanded park grounds and provide security. From the park headquarters, safety and awareness programs will be offered on water activities, hiking, and camp fires.

We have sited the proposed picnic and camp areas, as much as possible, in the protected enclaves of the park terrain. In the final design, landscape treatment will be provided, where necessary, to establish wind breaks. Existing activity areas will also be evaluated for additional landscape treatment, if necessary.

Special Studies

- *Have golf development costs been studied?*
- *Have adequate fishery studies been done?*
- *Count of fish and impact on the turtles needed.*
- *The boat ramp use is inaccurate in the EIS . . . it is used much more heavily.*

A feasibility study for the proposed golf course was conducted by Pederson Planning Consultants and a baseline assessment of the marine environment including a description of the coastal sea life was performed by Marine Research Consultants. Both studies are included in the appendices of the DEIS.

We appreciate your input as well as others from area residents on the extent of the boat ramp usage. We are evaluating the comments from the community and will make revisions, if necessary, in the Final EIS.

Traffic

- *Impact on the Puako Community of the extra cars and people could be very detrimental.*
- *Traffic study needed for additional cars per day coming on to Puako Road*

A traffic study was conducted by Pacific Planning & Engineering, Inc. and their assessment of traffic conditions and suggestions of possible mitigative measures are presented in Section 3.12.1 of the DEIS.

Others:

- *In the EIS, the state has measured the beach inaccurately . . . and probably in the summer, not winter.*
- *Ceded lands and the 20% to OHA was not mentioned in the EIS.*

Our description of Hapuna and Wailea Beaches in Section 3.2 of the DEIS includes estimates of the beach dimensions for conditions that would occur in the summer as well as in the high surf or winter seasons.

Section 3.11.2.1 of the DEIS provides a discussion of ceded lands and the 20 percent revenue requirement for the Office of Hawaiian Affairs.

We appreciate your thoughts and concerns on the proposed project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

RECEIVED
'96 SEP 13 A 11:03
OFFICE OF HAWAII

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

VOTE FOR NO ACTION

The public has had no opportunity to review the Environmental Impact statement.

Will State purchase this property and then sell to developers for hotels and residential facilities?

What's the hurry?

Signed: Frederick Jones, WIFE, 4 SONS
Date: 28 August 96

Name and address (please print):
FREDERICK JONES
72 Puako Puako Beach Drive
Kamuela, HI 96743

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPUTY
GILBERT COLOMA-AGARAN
AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. Frederick Jones
72 Puako Beach Drive
Kamuela, Hawaii 96743

Dear Mr. Jones:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project.

The availability of the Draft Environmental Impact Statement (DEIS) was announced in the June 23, 1996 issue of The Environmental Notice. This notice is published semi-monthly by the State Office of Environmental Quality Control. Copies of the DEIS were distributed to your State and County representatives and to your local libraries including the Hilo Regional Library, Bond Memorial (Kohala) Library, Holualoa Public Library, Kailua-Kona Public Library, Kealakekua Public Library, and Thelma Parker Memorial Library.

In August of this year, we held a public meeting to discuss the DEIS and informed the audience that the deadline for the public comment period had been extended an additional three weeks.

We are assuming the property that was referred by you is the private beach lots at Wailea. The State does not plan to purchase these beachfront properties and later sell them to developers for hotel and residential development. As provided in the park master plan, the State is proposing to develop picnic areas around the bay to improve public use of the coastal lands in association with the ocean resources. This is a medium-range plan that would be implemented over a 12 to 13 year period.

We appreciate hearing your thoughts and concerns on the project.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

RECEIVED
'96 SEP -3 A 10:13

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

I OBJECT TO THE CAVALIER MANNER IN WHICH THIS IS BEING HANDLED!
Additional camping facilities are desirable and needed but considerable thought must be given to the problems that may be created for all.

The Puako Community is already stressed by physical restrictions we already face. Picnic and camping areas close to Puako community increases the hazard of fire because of the extremely heavy winds we experience. Witness the effects of the July 1, 1987 Fire!

Our security must be considered - both physical and financial.

I'm wondering why the State feels it can take this on anyway. It is not able to meet its commitments as it is. The article in the Wall Street Journal certainly is justified! Article dated June 7, 1996. Here on this planning is more proof of brainless planning.

I WISH TO BE NOTIFIED OF FUTURE MEETINGS.

Signed: Helen J. Thomas Maddock
Date: 8/29/96

Name and address (please print): HELEN J. THOMAS MADDOCK
58 Puako Beach Drive
Kamuela, Hawaii 96743

THE WALL STREET JOURNAL.

MARKETPLACE

Sports: *A pole vault Under goes up over*

The Home Front: *'Pi cut the costs of high*

TRAVEL

Hawaii's Allure for Tourists Has Faded, And Some Say State Has Itself to Blame

By Jim Carlton
Staff Reporter of The Wall Street Journal

While many vacation hot spots in the U.S. are booming, there's trouble in paradise.

Tourism in Hawaii is rising only modestly, and experts say the state itself may be to blame. Costs for travelers to the islands exceed those in competing travel meccas like Orlando, Fla., and Las Vegas, partly because state officials have raised hotel taxes and other fees. Recently, Hawaii even cut its tourism marketing budget by 20%.

"This is a state that has not come to terms with the fact that tourism is their industry," says Joe Brancatelli, editor of Travel Holiday magazine.

Budget-minded travelers, who account for the bulk of American tourists, are often shocked at the prices in Hawaii. Four days at a "moderately" priced hotel cost about $440, almost double the cost in Orlando or Las Vegas. Rental cars can cost almost twice as much as well, with daily rates as high as $120 on one island.

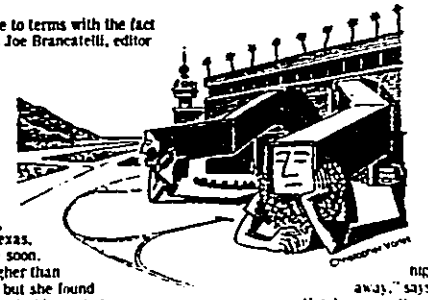
After her recent stay in Honolulu, Lorraine Conner of Crockett, Texas, vowed she wouldn't return anytime soon. Not only were her expenses much higher than they had been on her previous trip, but she found less of the famed Aloha spirit. "If you decide not to buy, they are so rude," she complains.

Other travelers seem to agree. The number of visitors to Hawaii rose only about 200,000 last year, compared with an increase of 2.5 million for Orlando and 700,000 for Las Vegas. Despite its six-year effort to pull out of a tourism slump, the Aloha State now attracts only about 6.6 million visitors a year, 400,000 fewer than in 1990.

Heavily dependent on visitors from California and Japan, Hawaii suffered a double whammy when both markets sank into recession. After that, the industry tried to become more competitive, with big tour operators offering bigger discounts. The state has rebounded from 1993, when the number of visitors hit bottom at 6.1 million. Another 3% increase is expected this year. "I think we are on our way up," says Daniel Inouye, a Democratic U.S. senator from Hawaii.

But regaining the old momentum will be tough. Tourism rose each year between 1950 and 1990 with little effort. But now many bargain-hunting Americans complain about Hawaiian price gouging. Particularly galling to some is the so-called Kama'aina, or local rate, under which a seaside room in the Princeville Hotel on Kauai recently cost locals $165 a night and out-of-staters $410. (Tourism officials say the price discrepancies allow locals to enjoy amenities that they might otherwise be unable to afford.)

Another negative development for mainlanders: the decline in Waikiki, Hawaii's main mecca. The 1.5-mile tourist strip "suffers from being overcrowded, congested and having too much concrete," observes a 1994 state report. In a recent study of the 12,... rooms on Waikiki charging at least $150 a night, the consultants and accountants PKF Hawaii found that half were physically "substandard."



Peoria, Ill., vacationers Dave and Rose Scherer noticed that on their 1995 trip, when a cockroach skittered across the kitchen counter in their $155-a-night room. "We checked out right away," says Mr. Scherer, a data processor.

Hoteliers say they are aware some tourists perceive them as less friendly. Richard Kelley, chairman of the Outrigger Enterprises Inc. hotel chain, recently lectured in a local newspaper column: "Be nice to tourists." Mike White, general manager of Maui's Kaanapali Beach Hotel, also acknowledges that there has been a decline in hotel upkeep but blames higher costs.

Indeed, the hotels face a heavy tax burden. A "differential property tax" that the state allowed counties to impose on hotels about nine years ago is so onerous that "some hotels are discontinuing upkeep," says Joseph Toy, director of the Hawaii Hospitality Consulting Group at Coopers & Lybrand. On Ma... hotels pay $9 per $1,000 of valuation, compared with $6.50 ... other businesses. The money was earmarked for tourism b...

Please Turn to Page B10, Column 1

DOCUMENT CAPTURED AS RECEIVED

Attraction Of Hawaii Has Faded

Continued From Page B1

instead went to the counties.

"At the time we enacted that, the hotel industry was making all kinds of money," says state Sen. Joe Tanaka, who chairs the Senate's tourism committee. "Now we need to re-evaluate that."

The state also levied a 5% room tax about five years ago, ostensibly to help build Hawaii's first convention center. But as the city of Honolulu feuded over where to put the center, the state gave the tax money to counties for general uses. Ground wasn't broken until last August. About a year ago, the state floated bonds to finance the $335 million center—and raised the room tax another percentage point to help pay them off.

Unlike most other visitors bureaus, the Hawaii Visitors Bureau hasn't received any proceeds from the room tax to help pay for its operations. For this fiscal year, Hawaii's Legislature chopped the bureau's budget 20% to $23 million amid a state deficit. Legislative officials don't buy the argument that state funding is too small. "I think we give our right hand and left hand to the tourism industry," says Sen. Tanaka.

Meanwhile, Hawaii has increased operating costs for an airline industry that is vital to its resurgence. In 1990, the state asked Sen. Inouye to sponsor federal legislation letting it divert into highway work a $250 million surplus from a fund the airlines endowed for airport improvements. When tourism plunged, the state jacked up the carriers' landing fees and rents to help replenish the fund. The landing fee for a Boeing 747, for instance, jumped to $1,755 from $409, adding to the costs for carriers already struggling on Hawaii flights that carry a disproportionate number of nonpaying frequent fliers. Airline ticket prices, meanwhile, remained competitive.

In mid-1991, UAL Corp.'s United Airlines was blocked by local officials from entering the lucrative interisland business. United began curtailing its Hawaii flights almost immediately. The exodus was joined by other carriers, reducing scheduled passenger seats from the mainland to 1.3 million a year from 1.9 million as of early last year, when figures were last tallied.

A recent upswing in charter traffic and mainland flights has helped offset the drop, but not enough, critics say. It's so hard to get to Hawaii that on some busy weekends, airport officials say, some people can't get seats.

To mollify the airlines, state officials reduced the landing fees 25% in 1995. Meanwhile, Sen. Inouye calls the airline cutbacks "purely a business decision" and adds that tourism was so strong when the airport fund was diverted that he doesn't consider the move a mistake.

"If one could have predicted five to six years ahead of you the market was dropping, it would have been a different story," he says. "But who could have pre-

BENJAMIN J CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809
DEC 3 1996

MICHAEL D WILSON CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Ms. Helen J. Thomas Maddock
58 Puako Beach Drive
Kamuela, Hawaii 96743

Dear Ms. Maddock:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project.

The threat of a brush fire from increased picnicking and camping activities in the expanded park is expected to be minimized by the removal of dry vegetation and deadwood and its replacement with green healthy plants and picnic lawns that are regularly irrigated and maintained. Figure 2-9 of the Draft EIS shows a concept plan of circular concrete pads for family barbecues. These special park features, which will be located at all new family camp sites, are designed to minimize the hazard of fire.

Safety or as you describe it, "security", from potential fire hazard will be served by improved fire protection services that are planned with the increased and improved accesses within the park. From these improvements, the County Fire Department would be better able to service emergency calls.

We believe the State's tight financial situation will soon be over and the State will again be addressing its commitments to the public. In the near future, we hope to move forward with the planned park expansion to meet the continuing demand for additional park space. West Hawaii, as you may know, is one of the fastest growing regions in the islands, and the proposed improvements will help meet the residents' demand for more recreational opportunities.

We appreciate hearing your thoughts and concerns on the project. We will notify you of further State Parks' public meetings, if any, for this project.

Sincerely,

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

Opening Waiaka Bay more than the limited shoreline access now provided is a great plan. There are too few good beaches on the island of Hawaii. A park for all to enjoy is a much better utilization of the area rather than private ownership by a limited few. Public park use would provide for sanitation, better fire prevention, and enjoyment by all. Hapuna is overcrowded most of the time. Parking is better in Waiaka Bay.
Golf course is a good idea as long as it is public available to the Hawaiians.

Signed: [signature]
Date: 8-28-96

Name and address (please print):

Herb & Jackie McKelvy
P. O. Box 384506
Waikoloa, HI 96738

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P O BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
- ENGINEERING BRANCH
- PLANNING BRANCH
- TECHNICAL & SUPPORT BRANCH

STATE PARKS
WATER RESOURCE MANAGEMENT

Mr. Herbert McKelvy
P.O. Box 384506
Waikoloa, Hawaii 96738

Dear Mr. McKelvy:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion plan.

We appreciate your input on the proposed project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

I vote for "no action" for proposal to expand Hapuna Beach State Recreation Area.
Your State cannot even properly maintain the existing parkarea — overall water inadequate.
State cannot even complete paved boat ramp. That is now in process of building. Beach washes.
Too many golf courses in Kona, Kohala now — State + county cannot even provide services desired for the area and Parker area. Photos of Reef already damaged
Adjacent Community of Puako not informed of any discussions or proposals — We only got notice in Aug 29th 1996 and Response Needed Today, Aug 30 1996 — This is totally unacceptable as it stands.

Signed: Dr. + Mrs. Andrew L. Morgan
Date: Aug 30, 1996

Name and address (please print):
DR + MRS ANDREW L. MORGAN
44 Puako Beach DR
Kamuela, HI 96743

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

Dr. and Mrs. Andrew L. Morgan
44 Puako Beach Drive
Kamuela, Hawaii 96743

Dear Dr. and Mrs. Morgan:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project.

With expansion of the park, there will be an increase in park management and maintenance staff. This would mean improved security and upgraded safety programs. Included in the park master plan is the development of a new well at the 1,200-foot elevation of the Lalamilo land tract. This well is anticipated to provide the needed potable water supply for the expanded park's domestic uses.

Funding will be sought for the project in the next few years after planning and permitting are completed. Depending on the implementation of other public improvement projects, the State will develop the park in increments over a 12 to 13 year period, allowing the cost of the project to be more manageable. The plan also calls for a possible co-sponsorship of the golf course project with a private interest which could significantly reduce the State's share of the park expansion cost by more than 50 percent.

Although there are a number of existing and planned golf courses in West Hawaii, there are no public golf courses. Such a facility would provide a much needed amenity to the west side. We look forward to having a facility that offers green fee rates that are lower than the private golf courses, including those with kamaaina rates.

The proposed park will install septic tanks that will meet Department of Health standards. Additionally, preliminary arrangements have been made with the adjacent Mauna Kea Resort to connect and convey an allocated maximum amount of sewage to the resort's wastewater treatment facility. We anticipate that the new golf clubhouse, potentially one of the park's largest generators of sewage, will initially connect with the private collection system.

Notices on the August 22, 1996 meeting in Waimea were sent by mail to a number of State and County agencies, community organizations and area residents. Additionally, two issues of *The Environmental Notice*, published by the Office of Environmental Quality Control, announced the availability of the Draft EIS to the public. The comment period deadline for the environmental document was originally August 7, 1996, but was extended to August 30th. A copy of the Final EIS will be sent to you for your information.

We trust our response adequately addresses your concerns.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

DOCUMENT CAPTURED AS RECEIVED

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

I received this form 9-14-96. No possible way to respond by 8-30-96. Was away a few days in Hilo - Surgery

1. Reduce size of Plan to realism based on fiscal capabilities of State. Should we upgrade - Negro and - no jobless funds for golf

2. Take a good hard look at available domestic and irrigation water. Pulses could impact S. Kohala aquifer. V. Kohala water is possible.

3. Forget condemning private property at Wailea - The State is 20 years too late to consider this - Based on current real property values Pua could bankrupt the State.

4. The Original deals by the State to Re Wisheck, Boise, Treadwell (HB) Aquarena for Hilmar nothing -- some by inside Land Group should have had a claim. Revert to the State at that cost. *

5. Consider an Aquarena at Hapuna instead of a Golf Course. My Hapuna & Waikoloa included as more than 2 i 6 needed for the area golf courses.

6. Improve access to Waialea Beach - Crucial now to obtain as a place.

Signed: Leon A. Thevenin
Date: 9-14-96

Name and address (please print): LEON A. THEVENIN
104 PUAKO BEACH DRIVE
KAMUELA - HI 96743
(808) 882-7965

* For ex... the real property assessed for Tax Purposes was 1C Even Less than Puako. Selling the owners here Hollowness of Jubilee as to value ??

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
  STEWARDSHIP BRANCH
  PLANNING BRANCH
  TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Mr. Leon A Thevenin
104 Puako Beach Drive
Kamuela, Hawaii 96743

Dear Mr. Thevenin:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project.

The proposed park expansion is a medium-range plan that is intended to meet the growing recreational needs of the region. During the plan's 12 to 13 year implementation period, there is a potential for obstacles such as funding shortages and priority shifts, but we hope not to lose sight of the overall development objective for the area.

The State is planning to develop a new well at the approximately 1200-foot elevation of the Lalamilo land tract to supply domestic water to the park facilities and golf clubhouse. On-site brackish wells will be developed for landscape irrigation. We anticipate these wells will be adequate to serve the park's water requirements. Use of North Kohala water for the Hapuna Beach State Recreation Area Expansion will have too many uncertainties and raises too many questions for the State to move forward with the project.

We acknowledge the cost of acquiring the private lots at Wailea will be substantial; however, efforts definitely will be made to minimize the expense during project implementation. An announcement of our intentions to purchase the private parcels was made in 1987. Interestingly, in recent years, many owners at Wailea have continued to make improvements as well as construct large homes. Immediate acquisition of these lots after the announcement would have been desirable to keep the cost down, but funding was limited at the time and only two parcels were acquired. Acquisition of the remainder of the properties should coincide with the development of the park expansion, but will be dependent on appropriations from the State Legislature.

We do not believe there is a strong enough demand for an aquarium in South Kohala. In the future, when the region is further developed, this idea could be explored. It is possible that a private enterprise might be interested in this concept.

We would improve the existing dirt road to Wailea Beach but it would not be enough to accommodate emergency vehicles and fire trucks. For that purpose, a smoother and straighter road would be necessary. It would also be slightly wider to accommodate two-way traffic.

We appreciate your concerns and input on the proposed project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

Public Comment Mail-in Form
Hapuna Beach State Recreation Area Expansion

This form offers a convenient way for you to provide comments regarding the Draft Environmental Impact Statement for the Hapuna Beach State Recreation Area Expansion. Write your comments, fold the form, staple or tape, stamp, and mail by August 30, 1996 to Belt Collins Hawaii, 680 Ala Moana Boulevard, First Floor, Honolulu, Hawaii 96813; Attn: Glen Koyama.

See attached comments. -

Signed: [signature]
Date: 27 Aug 96

Name and address (please print): Constance A. Treadwell
853 Vallejo St.
San Francisco, CA 94133

Family History

Let me start by giving you a brief synopsis of the history of my family in the Islands, a history of which I am very proud. My great great grandparents, Nicholas and Caroline Greenwell, arrived in Hawaii in the 1850's, so it is a relatively long history. Their granddaughter, Geraldine Bryant Treadwell, is my grandmother, making me, my brothers and cousins, the fifth generation of this Hawaii lineage. My grandfather, Richard T. Treadwell, a Texan by birth, became a doctor as was the tradition in his family, and came here in the 1920's to be the doctor for the sugar plantations of North Kohala. For the next 20 years he devoted his attention, his energy, and his love to the people for whom he cared, and it is said that these were the happiest years of his life. During these years he and my grandmother married and had three children, Beth, Richard and Florence. In the 1930's they acquired the property at Wailea Bay, which at the time was accessible only by boat or by foot. They would come in with supplies from Kawaihae and spend time enjoying the beauty and solitude of Wailea. Granddaddy and Tutu added a couple of bedrooms to the existing fisherman's cottage to accomodate the family, and a telephone so the doctor could be reached. In August 1941 my grandparents moved to California where Granddaddy completed a one year post-graduate program at Stanford University Medical School. With the war going on, he established his medical practice in San Luis Obispo, California. However, they kept their cottage at Wailea. To this day I am deeply moved by the reminiscing of the old-timers I occassionally meet in Kohala who still speak so glowingly and respectfully of Dr. Treadwell, because he touched all of their lives. There were many of them at his memorial service in 1988 at St. Augustin's in Kapa'au where he is buried alongside Tutu and her parents.

The relationship of the family to the Islands remained central to their hearts and identities. Instead of a weekly visit to Wailea they now visited yearly, and were even more appreciative of Hawaii's charms. Their son, Richard, my father, brought my mother to Wailea on their honeymoon. And the connection to the place took root in the next generation as, through the years, they brought their children, my three brothers and me, on annual trips so we could grow up enjoying Wailea Bay and knowing our Hawaii heritage. My cousins' families would do the same, and sometimes we would meet here, playing in the water and the sand. On these trips we would visit the many relatives and friends so dear to my father and his parents.

Leaving Wailea is a very painful thought for us. It is not simply a matter of relocating to a new vacation spot or reinvesting these resources elsewhere. We can not replace the emotional and historic meaning of this place in our lives. We grew up here and our sense of connectedness to Wailea Bay spans not only our lifetimes but that of generations before.

Relationship to the Land

My generation, the current owners of the Treadwell property at Wailea, continues to have the same respectful relationship to the land that my grandparents did. Through their example and our parents' after them, we have deep commitment to the preservation of this fragile yet ageless beach. We use it respectfully and encourage other people to do the same.

As the family has grown and as the members of my generation desire our children to also partake of the the tradition we have at Wailea, we have added two more houses on

our property, one owned by the Richard R. Treadwell family and the other owned by the Florence Treadwell Hosbein family. They are single family houses built primarily for each family to use as we have used the original house over the years. For me, an architect by profession, the opportunity to plan a house at Wailea was an opportunity to illustrate our essential conservationist bent. I took very seriously my responsibility to design the new house appropriately with respect ot the landscape, both in terms of the appearance of the structure itself and its impact (or lack therof) on the beach. A main objective was to be as unobtrusive as reasonably possible. By siting the house back from the beach and introducing plantings that would help to screen the house from the beach, I approached the development of this lot from a low-impact point of view. Taking advantage of the depth of the lot, the narrow side of the house faces the beach and much of the house recedes back, invisible to beach users. The natural wood siding also helps the house blend with rather than stand out from its setting. Much of Wailea development whether old or new has been approached in this manner. And I would argue that it is because of this respectful and unobtrusive use of the land rather than despite it, that the greater Wailea environment has remained intact and preserved.

Many people come to use this beach and for various reasons. Its unique layout and topography provide a variety of experiences not available in more "planned" park environments. It therefore makes sense, and here we concur with the DEIS, that it be developed not as an intense-use park like Hapuna, but as something similar to what has been occurring there for years - a limited-use park. A critical aspect of the development of the park is the installation of toilet facilities. Another critical issue is regular enforcement of the no-camping rule. With these two changes alone, a much safer park can be achieved quickly with little monetary expenditure by the state, and with minimal disruption to the fragile beach environment. We have expressed and continue to express an interest as private property owners to work with the state in achieving these objectives.

Constance A. Treadwell

cc: Richard R. Treadwell

David T. Hosbein

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
ENGINEERING BRANCH
PLANNING BRANCH
TECHNICAL & SUPPORT BRANCH
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

DEC 3 1996

Ms. Constance A. Treadwell
853 Vallejo Street
San Francisco, CA 94133

Dear Ms. Treadwell:

Environmental Impact Statement (EIS)
Proposed Hapuna Beach State Recreation Area Expansion
South Kohala, Hawaii

Thank you for returning our public comment mail-in form and offering your comments regarding the proposed Hapuna Beach State Recreation Area Expansion project.

Your family history was most interesting and your personal connection to the land was deeply felt. We concur that Wailea Bay is a special place and deserves careful consideration. We have taken needed steps to assure that planning of this area will preserve all that is precious and unique.

The very beauty and charm of Wailea that you cherish and hold dear is the very same beauty and charm that the State wishes to offer to the people of Hawaii. It is a resource that has wide public appeal and is considered a regional treasure. We would like to share this treasure with the rest of the state.

Wailea is being planned as a walk-in beach, and a comfort station is proposed for the convenience of beachgoers. Future security personnel will make routine checks of Wailea beach to assure no camping activities occur in the area. According to our current plans, no camping sites will be allowed near the bay. These activities are planned above Kanekanaka Point between Wailea and Hapuna Bay.

We appreciate your concerns and input on the proposed project.

Sincerely,

Andrew M. Monden

ANDREW M. MONDEN
Chief Engineer

AM:ek
c: Warren Harrison, Harrison Associates
Glen Koyama, Belt Collins Hawaii
State Parks Division, DLNR

CHAPTER 8
PUBLIC INPUT FROM COMMUNITY INFORMATIONAL MEETINGS

On August 4, 1992, the State Parks Division held a public informational meeting in Waimea to present the proposed Hapuna Beach State Recreation Area Expansion Master Plan. The presentation covered the physical elements of the proposed project. After the presentation, comments and questions were received by the State officials and their consultants. A summary of the comments and questions is provided at the end of this section.

Since that initial meeting in Waimea, the master plan has undergone modification and a Draft Environmental Impact Statement has been completed. On August 22, 1996, State Parks held a second public informational meeting in Waimea to brief the community on the updated plan and Draft Environmental Impact Statement findings. The meeting was conducted by a facilitator and was attended by 34 people. Comments and questions of clarifications from the audience were received and recorded. A summary of the meeting agenda and public input is presented in a group memory report following the notes of the first meeting.

It was also announced at the second meeting that the deadline for the Draft EIS comments was extended from August 7 to August 30, 1996. Members of the audience were also told that if they had additional comments on the project after the meeting, they could mail in the comment form (which were available at the rear of the meeting room) to the State by the end of August. Returned copies of the mail-in forms along with the State's response are provided in Chapter 7 of this EIS. The meeting began at 6:30 pm and concluded at approximately 9:00 pm.

Comments and Questions Received at the
Public Information Meeting for the
Hapuna Beach State Recreation Expansion
State Office Complex, Waimea, Hawaii
August 4, 1992

A. Project Schedule, Phasing, and Funding:

1. What is the project schedule?
2. Phases of development; can parts of it be developed without infrastructure? Which ones first?
3. Where is the money going to come from?
4. Instead of using funds to condemn property, use it for facilities instead.

B. Park Plan/Facilities:

1. Locations of restrooms?
2. Parking: how many stalls? Too many parking spaces at Wailea.
3. People like grassy areas (e.g., Mauna Lani).
4. Camping areas should be closer to the beach at Hapuna. Put camping at the site of the existing A-frames.
5. Preserve the kiawe trees at Wailea.
6. Use composting toilets.
7. The trail on the north side of the park needs to be cleaned, widened, and signed. During winter months, this trail provides access to the north end of beach.
8. Include the north end of the beach fronting the Mauna Kea Resort property as part of the park master plan. Concern that the beach not become a private enclave of the hotel.

C. Park Capacity:

1. What is the physical capacity of this area?
2. What is the projected park use? How many people? Peak?
3. What is "recreation demand"?
4. During the winter, the sand in the north part of Wailea beach disappears because of high surf, so this is a "part-time" beach.

D. Park Management and Operations:

1. Priority should be given to enforcing existing laws and rules at Hapuna/Wailea to make it safer for the public.
2. Should have interpretive programs at parks.
3. Should provide different uses at different parks.
4. What kind of water safety program will there be at Hapuna/Wailea?
5. Keep Hapuna and Wailea separate; these are two different kinds of places.
6. The State needs to manage uses to retain the Wailea ambience and Hapuna environment.

E. Golf Course:

1. How will the golf course be managed?
2. Concern about water quality degradation due to pesticides, etc.
3. Golf course can serve as a "fire break."
4. Instead of having two municipal courses in West Hawaii, combine the two ideas into one. Where? Hapuna or Kona?
5. Private courses all have public play requirements. Why spend money for this course if golf is already available at reasonable cost?
6. Need to have a "bio-rational" golf course that does not require toxic chemicals.
7. Need to distinguish between private courses that allow public play and municipal courses. Difference in affordability and required use of carts.

F. Land Use:

1. What are the land use designations for the site?
2. Is this use of the land appropriate?
   - Hawaiian lands.
   - Land ownership?
   - Ceded lands/OHA
3. Rezone all land to Conservation to prevent commercial uses (CV 10).

G. Wastewater System:

1. Puako is a critical wastewater disposal area. Can Mauna Kea Resort extend its wastewater system to Puako?
2. Water Quality needs to be protected.
3. Cost of wastewater system?
4. Individual wastewater systems; what are these? Are septic tanks sufficient to protect the bay?
5. What will the Mauna Kea Resort sewage treatment plant serve?
6. Sewage treatment plant leach field (golf course in Kona).

H. Hazards:

1. Need to address flood hazards. Flood zones; effect on picnic areas?
2. High winds.
3. Fire hazard—the risk is increased.

I. UH Marine Science Education Center:

1. Five acres are not enough.
2. Not necessary for all facilities to have ocean frontage—only the ocean dependent facilities. Others (classrooms, visitor accommodations, etc.) can be located further mauka.

J. Other Comments/Questions:

1. Get input from Hilo/Kona folks; Hapuna is a regional/islandwide resource.
2. Location of bypass road?
3. Need to set priorities for water use.

Department of Land & Natural Resources

Hapuna Beach State Recreation Area Expansion

Public Information Meeting

August 22, 1996
University of Hawai'i Extension Service Meeting Room
State Office Complex, Waimea, Hawai'i
6:30 p.m. - 9:00 p.m.

GROUP MEMORY

WELCOME / INTRODUCTIONS

The meeting began with a welcome by Ralston Nagata, Administrator of the Department of Land And Natural Resources (DLNR) Parks Division. He thanked community members for attending the meeting and introduced Andrew Monden and Dennis Imada, DLNR Engineers, consultants Warren and Linda Harrison of Harrison Associates, and Sue Sakai and Glen Koyama of Belt Collins Hawaii.

The meeting facilitator, Alice Paet-AhSing, was introduced. She welcomed community members to the meeting. Ms. Paet-AhSing of Resolutions Hawaii serves on the Judiciary's Center for Alternative Dispute Resolution (CADR) panel of mediators and facilitators. She explained that a request was made to have a neutral party assist in the process and management of the meeting. She clearly expressed that the meeting was a public informational meeting and not a public hearing, and that it was not the intent to arrive at any decisions on any aspects of the plan.

Michael Luke Aitken and Jay Ah Sing, served as the group's recorders. Their role was to assist in the recording of comments on the proposed expansion project and DEIS. Community members were tasked with the responsibility for making sure that their comments were summarized and captured accurately. The group memory will provide the State and their consultants a record of the community's comments, and the concerns identified will be addressed in the EIS. The group memory of the meeting's proceedings will serve as a documentation of public input and will be appended to the final EIS.

PRESENTATIONS

Warren Harrison of Harrison Associates provided an historical overview and background of the project.

Sue Sakai of Belt Collins Hawai'i presented a graphic rendering of the project conceptual plan and described the various elements of the project.

Ms. Sakai reported information on the tentative schedule for construction and plan implementation. She explained that in accordance with EIS requirements, three alternatives are included in the DEIS. She added that the alternatives could be modified to include or exclude any specific element(s) of the proposed plan. The three alternatives are:

- Development of all elements of the plan, including the golf course, located mauka of the highway and camping and picnic areas, hiking trails, road improvements and parking makai of the highway, as well as acquisition of private properties at Wailea Bay.
- All elements makai of the highway, excluding the golf course.
- No action, continued use of existing facilities, no expansion.

Glen Koyama of Belt Collins Hawaii summarized the DEIS findings. He discussed what benefits might result, as well as types of impacts and corresponding mitigation measures.

PUBLIC COMMENTS

Community members were asked if there were any questions about information that had been presented. Clarifying questions were responded to. Responses were made by G. Koyama unless otherwise noted. Community members were also asked to identify any other issues that need to be included in the EIS. The facilitator expressed that comments were welcomed.

- The Hapuna Beach State Recreation Area Expansion plan should be an economically sound plan and the EIS should include a fiscal analysis. It is important to insure that public funds are used efficiently. I would like to know that any element of the plan that is implemented is weighed for best use of public funds. The plan needs to be a real plan.

- I do not feel that the golf course is feasible. There are costs associated with development of a water well. It is questionable as to whether reasonable rates can be charged and have play at the course remain attractive.

- The EIS needs to include a study of a projected operating budget for the proposed expansion plan once it is completed. We need to know that operation and maintenance aspects are included in determining feasibility.

- Who owns the land within the proposed expansion?
  Response: Most of the land is state owned, with the exception of private lots fronting the beach and various utility and access easements.

- Why buy out the private landowners adjacent to the beach? A cost analysis and an assessment to determine the feasibility of land acquisition should be factored

into the expansion plan and included in the EIS. Have funds been allocated for the acquisition?
Response: The private landowners are located where it currently prevents the State from developing a continuous shoreline park with unobstructed view and physical access to the beach. A cost analysis on the land acquisition was not factored into the plan. Acquisition was a state policy objective. The State's functional plan policy indicates that the State shall acquire beach land to meet recreational demand, take advantage of shoreline resources and to have free, unobstructed access to the beach. Funds are not presently allocated for acquisition.

- Where are the walking and biking trails within the park plan?
  Community members were directed to the map that was presented and Sue Sakai pointed out the walking paths and hiking trails. She noted that the historical sites would be incorporated throughout. She stated that while the trails were not available to bikers, the roads in the area would certainly be.

- Are we constrained to the three alternatives described, or will other alternatives be considered?
  Response: Sue Sakai explained that the three alternatives presented were developed to comply with basic requirements for an EIS. She expressed that there is the flexibility to modify any of the alternatives and other alternatives and options will be considered.

- It is absurd to acquire lands and operate wells to support water needs for the park. The golf course will require an enormous cost to maintain and is not economically feasible without associated residential development.

- Without a good fiscal analysis, the plan could go awry. Let's have a plan that is based on good fiscal planning.

- Will utilities be underground within the park?
  Response: Yes.

- How is the waste water/sewage system planned?
  Response: Comfort stations will have individual septic systems. The main golf club house will be served by a central septic tank, but more likely by a connection to Mauna Kea Resort's western treatment facility.

- The cost of acquiring the privately owned parcels should be part of the financial analysis of the project.

- The state park has been planned to accommodate a regional demand. This is a state park, there should be public informational meetings held throughout the state (i.e., in Hilo and Kona as well as in Waimea).

- Areas for group activities (e.g., volleyball) and other recreation for campers/picnickers are needed. Why not acquire mauka lands instead?

- Perhaps we should be selling some of the land to finance this project rather than making it more costly by purchasing the private parcels.

- It seems that the extremely large cost for development of this project would be better spent developing better access and sanitation facilities at beach parks all along the coast.

- There should be some discussion in the EIS about the use of ceded lands for a potentially profit-making activity such as the proposed golf course.

- Was a study of future golf course use and demand trends on the Big Island included on the DEIS? Was the Waimea Country Club included in this study? The study needs to take into account the way rates and thus availability fluctuates on a seasonal basis on this island.
  Response: A study was done and is included in the DEIS.

- The analysis of the frequency of public use of the Puako boat ramp is clearly inaccurate. The methodology of the analysis was based on much too small a time period of study. As a result, the reported use is a gross underestimate.

- The size of Wailea Beach depicted on the map presented seems exaggerated. The beach could not possibly accommodate a thousand or so people daily.
  Response: The measurements used in drawing the map were taken from an aerial photograph. While the size of the beach does fluctuate seasonally, the DLNR's intention is to look at the potential for the beach.

- Will the trees along the beach be removed?
  Response: There will be no changes to the beach and structures will not be built on or near the beach. Parking will be located more than 400 feet mauka of the beach. As planned, this is a walk-in beach, except for a drop-off loop for the physically challenged and recreational equipment drop-offs.

- Will the infrastructure be built first? At what point will private property be acquired?
  Response: Infrastructure will be built first, projected in 1998-1999. Acquisition will be timed to fit with the rest of the construction schedule and as funds are made available.

- I would like to see private residences remain privately owned; however, if they are acquired by the State, I want an assurance that the structures are removed and not left to deteriorate and invite vandalism.

- The usage study done in 1992 was a two week survey that took place in the month of June. The results stated that 92 people per weekend is expected. These figures do not seem to be a reliable base for projection.
  Response: More current studies have been done, resulting in about 1050 people at Hapuna during peak hour, and 180 people at Wailea by the year 2010.

- Creating picnic areas at such a cost for few people seem way out of proportion.
  Response: The plan considers demand and need for picnic areas based on use projections for the whole park through the year 2010. The size of the picnic area is reasonable with projected use.

- Some private lands at Wailea Bay have already been acquired by the State in 1985 at a substantial cost ($700,000 to $2.8 million). Is it essential to the development of the park that more be acquired, or only desirable?

- The privately owned parcels should not be condemned. They should only be acquired if freely offered for sale.

- Is acquisition a done deal?
  Sue Sakai: Acquisition is contingent on the availability of funds.

- Allowing the present residents who own the lots at Wailea to live in their homes, should be a condition of acquisition. That would soften the blow and reduce acquisition costs.

- Funds for acquisition could be better spent elsewhere. These funds should be used to develop the Kona Coast State Park, to relieve the current stress of close to a thousand people per day on a busy weekend.

- If the privately owned parcels are condemned, there should be assurance that the project is completed in a timely manner. I do not want to see the acquired properties sit vacant and open to vandalism.

- I would like more details on the archaeological sites within the project.
  Sue Sakai: Response: Determinations on significance is based on the eligibility of a site to be placed on the National Registry of historic places.

- Why not defer the Hapuna-Puako road improvement until after the acquisition issue is resolved?

- The areas set aside for picnicking are too windy for that use much of the time.

- Where does the pressure to buy out the private landowners come from? Where did that plan originate?
  Response: It's one aspect of BLNR's policy for the area.

- The park expansion could go forward independently of the private land acquisition process.

- Incremental development of the park should continue. We need more recreational areas on the Big Island.

- An analysis of the possible expansion scenarios is needed. We need to compare the scenario of working with the landowners with the scenario of buying them out, to see which actually serves the public better, especially given the present fiscal constraints.

- A possible alternative to consider would be to make minimal improvements to have at least access, maintain sanitation, and not allow camping.

- Plans that have been proposed for other golf courses on the island need to be included in this plan's study on golf course feasibility.

- What kinds of camping are being considered?
  Sue Sakai: All types of camping are being considered, e.g., camp areas for fishermen, campgrounds to accommodate tents, and large group camping areas.

- The potential loss of property taxes presently being paid by the private landowners at Wailea Bay needs to be considered and weighed when determining the merits and downside of this plan.

- Water is a critical issue. Substantial yield for this coast has already been allocated. Water resources to support the park's needs and long range availability of those resources need to be considered.

- Landscaping should be designed with hardy plants that require minimal water (xeroscape species) and resistant to damage imposed by heavy winds.

- Historically, within the proposed expansion area, there has not been evidence of much habitation. This is an important clue to the suitability of the area for intensive public use.

- I would like to see a pavilion for dancing added to the plan. A dance pavilion should be designed and planned in a way that music and sounds that would come from the pavilion are somehow buffered by placement of the structure, or with hedges or barriers for noise abatement.

- Will the final EIS treat the concerns any differently than the DEIS?
  Facilitator: If new information or comments are received, they will be addressed in the EIS.

- In addition to the three alternatives presented, an alternative should be included that considers the concept of a public-private partnership, where the State works with the private landowners to achieve needed access.

- If private landowners are allowed to remain, privacy and security must be considered.

- If development is to be incremental, it should be done only in the context of a larger, long term plan in order to get the best use of funds and resources.

- Safety and maintenance should be at a higher standard and priority than is presently the case at state parks.

- The State should look at the situation at the old Kona Airport Park for guidelines on to how to deal with private homeowners located within the park.

- Will there be a park ambassador for Hapuna?

- The community should be involved in managing and maintaining state parks. Such a program or mechanism should be developed as part of the park's maintenance plan.

- A traffic study needs to be done for Puako Beach Road to assess the impact from the additional traffic on the Puako community..

- Are there any unimproved private lots fronting Waialea Bay? The growth potential of the area must be considered as part of the plan and planning process.

- Air pollution near the Hapuna Prince under-pass should be addressed if it impacts the park in any way. Its source should be identified in order to insure that the park development does not create a similar condition.

- What is the relative priority of the plans for Hapuna expansion versus the development of Kona Coast State Park? This information should be discussed somewhere, perhaps in an executive summary, in the EIS.

- Will the development of this expansion affect or delay the development or improvement plans for other Big Island state parks?

- The projected increase in fishing with the proposed expansion, and impact to fish and honu (turtle) populations in the area, need to be included in the EIS.

- The EIS should consider and include a discussion on the historical connections and living history associated with the private landowners at Waialea Bay. The State should take the time to talk with the private landowners who may face condemnation.

- A discussion on ethnography and cultural impacts should be included in the EIS. Oral histories and the meaning and correct spelling of place names should be verified and corrected if necessary.

- The area planned for the golf course should be planned for additional campground instead.

- Access within the park should give preference to bicyclists and pedestrians over vehicles, to minimize vehicle and traffic impacts to the park.

- I prefer the no action, or less action alternative. There should be less camping, less parking, and reduced access, thus reducing impacts.

- When planning for the Kona Coast State Park, the advisory committee discussed ways to minimize impacts, and one recommendation and was to leave the road as is and have minimal road improvements to maintain safety. The unimproved road would serve as a deterrent to many vehicles, and would control access to the beach.

- Golf is a family activity and not exclusionary.

- I support no expansion. We don't need more roads. We need areas that are safe, sanitary, and usable as they are now. We need to maximize human resources to insure appropriate uses of this area. There should not be any spear fishing or cross netting. There should be more focus on enforcement and control over drinking and drug use.

- Representative Tarnas stated that he would find it difficult to request state funds for acquisition of the lots at Wailea.

- Need to project if the income generated by golf course usage will pay for maintaining the course. The 20% to OHA should also be considered.

- Will there be other income generated by the park to cover maintenance costs?

- There should be a community advisory committee for this project in place before any development proceeds.

- Are there any plans to link Hapuna State Park with Spencer Beach Park? Miloli'i is over-crowded. Are other areas being explored for community parks? This should be discussed in the EIS.

- Remember, the area is dry and a fire hazard.

- As a landowner, I support the idea of working with the State to cooperatively address the impacts of this park expansion. The community would like to be a part of the planning and development process.

- We do need additional recreational areas. We need to keep it simple, work together, and cooperate.

- The DLNR should consistently and continually seek community input and cooperation in both their decision making and implementation actions.

NEXT STEPS

Community members were reminded that the EIS is being finalized and that any additional comments must be submitted by August 30, 1996. Comment sheets were made available and community members were encouraged to take a few to share with neighbors and other community members who may not have been able to participate in this meeting.

ADJOURNMENT

With no further comments, the meeting ended at 9:00 p.m.

Hapuna Beach State Recreation Area Expansion
Public Information Meeting
August 22, 1996
University of Hawai'i Extension Service Meeting Room
State Office Complex, Waimea, Hawai'i

ATTENDEES

Robert L. Bates	Bates Commercial Group
L.C. Beckvold	Kamuela, Hawaii
John Broussard	Kawaihae, Hawaii
Anne E. Field-Gomes	Waimea Community Association
Lynn Flores	Waimea Hawaiian Civic Club
L. Lee Mu Go	Kamuela, Hawaii
David B. Gomes	Waimea Community Association
Deborah D. Harkins	Kamuela, Hawaii
Marni Herkes	Kona Kohala Chamber of Commerce
David Hosbein	Santa Monica, California
Barbara Kopra	Kamuela, Hawaii
Lynn Lee	Office of Hawaiian Affairs
Peter L'Orange	Hawaii Leeward Planning Conference
Mike Lowrey	Kurtistown, Hawaii
Tom Mader	Kamuela, Hawaii
Ruby McDonald	Office of Hawaiian Affairs
Leroy Montana	Kamuela, Hawaii
Greg Mooers	Mooers Enterprise
Benjamin Moore	Kamuela, Hawaii
Patricia O'Kieffe	Kamuela, Hawaii
Rodney T. Oshiro	DLNR/DOFAW Na Ala Hele
Braley Pastoniro	Kamuela, Hawaii
Ann Peterson	Peoples Advocacy for Trails Hawaii
Kelly Pomeroy	Kawaihae, Hawaii
George Robertson	Kawaihae, Hawaii
Phyllis Sellens	Phyllis Sellens & Company
Amy Soma	Kamuela, Hawaii
Charles K. Supe	DLNR Parks Division
David Tarnas	State Representative
Mabel K. Tolutino	Waimea Hawaiian Civic Club
Constance Treadwell	San Francisco, California
Randy Vitousek	Cades Schutte
Barbara Wagsstaff	Kamuela, Hawaii
M/M William White	Kamuela, Hawaii
Bob Witthans	Kawaihae, Hawaii

CHAPTER 9
ORGANIZATIONS AND INDIVIDUALS WHO ASSISTED IN THE PREPARATION OF THIS EIS

The environmental impact statement was prepared for the Department of Land and Natural Resources, Division of State Parks by Harrison Associates in association with Belt Collins Hawaii and Pedersen Planning Consultants with input provided by subconsultants. The following were involved:

Harrison Associates

Warren M. Harrison	Principal in Charge

Belt Collins Hawaii

Joe Vierra	Principal in Charge
Susan A. Sakai	Project Manager
Glen T. Koyama	*Senior Planner*
Lesley A. Matsumoto	Environmental Scientist
Sarah Young	Environmental Scientist
Maria Stephens	Planner
Royden Ishii	Civil Engineer
Todd Yonamine	Jr. Civil Engineer
Amy Yamakawa	Graphic Designer
Paul McDonald	Word Processor, Editor
Millie Litsey	Word Processor

Pedersen Planning Consultants

Jim Pedersen	Principal in Charge

Subconsultants

Char & Associates	Botanical survey
Charles L. Murdoch & Richard E. Green	Fertilizer and pesticide impact study
Harding Lawson Associates	Soil study
Marine Research Consultants	Marine environmental study
Pacific Planning & Engineering, Inc.	Traffic analyses
Paul H. Rosendahl, Ph.D., Inc.	Archaeological inventory survey
Ronald N. S. Ho & Associates	Electrical requirements
Tom Nance Water Resource Engineering	Water and irrigation requirements
John Clark, Ocean Resource Consultant	Ocean recreation survey

CHAPTER 10
REFERENCES

Belt Collins & Associates (November 1992) *Drainage Report for Hapuna Beach State Recreation Area Expansion Master Plan.*

Belt Collins & Associates (October 1990) *Final Supplemental Environmental Impact Statement, Mauna Lani Cove, Mauna Lani Resort.*

Belt Collins & Associates (December 1987) *Final Environmental Impact Statement, South Kohala Resort.*

Bowles, S.P. (1974) *Evaluation of the Basal Brackish Lens Between Anaehoomalu Bay and Kawaihae, Hawaii.* Prepared for Olohana Corp. and Mauna Loa Land, Inc.

Bruner, Phillip L. (February 21, 1984) *An Avifaunal and Feral Mammal Survey of Mauna Kea Properties, Inc., Hawaii.*

Char & Associates (February 1994) *Botanical Survey, Hapuna Beach State Recreation Area Expansion, South Kohala District, Island of Hawaii.*

Clark, John (May 10, 1991) *Ocean Recreation Survey for Hapuna Beach State Area Expansion.*

Clark, John R.K. (1985) *Beaches of the Big Island.*

County of Hawaii (November 1989) *The General Plan, Hawaii County.*

_____ (November 1986) *Hawaii County Zoning Code,* Amended November 1986.

_____ (December 1991) *Hawaii County Water Use and Development Plan* (Plan Revision Draft).

_____ (September 1984) *Kawaihae-Puako Zone Map,* June 1986, and North & South Kohala Districts Zone Map.

_____ (no date) *Special Management Area Rules and Regulations.*

Edward K. Noda & Associates (1986) *Hawaii Ocean Science and Technology Park: First Increment Design, Oceanography Criteria for Design and Deployment of the Cold Water Pipe System.*

Federal Emergency Management Agency (September 1988) *Flood Insurance Rate Map, Community Panel 0277C.*

Harding Lawson Associates (June 21, 1991) *Geotechnical Consultation, Hapuna Beach State Recreation Area Expansion, South Kohala, Island of Hawaii.*

Kanehiro, B.Y. and Peterson, F.L. (1977) *Groundwater Recharge and Coastal Discharge for the Northwest Coast of the Island of Hawaii: A Computerized Budget Approach.* Technical Report No. 110. University of Hawaii, Water Resources Research Center.

Letters to Belt Collins Hawaii from private residents (dated November to December 1993) responding to Environmental Impact Statement Preparation Notice for Hapuna Beach State Recreation Area Expansion.

Loomis, Harold G. (1976) *Tsunami Wave Runup Heights in Hawaii,* Hawaii Institute of Geophysics, University of Hawaii, Tech. Report 76-5.

MacDonald, G.A., Abbott, A.T., and Peterson, F.L. (1983) *Volcanoes in the Sea, The Geology of Hawaii,* University of Hawaii Press.

MacDonald, G.A., Shepard, F.P., and Cox, D.C. (1947) *The Tsunami of April 1, 1946 in the Hawaiian Islands.*

MacDonald, G.A., and Wentworth, C.K. (1952) *The Kona Earthquake of August 21, 1951, and Its Aftershock,* Pacific Science, v. VI.

Marine Research Consultants (1991) *Baseline Assessment of the Marine Environment in the Vicinity of The Hapuna Beach Recreational Area, South Kohala, Hawaii.*

Mullineaux, D.R., and D.W. Peterson (1974) *Volcanic Hazards on the Island of Hawaii* (U.S. Geological Survey Open File Report 74-239).

Murdoch, Charles L. and Green, Richard E. (May 28, 1991) *Assessment of the Environmental Impact of Fertilizers and Pesticides on the Proposed Golf Course of the Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii.*

Nance, T.F. (1981) *A Proposal to Develop Groundwater for Domestic Use at Puukawaiwai, South Kohala, Hawaii.*

State of Hawaii. State Functional Plans, 1989, 1990, and 1991.

_____ Department of Agriculture (January 1976) *Agricultural Lands of Importance to the State of Hawaii: Sheet H-15.*

_____ Department of Business, Economic Development & Tourism (June 1994) *Data Book* 1993-94, *A Statistical Abstract.*

_____ Department of Health, Clean Air Branch. Hawaii Air Quality Data, January 1988-December 1990. Annual DOH Summaries 1991 to 1993.

_____ Department of Labor and Industrial Relations (1993) *Employment and Payrolls in Hawaii, 1992.*

_____ Department of Land and Natural Resources (1986) *Rainfall Atlas of Hawaii.*

_____ Department of Land and Natural Resources (December 1990) *State Recreation Functional Plan, Technical Reference Document.*

_____ Department of Land and Natural Resources (1990) *State Comprehensive Outdoor Recreation Plan.*

_____ Department of Taxation. Tax Map Key: 6-2-2, 6-6-01, 6-6-02, and 6-9-01.

_____ Division of State Parks (December 1993) *Master Plan Report R-90, Hapuna Beach State Recreation Area Expansion (Prefinal Draft).*

_____ Hawaii Administrative Rules (1995) Title II, Chapters 54, 59 & 60; Title 13, Chapters 236 & 256.

_____ Hawaii Revised Statutes (1990) Chapters 103, 188, 205, 205A, 226, 262 and 343.

_____ Hawaii Revised Statutes (1992) Chapter 103-24.6.

_____ Land Use Commission (January 9, 1990) *Land Use District Boundary Map, H-15,* Amended January 9, 1990.

_____ Office of the Governor (1995) *The Hawaii State Plan.*

_____ Office of State Planning (1992) *State Land Use District Boundary Review - Hawaii.*

_____ (1993-94) *The State of Hawaii Data Book.*

Pacific Planning & Engineering, Inc. (February 9, 1995) *2010 Traffic Impact Assessment Report for Hapuna Beach State Recreation Area Expansion.*

Pedersen Planning Consultants (April 1995) *Economic and Financial Analyses, Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii.*

_____ (April 1993) *Recreational Demand and Capacity Analysis, Hapuna Beach State Recreation Area.*

Personal communication with David Patton, Kona Community Hospital Administrator, dated August 1995.

Personal communication with Manuel Anduha, Kohala Hospital Administrator, dated August 16, 1995.

Rosendahl, Ph.D., Inc., Paul H. (February 1994) *Phased Archaeological Inventory Survey, Hapuna Beach State Recreation Area Expansion Project, Phase III - Data Analyses and Final Report.*

Stearns, H.T. and MacDonald, G.A. (1946) *Geology and Groundwater of the Island of Hawaii.*

Tilling, R.I., Koyanagi, R.Y., Lipman, P.W., Lockwood, J.P., Moore, J.G., and Swanson, D.A. (1976) *Earthquake and Related Catastrophic Events, Island of Hawaii, November 29, i 975.*

U.S. Department of Agriculture, Soil Conservation Service (December 1973) *Soil Survey of Island of Hawaii, State of Hawaii.*

_____ Soil Conservation Service, Engineering Division (June 1986) *Urban Hydrology for Small Watersheds.*

U.S. Weather Bureau (1967) *Climates of the States: Hawaii.*

U.S. Department of Commerce (1969) *Catalog of Tsunamis in The Hawaiian Islands.* Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. *1990 Census of Population and Housing.* Washington, D.C.

U.S. Department of Transportation (1982 Revised) *Federal Highway Administration Procedures for Abatement of Highway Traffic Noise.* Washington, D.C.

U.S. Geological Survey (1982) *Puu Hinai and Kawaihae Quadrangles,* Hawaii - Hawaii Co., Island of Hawaii, Topographic Map, 7.5 Minute Series.

U.S. Environmental Protection Agency (September 1985) *Compilation of Air Pollution Emission Factors, Volume I: Stationary Sources.*

_____ (September (1985) *Compilation of Air Pollution Emission Factors, Volume II: Mobile Sources.*

Y. Ebisu & Associates (June 1987) *Updated Acoustic Study of The Proposed South Kohala Resort.*

APPENDICES

APPENDICES

A. Economic and Financial Analyses, Hapuna Beach State Recreation Area Expansion

B. Recreational Demand and Capacity Analysis, Hapuna Beach Recreation Area

C. Geotechnical Consultation, Hapuna Beach State Recreation Area Expansion

D. Baseline Assessment of the Maine Environment in the Vicinity of Hapuna Beach Recreation Area, South Kohala, Hawaii

E. Assessment of the Environmental Impact of Fertilizers and Pesticides on the Proposed Golf Course of the Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii

F. Botanical Survey, Hapuna Beach State Recreation Area Expansion

G. Phased Archaeological Inventory Survey, Hapuna Beach State Recreation Area Expansion Project, Phase III - Data Analyses and Final Report

H. 2010 Traffic Impact Assessment Report for Hapuna Beach State Recreation Area Expansion

APPENDIX A

Economic and Financial Analyses
Hapuna Beach State Recreation Area Expansion

ECONOMIC AND FINANCIAL ANALYSES

HAPUNA BEACH
STATE RECREATION AREA EXPANSION

SOUTH KOHALA, HAWAII

Prepared for:

BELT COLLINS HAWAII
680 Ala Moana Boulevard
Honolulu, Hawaii 96813

Prepared by:

Pedersen Planning Consultants
P.O. Box 22
Volcano, Hawaii 96785

April, 1995

TABLE OF CONTENTS

Chapter	Title	Page No.
One	**INTRODUCTION**	**1-1**
1.1	BACKGROUND AND PURPOSE	1-1
1.2	SCOPE AND PROJECT APPROACH	1-1
1.3	CONSULTATION	1-3
TWO	**MARKET ANALYSIS**	**2-1**
2.1	INTRODUCTION	2-1
2.2	SHORELINE RECREATION AREAS ON THE ISLAND OF HAWAII	2-1
2.3	PARTICIPATION IN SHORELINE RECREATION	2-1
2.3.1	Big Island Residents	2-3
2.3.2	Big Island Visitors	2-3
2.4	SHORELINE RECREATION IN WEST HAWAII	2-4
2.4.1	County Beach Parks	2-4
2.4.2	State Recreation Areas	2-8
2.4.2.1	Old Kona Airport State Recreation Area	2-8
2.4.2.2	Kona Coast State Park	2-8
2.4.2.3	Hapuna Beach State Recreation Area	2-9
2.5	RECREATIONAL DEMAND	2-10
2.5.1	Anticipated Resident and Visitor Demands	2-10
2.5.2	Market Attraction	2-10
2.6	EXISTING AND POTENTIAL USER FEES	2-10
2.6.1	General	2-10
2.6.2	Camping	2-14
2.6.3	Picnicking	2-14
2.6.4	Golf	2-14

TABLE OF CONTENTS (Continued)

Chapter	Title	Page No.
THREE	**ECONOMIC ANALYSIS**	**3-1**
3.1	INTRODUCTION	3-1
3.2	METHODOLOGY	3-1
3.3	DIRECT AND SECONDARY ECONOMIC BENEFITS	3-2
3.3.1	Camping	3-2
3.3.2	Beach Activities	3-2
3.3.3	Golf Activities	3-7
3.3.4	Hiking Opportunities	3-7
3.4	COSTS	3-11
3.4.1	Introduction	3-11
3.4.2	Cumulative Costs	3-11
3.4.3	Capital Costs	3-11
3.4.3.1	Phase One	3-13
3.4.3.2	Phase Two	3-13
3.4.3.3	Phase Three	3-13
3.4.3.4	Phase Four	3-13
3.4.4	Operation and Maintenance Costs	3-13
3.4.4.1	General Assumptions	3-14
3.4.4.2	Park Area Makai of Queen Kaahumanu Highway	3-14
3.4.4.3	Golf Course	3-14
3.5	NET PRESENT VALUE ANALYSIS	3-14
3.5.1	Golf Course	3-18
3.5.2	Park Expansion Makai of Queen Kaahumanu Highway	3-18
3.5.3	Cumulative Economic Value of the Park Expansion	
FOUR	**FINANCIAL ANALYSIS**	**4-1**
4.1	INTRODUCTION	4-1
4.2	MARKET SUMMARY	4-1
4.2.1	Demand	4-1
4.2.2	Affordability	4-2

TABLE OF CONTENTS (Continued)

Chapter	Title	Page No.
4.3	PRO FORMA PROJECTION	4-2
4.3.1	Introduction	4-2
4.3.2	Revenues	4-5
4..3.2.1	Annual Volume of Play	4-5
4.3.2.2	Green Fees	4-5
4.3.2.3	Golf Cart Rentals	4-5
4.3.2.4	Driving Range	4-6
4.3.2.5	Food and Beverage	4-6
4.3.2.6	Pro Shop	4-6
4.3.3	Expenses	4-6
4.3.3.1	Golf Course Maintenance	4-6
4.3.3.2	Administration	4-7
4.3.3.3	Food Concession	4-7
4.3.3.4	Pro Shop	4-7
4.3.3.5	Driving Range	4-7
4.3.3.6	Golf Cart	4-7
4.3.4	Debt Service	4-8
4.3.5	Cash Flow	4-8
4.3.5.1	Cash Flow Objectives	4-8
4.3.5.2	Cash Flow Requirements for Golf Course Operator	4-8
4.3.5.3	Cash Flow Requirements for Developer-Operator	4-9
4.3.6	Profitability	4-9
4.3.6.1	Golf Course Operator	4-9
4.3.6.2	Developer-Operator	
4.4	CONCLUSIONS	4-9
4.4.1	State Lease of Golf Course Operation to Private Operator	4-9
4.4.2	State Lease of Lands to Developer-Operator	4-10
	REFERENCES	Ref-1

LIST OF FIGURES

Figure No.	Title	Page No.
1-1	PROPOSED EXPANSION MASTER PLAN HAPUNA BEACH STATE RECREATION AREA	1-2
2-1	SHORELINE RECREATIONAL OPPORTUNITIES COUNTY OF HAWAII	2-2

LIST OF TABLES

Table No.	Title	Page No.
2-1	MONTHLY TOTAL & AVERAGE DAILY BEACH ACTIVITY KAHALUU BEACH PARK FY 1992	2-5
2-2	MONTHLY TOTAL & AVERAGE DAILY BEACH ACTIVITY WHITE SANDS BEACH PARK FY 1992	2-6
2-3	MONTHLY TOTAL & AVERAGE DAILY BEACH ACTIVITY SPENCER BEACH PARK FY 1992	2-7
2-4	COMBINED RESIDENT & VISITOR DEMAND ON TYPICAL WEEKEND DAY HAPUNA BEACH STATE RECREATION AREA 1990-2015	2-11
2-5	COMBINED RESIDENT & VISITOR DEMAND ON TYPICAL WEEKDAY HAPUNA BEACH STATE RECREATION AREA 1990-2015	2-12
2-6	PROPORTION OF ISLAND-WIDE DEMAND ATTRACTED TO THE EXPANDED HAPUNA BEACH STATE RECREATION AREA	2-13
2-7	PUBLIC USER FEES	2-15
3-1	DIRECT CAMPING ACTIVITY BENEFITS ANTICIPATED FROM USER FEES 1993-2015	3-3
3-2	INDIRECT ECONOMIC BENEFITS DERIVED FROM CAMPING 1993-2015	3-4
3-3	DIRECT ECONOMIC BENEFITS DERIVED FROM BEACH ACTIVITIES 1993-2015	3-5

LIST OF TABLES (Continued)

Table No.	Title	Page No.
3-4	INDIRECT ECONOMIC BENEFITS DERIVED FROM BEACH ACTIVITIES 1993-2015	3-6
3-5	DIRECT GOLF ACTIVITY BENEFITS 1993-2015	3-8
3-6	INDIRECT GOLF ACTIVITY BENEFITS 1993-2015	3-9
3-7	DIRECT HIKING ACTIVITY BENEFITS 1993-2015	3-10
3-8	ESTIMATED CAPITAL AND OPERATIONS/ MAINTENANCE COSTS HAPUNA BEACH PARK EXPANSION 1993-2015	3-12
3-9	ESTIMATED ANNUAL PARK MANAGEMENT AND MAINTENANCE COSTS PARK AREA MAKAI OF QUEEN KAAHUMANU HIGHWAY 1993 DOLLARS	3-15
3-10	ESTIMATED ANNUAL MANAGEMENT AND MAINTENANCE COSTS GOLF COURSE MAUKA OF QUEEN KAAHUMANU HIGHWAY 1993 DOLLARS	3-16
3-11	NET PRESENT VALUE ANALYSIS HAPUNA BEACH PARK EXPANSION 1993-2015	3-17
4-1	PRO FORMA PROJECTION GOLF COURSE OPERATION BY PRIVATE DEVELOPER-OPERATOR HAPUNA BEACH STATE RECREATION AREA	4-3
4-2	PRO FORMA PROJECTION GOLF COURSE OPERATION BY PRIVATE OPERATOR HAPUNA BEACH STATE RECREATION AREA	4-4

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND AND PURPOSE

A prefinal draft master plan for the proposed expansion of Hapuna Beach State Recreation Area was prepared in December, 1993, for the State Department of Land and Natural Resources by its consultant, Harrison Associates. The plan recommends the incorporation of an additional 900 acres of undeveloped State land to the park and the development of expanded beach, camping, picnicking, hiking, golf, and environmental education opportunities (Figure 1-1).

This report is a technical appendix to an environmental impact statement that has been prepared for the proposed expansion of Hapuna Beach State Recreation Area. It has been prepared to address the following considerations:

1. What is the amount of economic benefits and costs that would be generated by the development of increased recreational opportunities and facilities at an expanded Hapuna Beach State Recreation Area?

2. Since the proposed golf course represents the most expensive aspect of the proposed park expansion, what is the economic feasibility of a private concessionaire developing and/or operating the proposed golf course?

3. What development and operation assumptions must be made to make the cost for a round of golf marketable to resident players and more affordable than other nearby private courses?

1.2 SCOPE AND PROJECT APPROACH

The economic and financial analyses made in this report represent a part of the overall master planning of a proposed expansion of Hapuna Beach State Recreation Area. The anticipated economic impact of the proposed park expansion is evaluated through the use of economic analyses. In contrast, the feasibility of golf course development and operations by a private concessionaire is examined via a more conventional financial analysis.

An economic analysis differs from a typical financial analysis. An economic analyses widens the perspective from the private investor to the regional society affected. For example, the proposed park expansion will be partly or completely financed by the State of Hawaii, and used by local residents and visitors to the Island of Hawaii. An economic analysis of this expansion would consider the development cost and economic benefits of the expansion to the State of Hawaii. Capital expenditures are fully accounted for in the year they occur since society incurs the debt the year of the expenditure. Unlike typical financial analysis, social opportunities such as increased recreational opportunities are assigned "shadow prices" to calculate their value as a benefit to the State of Hawaii.

DOCUMENT CAPTURED AS RECEIVED

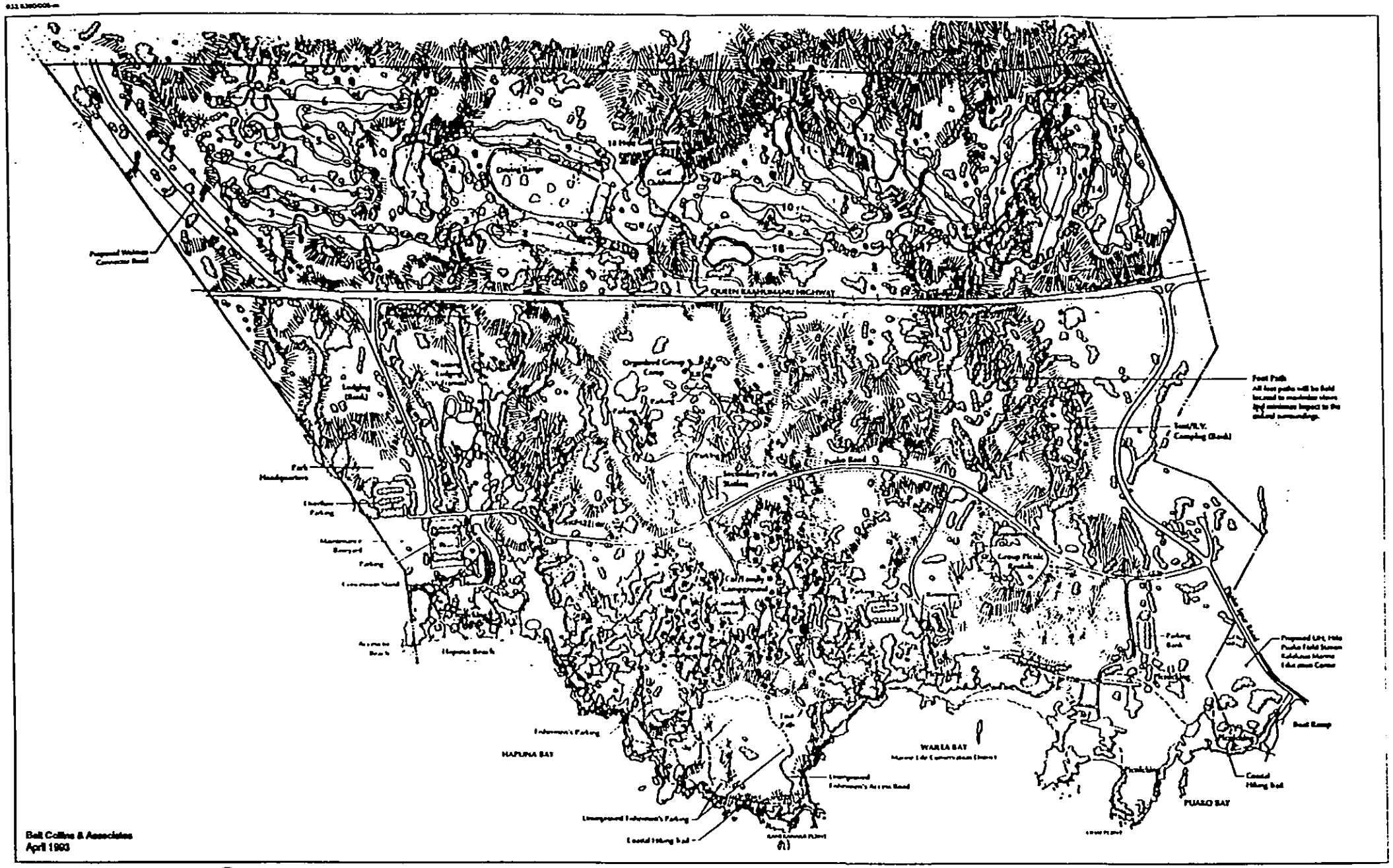


Figure 4-1
Hapuna Beach State Recreation Area Expansion
MASTER PLAN

4-2

Figure 1-1
Use 11x17 foldout

The financial analysis made to evaluate private concessionaire opportunities determines capital costs that are amortized over the "life" of the golf course project, during an assumed loan period, if debt financed. Only private market values are used to calculate anticipated project benefits and costs.

Economic and financial analyses both require upon an initial market analysis that evaluates existing demands, competition, and marketability. Fortunately, the master plan for the proposed park expansion includes specific recreational demand forecasts and related use assumptions for various recreational activities. The forecasts were used and supplemented by other information and assumptions concerning local user fees for selected activities and estimated secondary expenditures.

1.3 CONSULTATION

The preparation of this report involved coordination with and the cooperation of representatives from the Hawaii County Department of Parks and Recreation; National Golf Foundation; Hawaii Golf Association; Nelson & Wright, golf course architects; as well as operators and maintenance representatives of public and private golf courses on the Island of Hawaii.

CHAPTER TWO
MARKET ANALYSIS

2.1 INTRODUCTION

The following market analysis uses a conventional approach that merges evaluations of both supply and demand.

Recreational opportunities at existing shoreline areas are identified and evaluated. This analysis is an abbreviated version of a similar evaluation presented in the park expansion master plan.

Available forecasts of future recreational demand for an expanded Hapuna Beach State Recreation Area are presented which take into account the relative attraction of other shoreline recreational opportunities on the Island of Hawaii. Consequently, these forecasts represent the prospective recreational demand at the expanded park.

Recreational demand forecasts are subsequently applied to the economic analysis (Chapter Three) as an important "base" number for the calculation of regional benefits. Similarly, golf course demands are used in the determination of potential revenues for the proposed golf course operation (Chapter Four).

Another important factor affecting the future marketability and financial feasibility of an expansion of the Hapuna Beach State Recreation Area is the potential imposition of user fees. Selected activities from the range of recreational opportunities proposed for the park are examined.

2.2 SHORELINE RECREATION AREAS ON THE ISLAND OF HAWAII

The Island of Hawaii contains approximately 266 miles of coastline; much of the Island's coast is used for shoreline recreation. The majority of shoreline recreation takes place at 15 public beach parks operated and maintained by the County of Hawaii. In addition, there are three regional State recreation areas located along the West Hawaii coast (Figure 2-1).

The majority of shoreline recreation occurs in the vicinity of Hilo and Kailua-Kona where more public beach parks and recreation areas are located. West Hawaii is blessed with more accessible white sand beaches, more opportunities for diverse shoreline recreational activities, and more favorable nearshore water conditions during most of the year. The Kohala area offers significant shoreline recreational opportunities for both residents and visitors at Hapuna Beach State Recreation Area, Puako Bay and Spencer Beach Park.

2.3 PARTICIPATION IN SHORELINE RECREATION

Residents and visitors alike participate in a wide range of shoreline recreational activities. Along Big Island beaches, sunbathing, picnicking, and overnight camping are the more popular activities.

DOCUMENT CAPTURED AS RECEIVED

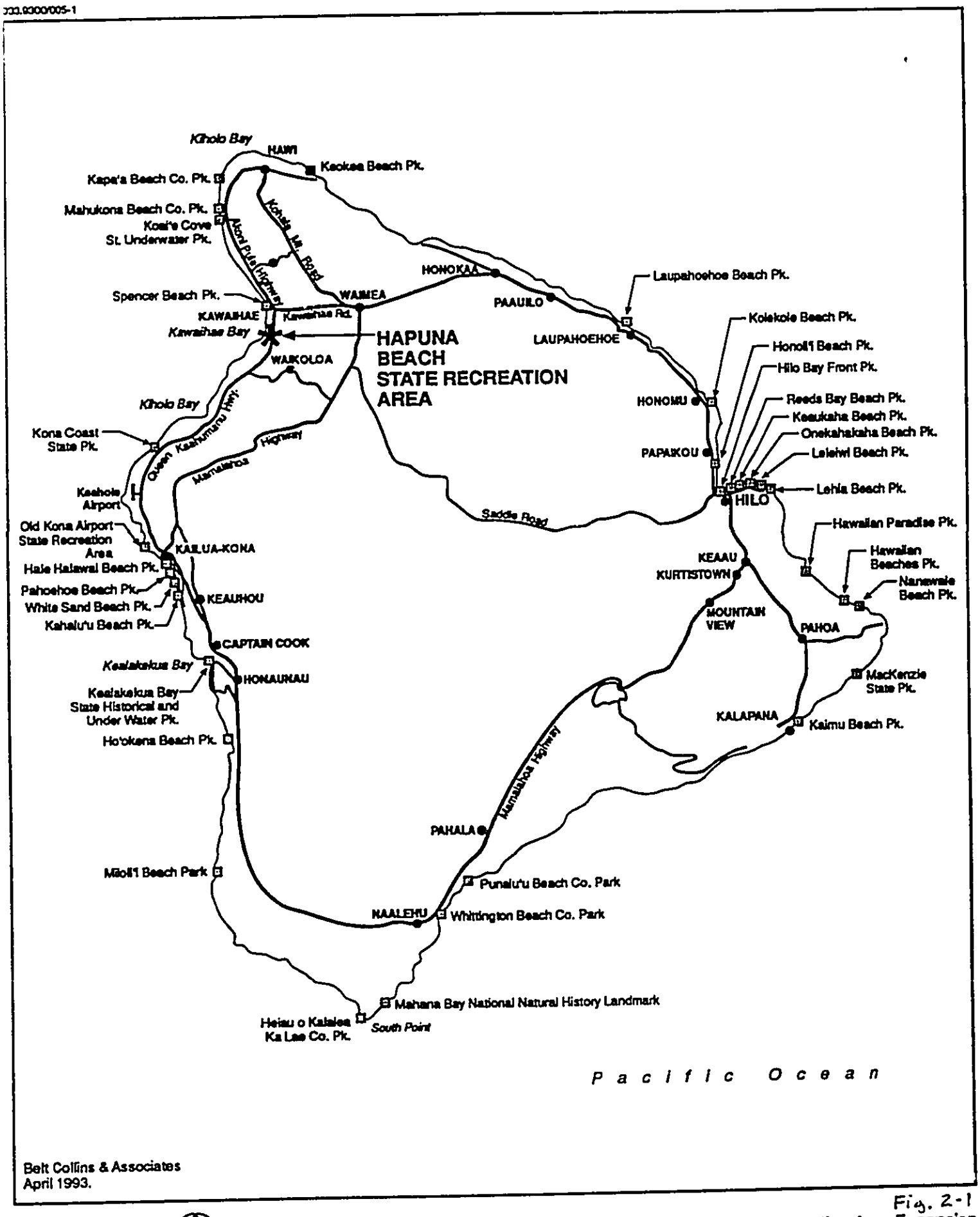


Fig. 2-1

Hapuna Beach State Recreation Area Expansion
SHORELINE RECREATIONAL OPPORTUNITIES, COUNTY OF HAWAII

Within the nearshore waters, bodyboarding, swimming, bodysurfing, snorkeling, diving, shoreline fishing, windsurfing, board surfing, canoe paddling and kayaking are common activities.

Recreation participation data for Hawaii residents and visitors was obtained through surveys conducted in 1989. The resident and visitor surveys were part of the 1990 State Comprehensive Outdoor Recreation Plan (SCORP).

2.3.1 Big Island Residents

SCORP survey data indicate that roughly seven percent of Big Island residents participate in beach-related activities such as sunbathing, swimming and/or picnicking during the weekend. During the week, daily participation in these activities drops to about one percent. Roughly 20 percent of these beach related activities take place in the Kohala area.

Over two percent of Big Island residents engage in bodysurfing and/or bodyboarding on weekends; less than one percent on weekdays. Roughly 25 percent of the weekend this activity takes place in the Kohala area, e.g. Hapuna. During the week, survey results suggest that about 14 percent of bodysurfers use the Kohala area.

SCORP survey results indicate that less than one percent (0.9%) of all Big Island residents go camping on weekends. Few engage in this activity during the week. Roughly 80 percent of all camping by residents occurs along the shoreline. About 20 percent of the camping occurs in the Kohala area, e.g. Spencer Beach Park.

While not always a shoreline activity, the SCORP survey indicated that less than one percent (0.7 %) of residents engage in golf during the week. However, average daily participation doubles during weekend days. It is interesting to note that less than 10 percent of participating golfers play in the Kohala area during the weekends. On weekdays, over 25 percent of participating golfers play courses in the Kohala area.

SCORP survey results suggest that a significantly smaller number of Big Island residents engage in other shoreline activities such as snorkeling/diving, paddling, shoreline fishing, and surfing. Roughly one-third of the shoreline fishing, snorkeling, and diving activity takes place in the Kohala area. Paddling is popular along various parts of the shoreline, particularly in Hilo Bay and along the North and South Kona coastline.

2.3.2 Big Island Visitors

In 1991, the average daily visitor census in 1991 was almost 18,900 visitors per day; the average visitor length of stay was about 5.8 days (Hawaii Visitors Bureau, Market Research Department, 1992). Visitors involved in shoreline activities spend some time during two days of their entire length of stay participating in shoreline-related recreation (Belt Collins & Associates and Community Resources, Inc., 1990). On an average day, up to 6,000 visitors (about 32 percent of average daily census) are typically involved in some form of shoreline recreation. Roughly 60 to 90 percent of all shoreline-related activities carried out by visitors occur in locations outside of established resort areas.

Shoreline activity by visitors primarily includes beach activities such as sunbathing and swimming. These activities, and other lesser activities such as picnicking and fishing activity, are engaged in by about 32 percent of all visitors on a given day. Interestingly, 43 percent of the visitors engaging in these activities do so at shoreline areas outside of resort areas. Forty percent participate in these activities within resort areas and 17 percent do so outside of local resort beach areas.

Almost 14 percent of all visitors participate in diving activities on a given day. About 60 percent engage in this activity outside of resort areas. About one-third of all diving by visitors occurs in the Kohala area.

Another popular shoreline recreational activity for visitors is bodyboarding (boogyboarding) and/or bodysurfing. About six percent of visitors are involved in this activity. Most visitors participating in this activity do so outside of the local resort areas; about 30 percent engage in this activity in the Kohala area, e.g., Hapuna.

Six percent of all visitors also play golf during two days of their stay on the Big Island. For visitors, golf clearly represents a shoreline activity as over 90 percent of the play occurs within resorts. Over 60 percent of all visitor golf activity takes place in the Kohala area.

2.4 SHORELINE RECREATION IN WEST HAWAII

2.4.1 County Beach Parks

In FY 1992, available information for Kahaluu, White (Magic) Sands, and Spencer Beach Parks indicates that these County beach parks provide beach-related opportunities for almost 3,000 people per day (Tables 2-1, 2-2, 2-3). Sunbathing is the predominant activity at all three beach parks even though good recreational opportunities for both bodysurfing and swimming are available. It is recognized that there is considerable overlap in these recreational opportunities as people on the beach move in and out of the adjoining inshore waters for swimming, bodysurfing or bodyboarding. Nevertheless, roughly 70 percent of the beach activities at these beach parks occur out of the water at any given time.

Significantly less shoreline activity occurs at Hookena Beach Park and Milolii Beach Park in South Kona. Use of Hookena Beach Park is increasing as a growing number of West Hawaii residents continue to seek less-crowded shoreline recreation environments. Milolii is almost exclusively used by residents of Milolii village.

Limited overnight tent camping opportunities are also available at Spencer Beach Park for about 68 persons. Smaller numbers of campsites are also available at County beach parks at Mahukona, Kapaa, Keokea, and Hookena. On a combined basis, these parks can provide camping opportunities for an additional 79 persons (Miyao, 1992).

TABLE 2-1

MONTHLY TOTAL AND AVERAGE DAILY BEACH ACTIVITY
FY 1992
(Number of Persons)

KAHALUU BEACH PARK

Month	ACTIVITIES							
	Sunbathing		Swimming		Surfing		Total All Activities	
	Monthly Count	Daily Average	Monthly Count	Daily Average	Monthly Count	Daily Average	Monthly Count	Daily Average
1991 July	30,029	969	14,565	470	377	12	44,971	1,451
Aug	27,049	873	14,859	479	27	-	41,935	1,354
Sept	22,144	738	9,822	327	878	28	32,844	1,095
Oct	19,987	645	9,216	297	535	17	29,738	959
Nov	21,922	731	9,183	306	950	32	32,055	1,069
Dec	26,849	866	10,064	325	1,716	55	38,629	1,246
1992 Jan	22,128	714	7,198	232	1,427	46	30,753	992
Feb	28,140	970	8,576	260	1,071	37	37,787	1,303
Mar	24,341	785	8,992	290	1,121	36	34,454	1,111
Apr	23,068	769	8,761	292	1,238	41	33,067	1,102
May	23,227	749	9,624	310	563	18	33,414	1,078
June	19,661	655	9,040	301	103	3	28,804	960
Total	**288,545**		**119,900**		**10,006**		**418,501**	

Source: County of Hawaii, Department of Parks & Recreation, 1992.

TABLE 2-2

MONTHLY TOTAL AND AVERAGE DAILY BEACH ACTIVITY
FY 1992
(Number of Persons)

WHITE SANDS BEACH PARK

Month	ACTIVITIES							
	Sunbathing		Swimming		Surfing		Total All Activities	
	Monthly Count	Daily Average	Monthly Count	Daily Average	Monthly Count	Daily Average	Monthly Count	Daily Average
1991 July	25,339	817	13,980	451	522	17	39,841	1,285
Aug	26,543	856	13,493	435	5	-	40,041	1,292
Sept	19,162	639	9,087	303	148	5	28,397	947
Oct	20,834	672	9,412	304	68	2	30,314	978
Nov	18,944	.654	9,225	308	90	3	28,259	947
Dec	11,340	366	4,131	133	294	10	15,765	509
1992 Jan	4,175	135	252	8	165	5	4,592	153
Feb	4,665	161	824	28	165	5	5,654	195
Mar	6,609	213	1,709	55	50	2	8,368	270
Apr	15,961	532	6,890	230	258	9	23,109	770
May	13,277	428	5,800	187	110	4	19,187	619
June	22,700	757	11,025	368	0	-	33,725	1,124
Total	**189,549**		**85,828**		**1,875**		**277,252**	

Source: County of Hawaii, Department of Parks & Recreation, 1992.

TABLE 2-3

MONTHLY TOTAL AND AVERAGE DAILY BEACH ACTIVITY
FY 1992
(Number of Persons)

SPENCER BEACH PARK

Month	ACTIVITIES							
	Sunbathing		Swimming		Surfing		Total All Activities	
	Monthly Count	Daily Average	Monthly Count	Daily Average	Monthly Count	Daily Average	Monthly Count	Daily Average
1991 July	13,103	423	8,477	273	0	N/A	21,580	696
Aug	11,204	361	5,538	179	0	N/A	16,742	540
Sept	3,935	131	1,875	63	0	N/A	5,810	194
Oct	3,454	111	1,137	37	0	N/A	4,591	148
Nov	4,230	141	1,450	48	0	N/A	5,680	189
Dec	3,300	106	765	25	0	N/A	4,065	131
1992 Jan	4,670	151	1,596	52	65	2.1	6,331	204
Feb	4,180	144	1,165	40	107	3.7	5,452	188
Mar	7,190	232	2,052	66	0	N/A	9,242	298
Apr	4,130	138	1,030	34	0	N/A	5,160	172
May	4,000	129	1,450	47	0	N/A	5,450	176
June	10,999	367	3,601	120	2	N/A	14,602	487
Total	**74,395**		**30,136**		**174**		**104,705**	

Source: County of Hawaii, Department of Parks & Recreation, 1992.

2.4.2 State Recreation Areas

Aside from Hapuna, there are two other State recreation areas in West Hawaii: the Old Kona Airport State Recreation Area and Kona Coast State Park (Figure 2-1). A limited number of visitors and residents also use the black sand beach in Kealakekua Bay which has been designated as a State Marine Conservation District.

2.4.2.1 Old Kona Airport State Recreation Area

The Old Kona Airport State Recreation Area is an 80-acre complex that includes one larger community pavilion, two smaller picnic complexes, two restroom facilities, some 15 picnic sites, and portions of the former airport runway that provides vehicular access and parking. Some 34 acres of the south end of the Old Kona Airport State Recreation Area site have been leased by the State of Hawaii to the County of Hawaii for its Kailua Park facilities.

In terms of shoreline recreational activities, overall vehicular counts indicate a park visitation of 384,000 persons in FY 1991 assuming that each vehicle transported two persons. Deducting the participation of roughly 80,000 persons which participated in County sport and cultural programs and informal activities during the same year, the Old Kona Airport State Recreation Area could conceivably attract as many as 304,000 persons per year, or some 833 people per day.

The use of vehicular counts from the entrance of the Old Kona Airport State Recreation Area provides dubious information because of the multi-use nature of this overall recreation area and the presence of the County of Hawaii's Kailua Park facilities. Visual observations of shoreline recreational activities along the less-developed beach and shoreline of this State recreational area suggest a limited use of the shoreline--less than 100 persons per day. Along the shoreline, snorkeling and diving are popular in the vicinity of Pawai Bay which is situated at the north end of the State recreation area. However, limited shoreline fishing, picnicking, and sunbathing occurs along the remainder of the Old Kona Airport State Recreation Area's 1.5 mile shoreline. Local park caretakers say that the new Kona Coast State Park has generated a noticeable decline in the use of the shoreline beach at Old Kona Airport State Recreation Area shoreline area for general beach activities.

2.4.2.2 Kona Coast State Park

Kaelehuluhulu Beach, located approximately 23 miles north of Kailua-Kona, was opened by the State Parks Division in April, 1992. The shoreline extends approximately 1,000 feet immediately south of Mahaeula Bay. Facilities consist of 22 picnic tables, 10 portable toilets, and a vehicular parking area for about seven vehicles.

The public response to the opening of this recreational area has been enormous. State Park caretaker, Mr. Tommy Lindsey, indicates that peak usage has drawn as many as 1,000 vehicles in one day to the new recreation area. Sporadic vehicular counts made by a traffic counter from May 7 through June 15, 1992 indicate that weekday attendance is more typically 150 to 350 cars while weekend attendance ranges from 300 to 725 vehicles per day. Assuming that each car carries an average of two persons, Kaelehuluhulu Beach is already attracting peak visitations of roughly 720 people on weekdays and roughly 1,400 people during weekend days.

The park is apparently very attractive for sunbathing, which is the primary activity at Kaelehuluhulu Beach. The presence of an extensive beach in closer proximity to Kailua-Kona is believed to be the primary factor influencing an early significant use of the beach by the general public. Mr. Lindsey reports that park users are probably 50 percent visitors and 50 percent residents. Other activities include some shoreline fishing, skimboarding, and bodyboarding.

2.4.2.3 Hapuna Beach State Recreation Area

During the past 25 years, Hapuna Beach State Recreation Area has gradually expanded to a 65-acre regional park that serves island residents from both West and East Hawaii, as well as an increasing number of visitors. The proportional use of Hapuna Beach State Recreation Area by visitors and residents has never been examined. Informal observations by lifeguards suggests that visitor use is greater during the week; weekends bring a greater number of residents, especially during higher nearshore wave conditions (Bowers, 1992). The exposure of this unique shoreline setting to both residents and visitors has significantly increased participation in a wide variety of shoreline recreational activities.

Present activities at Hapuna Beach State Recreation Area include sunbathing, bodysurfing, swimming, bodyboarding, volleyball, snorkeling and diving, picnicking, and overnight camping. Users of the overnight cabins are predominantly off-island visitors. However, intermittent beach counts made between 1985 and 1992 indicate that beach-related activities remain as Hapuna's primary attraction.
A two-week survey of shoreline recreational activities in the park and proposed expansion area was made by Pedersen Planning Consultants in June, 1992. From June 5 through 18, the type of activities and number of participants occurring from Hapuna Beach to the Puako Boat Ramp (between the shoreline and the former Puako-Kawaihae Road) were recorded at five daily time intervals.

Results of the survey show that roughly 70 percent of all recreation in the project area occurs along existing beaches and adjacent nearshore waters. Roughly three-fourths of the beach activities take place at Hapuna Beach; the remainder occur at "Beach 68" and "Beach 69" in Wailea Bay.

Mauka of Hapuna Beach are landscaped picnic areas, picnic shelters, picnic tables and barbecue pits, pavilions, restrooms and showers, and a food concession. This area accounts for roughly 30 percent of all recreational activity during both weekday and weekend periods.

With the exception of Wailea Beach, the 1.4 mile shoreline between Hapuna and the Puako Boat Ramp is a rocky shoreline that is characterized by a variety of steep cliffs, small coves, shoreline caves, a sea arch, and small jagged points. Two to three percent of all recreational activities in the project area occur in these undeveloped shoreline areas, as well as the hilly grasslands between the shoreline and the former Kawaihae-Puako Road.

2.5 RECREATIONAL DEMAND

2.5.1 Anticipated Resident and Visitor Demands

The master plan for expansion of the Hapuna Beach State Recreation Area includes forecasts of anticipated resident and visitor demand for various recreational activities (Table 2-4 and Table 2-5).

By the year 2010, these forecasts indicate that about 2,430 persons will use the expanded park on weekdays; on weekends, daily park attendance will increase to approximately 4,175 persons. The predominant use of the park will include beach and inshore water activities such as sunbathing, picnicking, bodysurfing/bodyboarding, and snorkeling/diving. Secondarily, the expanded park will be used for camping, hiking, and golf.

The master plan for park expansion also provides assumptions concerning the relative attraction of Hapuna Beach State Recreation Area to other shoreline recreation areas on the Island of Hawaii. The assumptions used in the development of the recreational demand forecasts (Table 2-6) closely resemble the participation trends of residents and visitors that were identified during a 1989 State Comprehensive Outdoor Recreation Plan (SCORP) survey.

2.5.2 Market Attraction

The anticipated trends clearly indicate that an expanded Hapuna Beach State Recreation Area will continue to be a primary recreational attraction for both resident and visitors. West Hawaii is blessed with four State recreation areas (including Hapuna) and three shoreline beach parks that offer shoreline recreational opportunities. Once Hapuna is expanded, none of these shoreline areas will match the diversity of available recreational opportunities. This diversity will continue to draw park attendance from residents from all island districts. Visitors will continue to be attracted to this area. The opportunities offered by the expanded park will be exposed to a greater number of visitors who will learn of the park expansion via travel guide books, news articles, and hotel personnel.

The increased attraction to Hapuna may somewhat diminish attendance at other shoreline parks in West Hawaii. However, the proximity of the Kona Coast State Park to Kailua-Kona will, for example, continue to attract many West Hawaii residents and some visitors during weekdays because of a more convenient travel distance and the suitability of the shoreline for sunbathing. Likewise, County beach parks at White Sands, Kahaluu, and Spencer will also continue to be popular destinations for sunbathing and bodysurfing, and Spencer Beach Park will also continue to provide camping opportunities. However, the capacity of the County beach parks will gradually be reached even though modest population growth is anticipated during the next 20 years.

2.6 EXISTING AND POTENTIAL USER FEES

2.6.1 General

State income tax and County property tax revenues currently provide the financial support for the development, operation and maintenance of public recreational facilities on the Island of Hawaii. User

TABLE 2-4
COMBINED RESIDENT AND VISITOR DEMAND ON TYPICAL WEEKEND DAY
HAPUNA BEACH STATE RECREATION AREA
1990-2015
(Number of Persons)

Year	Beach Activity	Bodybrdng/ Bodysurfing	Surfing	Camping: Group	Camping: Family	Golf	Hiking
1990	2,129	928	40	53	97	177	274
1991	2,297	977	41	55	105	184	303
1992	2,336	998	42	57	107	188	307
1993	2,376	1,019	42	59	110	192	311
1994	2,417	1,040	43	62	113	197	315
1995	2,459	1,062	44	64	116	201	320
1996	2,514	1,087	45	66	119	206	326
1997	2,570	1,113	46	69	123	211	333
1998	2,628	1,139	47	72	127	216	340
1999	2,687	1,166	48	74	130	221	348
2000	2,747	1,193	49	77	134	227	355
2001	2,795	1,219	50	80	138	232	360
2002	2,844	1,244	51	83	141	237	365
2003	2,894	1,271	52	85	144	243	370
2004	2,945	1,298	53	88	148	248	375
2005	2,997	1,325	54	91	152	254	381
2006	3,050	1,353	55	95	155	260	386
2007	3,104	1,382	56	98	159	266	391
2008	3,159	1,412	57	101	163	272	397
2009	3,216	1,442	58	104	167	278	403
2010	3,273	1,473	59	108	171	285	408
2011	3,332	1,505	61	111	175	291	414
2012	3,392	1,537	62	115	180	298	420
2013	3,453	1,570	63	119	184	305	426
2014	3,516	1,604	64	123	189	312	432
2015	3,580	1,639	66	127	193	319	439

Source: Pedersen Planning Consultants, 1995.

TABLE 2-5
COMBINED RESIDENT AND VISITOR DEMAND ON TYPICAL WEEKDAY
HAPUNA BEACH STATE RECREATION AREA
1990-2015
(Number of Persons)

Year	Beach Activity	a) Bodybrdng/ Bodysurfing	b) Surfing	c) Camping: Group	Family	Golf	d) Hiking
1990	1,244	358	0	0	44	253	202
1991	1,390	393	0	0	50	262	229
1992	1,407	399	0	0	50	268	231
1993	1,424	404	0	0	51	274	233
1994	1,441	410	0	0	51	280	236
1995	1,458	416	0	0	52	287	238
1996	1,488	425	0	0	53	294	243
1997	1,519	435	0	0	54	301	248
1998	1,550	444	0	0	55	309	252
1999	1,583	454	0	0	56	316	258
2000	1,615	463	0	0	57	324	263
2001	1,635	470	0	0	58	332	265
2002	1,655	477	0	0	58	339	268
2003	1,675	485	0	0	59	347	271
2004	1,695	492	0	0	60	355	273
2005	1,716	499	0	0	60	364	276
2006	1,737	507	0	0	61	372	279
2007	1,758	514	0	0	61	381	282
2008	1,780	522	0	0	62	390	284
2009	1,802	530	0	0	63	399	287
2010	1,824	538	0	0	63	409	290
2011	1,847	547	0	0	64	419	293
2012	1,870	555	0	0	65	428	296
2013	1,893	564	0	0	65	439	299
2014	1,916	572	0	0	66	449	302
2015	1,940	581	0	0	67	460	305

a) Bodyboarding and bodysurfing is an activity related to beach activities. Consequently, this data is presented to better understand how many beachgoers use the nearshore waters.
b) Surfing activity is expected to be performed almost exclusively by local residents who will continue to surf primarily during the winter months and when favorable surf conditions prevail.
c) Camping activity on weekdays is expected to be done almost exclusively by island visitors.
d) Hiking activity on weekdays is assumed to represent only visitor activity.

Source: Pedersen Planning Consultants. 1995.

TABLE 2-6

PROPORTION OF ISLAND-WIDE DEMAND ATTRACTED TO THE EXPANDED HAPUNA BEACH STATE RECREATION AREA

Activity	Proportion of Island-Wide Participation				Proportion of Island-Wide Demand at Hapuna			
	Residents		Visitors		Residents		Visitors	
	Week day	Week end	Week day	Week end	Week day	Week end	Week day	Week end
Beach	1%	1%	32%	32%	15%	13%	20%	20%
Bodyboarding/ Bodysurfing	0.7	2	6	6	14	26	24	24
Camping	< 0.1	0.9	0.8	0.8	20	20	33	33
Hiking	< 0.1	0.6	9.1	< 0.1	1.0	10	14	14
Golf	0.7	1.4	6	6	27	9	2.5	2.5

Source: Pedersen Planning Consultants, 1995.

fees associated with public recreational facilities on the Island of Hawaii have been limited to nominal charges by both the State Department of Land and Natural Resources and the County of Hawaii Department of Parks and Recreation. The price of existing user fees presently charged to residents and visitors (Table 2-7) suggest that fees have been imposed to control and monitor the number of users rather than an attempt to meet a portion of annual operation and maintenance expenditures.

2.6.2 Camping

Camping fees range from $1 for tent camping at Hawaii County beach parks to $15 for a three-person camping shelter at Hapuna Beach State Recreation Area. Variable rates are available for cabins at Mauna Kea State Park and Kalopa State Park. At Kalopa, for example, the overnight cabin rate for one person is $8, a party of three is $16.50 or $5.50/camper, and a maximum group of 32 persons is provided for a rate of $2.75 per person.

There is considerable variation in local user fees. The difference between State and County camping fees is not inappropriate as State camping opportunities include an enclosed shelter that has cooking facilities within individual cabins, i.e. Mauna Kea State Park, or a central kitchen and dining area, i.e., Kalopa State Park and Hapuna Beach State Recreation Area.

Present rates are clearly marketable to both resident and visitors. County beach parks are frequently booked to capacity. State cabins are typically booked to capacity on weekends for months in advance; mid-week usage is limited. It is believed that the County's more affordable tent camping fees could easily be increased, particularly if some centralized cooking facilities were provided for each campsite.

2.6.3 Picnicking

Future user fees for tent camping at Hapuna Beach State Recreation Area could initially be established at a rate of $5 per person and be competitive with existing County tent camping and State cabin rates. However, tent campsites would need to contain, at least, centralized cooking facilities, well-maintained restroom facilities, convenient vehicular parking, and onsite park security.

2.6.4 Golf

The only golf course being operated for only public play is the Hilo Municipal Golf Course in Hilo. Current green fees at this course represent an extremely affordable opportunity for golfers of all ages (Table 2-7). Unfortunately, existing fees ranging from three to six dollars for most golfers is not sufficient to meet existing operation and maintenance costs.

Discussions with golf course managers at two private courses in the South Kohala area suggest that a marketable price range at the proposed golf course in the park would be from $25 to $30 per round. An additional $15 per person would also be charged for golf cart rental which, from a management perspective, would be required during morning play to expedite the busier part of the day.

TABLE 2-7

PUBLIC USER FEES

Activity/Location	Public Agency	Type and Amount of Fees
CAMPING		
Hapuna SRA Cabins	State Parks Division Concessionaire	$15/night/cabin
Kalopa State Park	State Parks Division	Variable: $8/person; $5.50/person (party of 3); $2.75/person (party of 32)
Mauna Kea State Park	State Parks Division	Variable: $8/person; $5.50/person (party of 3); $2.75/person (party of 32)
County Beach Parks (Tent Camping)	County of Hawaii, Dept. of Parks & Recreation	$1/night for adults $0.50/night for ages 13-17
PICNICKING		
Pavilions	County of Hawaii, Dept. of Parks & Recreation	$25 security deposit minimum of $5 retained as fee
Pavilions	State Parks Division	No charge
GOLF		
Hilo Municipal Golf Course	County of Hawaii, Dept. of Parks & Recreation	Seniors: $3/round weekdays $4/rnd weekends/holidays Residents: $4/rnd weekdays (18-55) $6/rnd weekends/holidays College Students: $3/rnd weekdays $4/rnd weekends/holidays Elem-High School Students: $1/round weekdays $2/rnd weekends/holidays

Source: Pedersen Planning Consultants, 1995.

CHAPTER THREE
ECONOMIC ANALYSIS

3.1 INTRODUCTION

The purpose of this economic analysis is to evaluate the potential costs and benefits that will be generated by the proposed expansion of Hapuna Beach State Recreation Area. As stated in Chapter One, this economic analysis assigns monetary values to considerations often not included with the scope of conventional financial analyses. Consequently, reviewers are able to better determine the value of the project to the State economy.

3.2 METHODOLOGY

The initial focus of the analysis identifies potential benefits of the proposed expansion project. The proposed park expansion will establish increased opportunities for camping, beach activities, golf, and hiking. The anticipated availability of these opportunities was assumed to occur in the year following the planned construction of proposed park improvements (see Table 2-1 of the draft EIS).

Existing user fees and arbitrary economic values were assigned to each opportunity and multiplied by the number of anticipated users. Additional benefits were identified through the establishment of secondary multipliers for each recreational opportunity.

The second focus was to determine the costs of the proposed expansion which involves both capital or construction costs, as well as operational and maintenance costs. Preliminary construction costs were prepared by Belt Collins Hawaii. Park maintenance costs were coordinated with State park maintenance supervisors. Operation and maintenance costs for the proposed golf course were derived on the basis of discussions with golf industry professionals in East and West Hawaii who have extensive industry experience and are well acquainted with the operational requirements and consumer demands of the Big Island golf market.

Anticipated benefits were subtracted from costs to determine an annual cash flow to the economy. This dollar amount was discounted over a 21-year forecast period to reflect the changing value of money over time. A discount rate of 3.5 percent, beginning in 1994, was used for this analysis.

The discounted annual cash flow represents the annual net present value. A cumulative net present value was also calculated to determine the overall, long-term benefit of the project. However, the 1993-2000 period was also included to demonstrate the economic value of the existing park without the proposed project.

The overall calculation of net present value, and related intermediate calculations, were made through the use of Lotus 1-2-3, Release 5, for Windows, a software spreadsheet program. This approach facilitated the revision of shadow prices for benefits and updates to preliminary construction costs during the planning and subsequent review process.

3.3 DIRECT AND SECONDARY ECONOMIC BENEFITS

3.3.1 Camping

Expanded camping opportunities available in the year 2005 will generate about $286,000 in annual direct economic benefits to the Big Island economy (Table 3-1). By the year 2015, camping benefits will increase to about $356,000. These benefits will result from tent camping user fees that would be generated beginning in 2005. Each camping experience was assigned an economic value of $7 between 2005 and 2015. This value is based upon current user fees at State cabins and the assumption that tent camping fees could be comparable to cabin rentals if more amenities are made available.

Secondary retail expenditures by resident and visiting campers generate even greater and more significant economic benefits to the Big Island economy (Table 3-2). Each camping trip is dependent upon local food, fuel, and equipment purchases. It is estimated that the average secondary retail expenditure will be about $30 for each resident camper and about $40 for each visiting camper. Visitors are believed to expend more because the average size of each camping group averages about two persons while typical resident camping groups include, at least, six persons. A greater economy for food and fuel costs is achieved by the presence of more campers in each camping group.

3.3.2 Beach Activities

The direct benefits generated by expanded beach activities will represent an annual input of almost $4.4 million by the year 2015 (Table 3-3). While no user fees are anticipated for beach activities such as sunbathing, picnicking, swimming, bodyboarding, and snorkeling, a "shadow price" value of about $5 per person is believed to be appropriate.

Indirect economic benefits will also be created by beachgoers who purchase food, fuel and equipment purchases prior to and during their visit to the beach. In the year 2015, secondary benefits related to beach activities will account for almost $14 million per year (Table 3-4).

During daytime hours, roughly 40 percent of those who come to Hapuna Beach State Recreation Area spend their time out of the water on the beach or the adjoining back-up picnic area. These beachgoers usually bring food for a one-meal picnic before coming to the park, as well as gasoline required for transportation to the park. The per capita expenditure by those using the beach and back-up area for picnicking is expected to be about $14 for every resident or visitor.

Roughly 60 percent of beachgoers at Hapuna spend almost of their time in the nearshore waters as they participate in one or more water activities. However, they may purchase a snack at the park food concession and are more likely to occasionally purchase some recreational equipment in Hilo or Kona. Consequently, it is assumed that these beach users will each expend an average of about $3 for convenience food, two dollars for equipment, $12 for gasoline, or a total of $17 per person.

TABLE 3-1 DIRECT CAMPING ACTIVITY BENEFITS ANTICIPATED FROM USER FEES, 1993-2015

Year	No. of Residents	No. of Visitors	Subtotal	Value	TOTAL BENEFITS
1993	12,272	18,615	30,887	$0	$0
1994	12,896	18,615	31,511	$0	$0
1995	13,312	18,980	32,292	$0	$0
1996	13,728	19,345	33,073	$0	$0
1997	14,352	19,710	34,062	$0	$0
1998	14,976	20,075	35,051	$0	$0
1999	15,392	20,440	35,832	$0	$0
2000	16,016	20,805	36,821	$0	$0
2001	16,640	21,170	37,810	$0	$0
2002	17,264	21,170	38,434	$0	$0
2003	17,680	21,535	39,215	$0	$0
2004	18,304	21,900	40,204	$0	$0
2005	18,928	21,900	40,828	$7	$285,796
2006	19,760	22,265	42,025	$7	$294,175
2007	20,384	22,265	42,649	$7	$298,543
2008	21,008	22,630	43,638	$7	$305,466
2009	21,632	22,995	44,627	$7	$312,389
2010	22,464	22,995	45,459	$7	$318,213
2011	23,088	23,360	46,448	$7	$325,136
2012	23,920	23,725	47,645	$7	$333,515
2013	24,752	23,725	48,477	$7	$339,339
2014	25,584	24,090	49,674	$7	$347,718
2015	26,416	24,455	50,871	$7	$356,097

Source: Pedersen Planning Consultants, 1995.

TABLE 3-2 INDIRECT ECONOMIC BENEFITS DERIVED FROM CAMPING, 1993-2015

Year	No. of Residents	Value	Subtotal Benefits	No. of Visitors	Value	Subtotal Benefits	TOTAL BENEFITS
1993	12,272	$0	$0	18,615	$0	$0	$0
1994	12,896	$0	$0	18,615	$0	$0	$0
1995	13,312	$0	$0	18,980	$0	$0	$0
1996	13,728	$0	$0	19,345	$0	$0	$0
1997	14,352	$0	$0	19,710	$0	$0	$0
1998	14,976	$0	$0	20,075	$0	$0	$0
1999	15,392	$0	$0	20,440	$0	$0	$0
2000	16,016	$0	$0	20,805	$0	$0	$0
2001	16,640	$0	$0	21,170	$0	$0	$0
2002	17,264	$0	$0	21,170	$0	$0	$0
2003	17,680	$0	$0	21,535	$0	$0	$0
2004	18,304	$0	$0	21,900	$0	$0	$0
2005	18,928	$30	$567,840	21,900	$40	$876,000	$1,443,840
2006	19,760	$30	$592,800	22,265	$40	$890,600	$1,483,400
2007	20,384	$30	$611,520	22,265	$40	$890,600	$1,502,120
2008	21,008	$30	$630,240	22,630	$40	$905,200	$1,535,440
2009	21,632	$30	$648,960	22,995	$40	$919,800	$1,568,760
2010	22,464	$30	$673,920	22,995	$40	$919,800	$1,593,720
2011	23,088	$30	$692,640	23,360	$40	$934,400	$1,627,040
2012	23,920	$30	$717,600	23,725	$40	$949,000	$1,666,600
2013	24,752	$30	$742,560	23,725	$40	$949,000	$1,691,560
2014	25,584	$30	$767,520	24,090	$40	$963,600	$1,731,120
2015	26,416	$30	$792,480	24,455	$40	$978,200	$1,770,680

Source: Pedersen Planning Consultants, 1995.

TABLE 3-3 **DIRECT ECONOMIC BENEFITS DERIVED FROM BEACH ACTIVITIES 1993-2015**

Year	No. of Residents	No. of Visitors	Subtotal	Value	TOTAL
1993	168,462	450,045	618,507	$5	$3,092,535
1994	172,679	454,790	627,469	$5	$3,137,345
1995	177,104	459,170	636,274	$5	$3,181,370
1996	181,529	468,295	649,824	$5	$3,249,120
1997	185,954	477,785	663,739	$5	$3,318,695
1998	190,587	487,275	677,862	$5	$3,389,310
1999	195,481	497,130	692,611	$5	$3,463,055
2000	200,218	506,985	707,203	$5	$3,536,015
2001	205,320	512,095	717,415	$5	$3,587,075
2002	210,526	517,205	727,731	$5	$3,638,655
2003	215,836	522,315	738,151	$5	$3,690,755
2004	221,146	527,425	748,571	$5	$3,742,855
2005	226,664	532,900	759,564	$5	$3,797,820
2006	232,443	538,010	770,453	$5	$3,852,265
2007	238,169	543,485	781,654	$5	$3,908,270
2008	244,156	548,960	793,116	$5	$3,965,580
2009	250,247	554,435	804,682	$5	$4,023,410
2010	256,546	559,910	816,456	$5	$4,082,280
2011	262,845	565,750	828,595	$5	$4,142,975
2012	269,352	571,225	840,577	$5	$4,202,885
2013	276,224	577,065	853,289	$5	$4,266,445
2014	283,096	582,905	866,001	$5	$4,330,005
2015	290,176	588,380	878,556	$5	$4,392,780

Source: Pedersen Planning Consultants, 1995.

TABLE 3-4 **INDIRECT ECONOMIC BENEFITS DERIVED FROM BEACH ACTIVITIES, 1993-2015**

Year	No. of Beachgoers	Picnickers x40%	Value	Subtotal Benefits	Others x60%	Value	Subtotal Benefits	TOTAL
1993	618,507	247,403	$14	$3,463,639	371,104	$17	$6,308,771	$9,772,411
1994	627,469	250,988	$14	$3,513,826	376,481	$17	$6,400,184	$9,914,010
1995	636,274	254,510	$14	$3,563,134	381,764	$17	$6,489,995	$10,053,129
1996	649,824	259,930	$14	$3,639,014	389,894	$17	$6,628,205	$10,267,219
1997	663,739	265,496	$14	$3,716,938	398,243	$17	$6,770,138	$10,487,076
1998	677,862	271,145	$14	$3,796,027	406,717	$17	$6,914,192	$10,710,220
1999	692,611	277,044	$14	$3,878,622	415,567	$17	$7,064,632	$10,943,254
2000	707,203	282,881	$14	$3,960,337	424,322	$17	$7,213,471	$11,173,807
2001	717,415	286,966	$14	$4,017,524	430,449	$17	$7,317,633	$11,335,157
2002	727,731	291,092	$14	$4,075,294	436,639	$17	$7,422,856	$11,498,150
2003	738,151	295,260	$14	$4,133,646	442,891	$17	$7,529,140	$11,662,786
2004	748,571	299,428	$14	$4,191,998	449,143	$17	$7,635,424	$11,827,422
2005	759,564	303,826	$14	$4,253,558	455,738	$17	$7,747,553	$12,001,111
2006	770,453	308,181	$14	$4,314,537	462,272	$17	$7,858,621	$12,173,157
2007	781,654	312,662	$14	$4,377,262	468,992	$17	$7,972,871	$12,350,133
2008	793,116	317,246	$14	$4,441,450	475,870	$17	$8,089,783	$12,531,233
2009	804,682	321,873	$14	$4,506,219	482,809	$17	$8,207,756	$12,713,976
2010	816,456	326,582	$14	$4,572,154	489,874	$17	$8,327,851	$12,900,005
2011	828,595	331,438	$14	$4,640,132	497,157	$17	$8,451,669	$13,091,801
2012	840,577	336,231	$14	$4,707,231	504,346	$17	$8,573,885	$13,281,117
2013	853,289	341,316	$14	$4,778,418	511,973	$17	$8,703,548	$13,481,966
2014	866,001	346,400	$14	$4,849,606	519,601	$17	$8,833,210	$13,682,816
2015	878,556	351,422	$14	$4,919,914	527,134	$17	$8,961,271	$13,881,185

Source: Pedersen Planning Consultants, 1995.

3.3.3 Golf Activities

Direct economic benefits from proposed golf opportunities will be derived from green fees, golf cart rentals, driving range user fees, as well as food and beverage and golf supply purchases at the proposed clubhouse. The cumulative direct benefits of these sales will represent about $4.9 million per year in the year 2015 (Table 3-5). This level of benefits is based upon the following assumptions:

1. The annual number of rounds played at the course will be 53,250 rounds or an average of about 150 rounds per day. This volume of play will gradually rise to 88,750 per year (approximately 250 rounds per day) by the fifth year of course operation.

2. A round of golf will initially cost $15 and gradually increase to $20 by the fifth year of operation (2014). This cost does not include a golf cart fee.

3. Seventy-five percent of the players will use carts rented for shared price of $15 per golfer; hand carts will be rented to 20 percent of the golfers for $5. The remaining golfers will use their own personal carts.

4. Seventy percent of all golfers coming to the golf course will purchase a bucket of balls and use the driving range prior to "tee-off". The remaining 30 percent will use the driving range on days when they do not play a round of golf.

5. Food and beverage sales will average about $9 to $10 per golfer.

6. Pro shop sales are estimated to be $10 for every round of golf. These sales will increase to $12 per round by the fifth year of operation.

Indirect economic benefits (Table 3-6) will include local retail sales for various types of golf equipment such as golf clubs, accessories, and clothing. Employment at the proposed golf course, which is a cost of the project, also generates other retail and service expenditures within the Big Island economy to landscape maintenance contractors, landscape architects, and others. No local data is available to assess the significance of these expenditures to the local economy. However, a recent National Golf Foundation study of the golf industry in Chicago concluded that every dollar of direct golf course employment generated another dollar of sales and income in the local secondary economy (FXM Associates, 1992). This assumption was used for the Big Island economy despite an increasing trend for more off-island, mail-order purchases because the same opportunity is available in Chicago.

3.3.4 Hiking Opportunities

The direct economic benefits will be the enjoyed experience of scenic walks along the coastline. Such benefits will begin to be realized in the year 2005 following completion of a shoreline and fishermen's trail development.

This benefit is assigned an economic value, or shadow price, of $2 per hiker. Consequently, hiking opportunities will provide direct benefits valued at about $250,000 in the year 2015 (Table 3-7).

TABLE 3-5 DIRECT GOLF ACTIVITY BENEFITS, 1993-2015

Year	No.Rounds Per Year	a) W/Golf Cart Value/Round	Benefits	b) w/Hand Cart Value/Round	Benefits	c) w/o Cart Value/Round	Benefits	Total Direct Benefits
1993	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
1994	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
1995	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
1996	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
1997	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
1998	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
1999	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2000	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2001	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2002	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2003	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2004	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2005	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2006	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2007	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2008	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2009	0	$0.00	$0	$0.00	$0	$0.00	$0	$0
2010	53,250	$50.50	$2,016,844	$40.50	$431,325	$35.50	$94,519	$2,542,688
2011	62,125	$53.50	$2,492,766	$43.50	$540,488	$38.50	$119,591	$3,152,844
2012	71,000	$56.50	$3,008,625	$46.50	$660,300	$41.50	$147,325	$3,816,250
2013	79,875	$58.50	$3,504,516	$48.50	$774,788	$43.50	$173,728	$4,453,031
2014	88,750	$58.50	$3,893,906	$48.50	$860,875	$43.50	$193,031	$4,947,813
2015	88,750	$58.50	$3,893,906	$48.50	$860,875	$43.50	$193,031	$4,947,813

Notes:
a) 75% of total number of rounds per year are assumed to use golf carts.
b) 20% of total number of rounds per year are assumed to use hand carts.
c) 5% of total number of rounds per year are assumed to not use any carts.

Source: Pedersen Planning Consultants, 1995.

TABLE 3-6 INDIRECT GOLF ACTIVITY BENEFITS 1993-2015

Year	Total Employment $	a) Indirect Retail Expenditure	Total Benefits
1993	$0	---	$0
1994	$0	---	$0
1995	$0	---	$0
1996	$0	---	$0
1997	$0	---	$0
1998	$0	---	$0
1999	$0	---	$0
2000	$0	---	$0
2001	$0	---	$0
2002	$0	---	$0
2003	$0	---	$0
2004	$0	---	$0
2005	$0	---	$0
2006	$0	---	$0
2007	$0	---	$0
2008	$0	---	$0
2009	$0	---	$0
2010	$1,890,834	$1.00	$1,890,834
2011	$1,957,013	$1.00	$1,957,013
2012	$2,025,509	$1.00	$2,025,509
2013	$2,096,402	$1.00	$2,096,402
2014	$2,169,776	$1.00	$2,169,776
2015	$2,245,718	$1.00	$2,245,718

Notes:
a) Indirect retail expenditure calculation assumes one dollar of indirect retail sales for every dollar of direct employment, as well as an inflation factor of 3.5%. (Table 3-10 1993 employment dollars) Golf course opens in 2010.

Source: Pedersen Planning Consultants, 1995.

TABLE 3-7 **DIRECT HIKING ACTIVITY BENEFITS**
1993-2015

Year	No. of Residents	No. of Visitors	Total Users	Value	TOTAL BENEFITS
1993	8,112	85,045	93,157	$0	$0
1994	8,320	86,140	94,460	$0	$0
1995	8,528	86,870	95,398	$0	$0
1996	8,736	88,695	97,431	$0	$0
1997	8,944	90,520	99,464	$0	$0
1998	9,152	91,980	101,132	$0	$0
1999	9,360	94,170	103,530	$0	$0
2000	9,568	95,995	105,563	$0	$0
2001	9,880	96,725	106,605	$0	$0
2002	10,088	97,820	107,908	$0	$0
2003	10,400	98,915	109,315	$0	$0
2004	10,608	99,645	110,253	$0	$0
2005	10,920	100,740	111,660	$2	$223,320
2006	11,128	101,835	112,963	$2	$225,926
2007	11,440	102,930	114,370	$2	$228,740
2008	11,752	103,660	115,412	$2	$230,824
2009	11,960	104,755	116,715	$2	$233,430
2010	12,272	105,850	118,122	$2	$236,244
2011	12,584	106,945	119,529	$2	$239,058
2012	12,896	108,040	120,936	$2	$241,872
2013	13,208	109,135	122,343	$2	$244,686
2014	13,624	110,230	123,854	$2	$247,708
2015	13,936	111,325	125,261	$2	$250,522

Source: Pedersen Planning Consultants, 1995.

3.4 COSTS

3.4.1 Introduction

The direct costs associated with the park expansion are capital costs incurred during construction and long-term operation and maintenance. Estimated capital costs are based upon 1993 dollars. However, these estimates have been inflated by an annual rate of 3.5 percent to account for future inflated costs associated with construction materials and labor.

An annual inflation rate of 3.5 percent was also applied to operation and maintenance costs. Base salary rates for both government and private industry labor, as well as other direct costs, primarily increase because of inflation.

3.4.2 Cumulative Costs

The overall expansion of the Hapuna Beach State Recreation Area will require the expenditure of about $40 million in capital expenditures over a 13-year construction period (Table 3-8). Upon completion of all facilities and improvements within the project area, operation and maintenance expenditures will require about $4.7 million per year. From the year 1998 through the year 2015, cumulative capital and operation/maintenance expenditures will cost an estimated $77 million.

3.4.3 Capital Costs

3.4.3.1 Phase One

The initial phase of construction will occur between 1998 and the year 2000. This phase of park expansion will represent a State expenditure of approximately $1,531,750 (1993 dollars) for the following improvements:

- Offsite development and improvement of water supply and transmission systems for both potable and irrigation water.

- Development of a new access road and vehicular parking area mauka of Wailea Beach, as well as the construction of restrooms, a small picnic area, and lifeguard stands along an existing 40-foot right-of-way in the Wailea Bay houselot area.

TABLE 3-8 ESTIMATED CAPITAL AND OPERATIONS/MAINTENANCE COSTS HAPUNA BEACH PARK EXPANSION 1993-2015

Year	Capital Costs	Operations/ Maintenance Golf Course	Operations/ Maintenance Park Area	O/M Total	TOTAL
1993	$0	$0	$0	$0	$0
1994	$0	$0	$0	$0	$0
1995	$0	$0	$0	$0	$0
1996	$0	$0	$0	$0	$0
1997	$0	$0	$0	$0	$0
1998	$606,414	$0	$0	$0	$606,414
1999	$627,638	$0	$0	$0	$627,638
2000	$649,605	$0	$0	$0	$649,605
2001	$2,309,913	$0	$0	$0	$2,309,913
2002	$2,390,760	$0	$0	$0	$2,390,760
2003	$2,474,437	$0	$0	$0	$2,474,437
2004	$2,561,042	$0	$0	$0	$2,561,042
2005	$5,015,464	$0	$1,680,079	$1,680,079	$6,695,542
2006	$5,191,005	$0	$1,738,881	$1,738,881	$6,929,886
2007	$5,372,690	$0	$1,799,742	$1,799,742	$7,172,432
2008	$5,560,734	$0	$1,862,733	$1,862,733	$7,423,467
2009	$5,755,360	$0	$1,927,929	$1,927,929	$7,683,289
2010	$1,371,132	$2,258,204	$1,995,406	$4,253,611	$5,624,743
2011	$0	$2,337,242	$2,065,246	$4,402,487	$4,402,487
2012	$0	$2,419,045	$2,137,529	$4,556,574	$4,556,574
2013	$0	$2,503,712	$2,212,343	$4,716,054	$4,716,054
2014	$0	$2,591,341	$2,289,775	$4,881,116	$4,881,116
2015	$0	$2,682,038	$2,369,917	$5,051,955	$5,051,955
	$39,886,195	**$14,791,582**	**$22,079,580**	**$36,871,162**	**$76,757,357**

Note: 1993 dollars have been inflated at the rate of 3.5%/annum.

Source: Pedersen Planning Consultants, 1995.

3.4.3.2 Phase Two

Phase Two will primarily develop the infrastructure, sites and facilities makai of Queen Kaahumanu Highway for a new camping area, picnicking and hiking opportunities between the south end of Hapuna Beach to roughly Kanekanaka Point. These improvements will include the construction of a new primary roadway, water and electrical distribution systems, picnic rental grounds, family campsite clusters, group cabins, and a portion of a coastal trail between Hapuna Bay and Puako Bay.

Other improvements during Phase Two will include construction of a park headquarters east of the existing parking area and a new paved access to Wailea Beach.

Phase Two improvements will be constructed between 2001 and 2004 for a cost of approximately $7,016,700 (1993 dollars).

3.4.3.3 Phase Three

Construction of the golf course mauka of Queen Kaahumanu Highway will be completed between 2005 and 2009. Golf course development will include site preparation of the golf fairways and tees, the onsite development of all utility systems, site preparation and construction of a new clubhouse. It is estimated that the golf course development will require an estimated $16,595,750 (1993 dollars) for construction.

3.4.3.4 Phase Four

Phase Four, which is scheduled to occur in the year 2010, will involve the development of additional campsites for recreational vehicles or tent camping, as well as additional picnic sites. Other support facilities will include the construction of additional water distribution and roadway to the new camping area. Additional vehicular parking area will also be constructed mauka of Hapuna Beach. The anticipated cost of these improvements is $764,000 (1993 dollars).

3.4.4 Operation and Maintenance Costs

3.4.4.1 General Assumptions

Final determinations have not been reached concerning the use of private concessionaires for the operation and maintenance of the park areas makai of Queen Kaahumanu Highway and the public golf course mauka of the Highway. Nevertheless, a number of assumptions were used to derive an estimate for both park and golf course facilities. These assumptions include the following:

1. The park area makai of Queen Kaahumanu Highway will be managed, operated and maintained by the State Parks Division or a concessionaire, or a combination of public program management and supporting private operation and maintenance contractor .

2. Golf course management responsibility will be assigned to a separate management and maintenance organization which will develop and lease State lands for the operation of a public golf course.

3.4.4.2 Park Area Makai of Queen Kaahumanu Highway

The master plan for the park expansion indicates that the operation and maintenance of the park will require both program management and maintenance personnel. The size of the expanded park, resource management requirements, and the anticipated number of future users prompts the need for more comprehensive onsite management (Table 3-9).

Program management personnel will include a chief ranger, office manager/bookkeeper, reservations clerk, water safety director and three lifeguards. These personnel are estimated to generate about $617,000 in annual labor costs; other direct costs required to support these personnel will represent about $7,000 per year.

The maintenance of facilities will require a maintenance supervisor and 12 maintenance personnel (Table 3-9). The two tradesman, e.g., carpenter and plumber, envisioned for the Hapuna maintenance crew will also provide occasional support to the Kona Coast State Park and Old Kona Airport State Recreation Area (Supe, 1992). Labor and other direct costs relating to maintenance activities are estimated to cost about $488,000 per year.

The management and maintenance of the park area makai of Queen Kaahumanu Highway represents a combined or total cost of approximately $1,111,848 (1993 dollars) per year .

3.4.4.3 Golf Course

Similar to other park facilities, the golf course mauka of Queen Kaahumanu Highway will require both program management and maintenance personnel. The labor and other direct costs required to operate and maintain the proposed golf course will require a private expenditure of approximately $1,258,280 (Table 3-10).

Labor is expected to represent the greatest expense for the operation of the course and clubhouse, as well as the maintenance of the course. Labor costs associated with the course and clubhouse operations will be about $455,000 per year. Golf maintenance will require an expenditure of almost $600,000 for in-house maintenance personnel.

3.5 NET PRESENT VALUE ANALYSIS

3.5.1 Golf Course

The calculation of project benefits and costs over the 1993-2015 period indicates that the golf course development at Hapuna requires a sizable capital investment of approximately $16.6 million (1993 dollars) over a five-year period (Table 3-11). However, this investment is offset by a significant generation of direct project benefits derived from green fees, cart rentals, pro shop sales, as well as food and beverage sales. In addition, the golf course is expected to also generate additional project benefits via secondary retail expenditures in the local economy (all services and employment outside of the golf course and clubhouse) for landscape contracting, professional services, golf equipment and apparel, and other local sales.

TABLE 3-9 **ESTIMATED ANNUAL PARK MANAGEMENT AND MAINTENANCE COSTS PARK AREA MAKAI OF QUEEN KAAHUMANU HIGHWAY 1993 DOLLARS**

PROGRAM MGT Labor (Classif.)	No. of Positions	Base Hourly Rate	Fringe Benefits	Gross Wage Rate	Annual Cost Per Position	Annual Cumulative Cost	Subtotal
Chief Ranger	1	$13.89	$3.47	$17.36	$36,114	$36,114	
Park Ranger	11	$12.84	$3.21	$16.05	$33,384	$367,224	
Clerk	2	$11.42	$2.86	$14.28	$29,692	$59,384	
Water Safety Dir.	1	$17.58	$4.40	$21.98	$45,708	$45,708	
Lifeguards	3	$13.89	$3.47	$17.36	$36,114	$108,342	$616,772
Other Direct Costs							
Office Supplies						$1,000	
Office Equipment						$3,000	
Communications						$3,000	$7,000
TOTAL PROGRAM MANAGEMENT.							**$623,772**
MAINTENANCE MGT							
Labor (Classif.)							
Park Maintenance Su	1	$13.00	$3.25	$16.25	$33,800	$33,800	
Mechanic	1	$12.93	$3.23	$16.16	$33,618	$33,618	
Carpenter	1	$12.93	$3.23	$16.16	$33,618	$33,618	
Plumber	1	$12.93	$3.23	$16.16	$33,618	$33,618	
Equipment Oper/Crtk	1	$11.03	$2.76	$13.79	$28,678	$28,678	
Caretaker II	8	$10.18	$2.55	$12.73	$26,468	$211,744	$375,076
Other Direct Costs							
Office Supplies						$15,000	
Office Equipment						$20,000	
Maintenance Equipment						$14,000	
Consummable Supplies						$10,000	
Equipment Repair						$15,000	
Small Tools						$4,000	
Fertilizers/Chemicals						$35,000	$113,000
TOTAL MAINTENANCE MANAGEMENT							**$488,076**
TOTAL ESTIMATED ANNUAL PARK MANAGEMENT & MAINTENANCE COSTS							**$1,111,848**

Source: Pedersen Planning Consultants, 1995.

TABLE 3-10 **ESTIMATED ANNUAL MANAGEMENT AND MAINTENANCE COSTS GOLF COURSE MAUKA OF QUEEN KAAHUMANU HIGHWAY 1993 DOLLARS**

PROGRAM MANAGEMENT Labor (Classified)	No. of Positions	Base Hourly Rate	x25% Fringe Benefits	Gross Wage Rate	Annual Cost Per Position	Annual Cumulative Cost	Totals
Golf Pro-Salaried	1				$45,000	$45,000	
Assistant Golf Pro	1	$11.00	$2.75	$13.75	$28,600	$28,600	
Office Manager/Bookkee	1	$10.00	$2.50	$12.50	$26,000	$26,000	
Clerk	2	$8.50	$2.13	$10.63	$22,100	$44,200	
Mechanic	1	$14.14	$3.54	$17.68	$36,764	$36,764	
Mechanic's Assist	1	$12.56	$3.14	$15.70	$32,656	$32,656	
Cart Assistant	2	$8.50	$2.13	$10.63	$22,100	$44,200	
Head Cook-Salaried	1				$36,000	$36,000	
Cook	2	$10.00	$2.50	$12.50	$26,000	$52,000	
Cashier	1	$8.00	$2.00	$10.00	$20,800	$20,800	
Kitchen Helper	2	$6.00	$1.50	$7.50	$15,600	$31,200	
Dishwasher	2	$6.00	$1.50	$7.50	$15,600	$31,200	
Waiter	2	$5.00	$1.25	$6.25	$13,000	$26,000	
Labor Subtotal							$454,620
Other Direct Costs							
Office Supplies						$500	
Office Equipment						$1,000	
Telecommunications						$2,400	
Advertising						$3,000	
Postage & Delivery						$1,800	
Other Direct Costs Subtotal							$8,700
TOTAL PROGRAM MANAGEMENT COSTS							**$463,320**
MAINTENANCE MANAGEMENT							
Labor (Classified)							
Golf Superintendent	1				$50,000	$50,000	
Assist Golf Superintenden	1				$30,000	$30,000	
Mechanic	1	$14.14	$3.54	$17.68	$36,764	$36,764	
Mechanic Helper	1	$12.56	$3.14	$15.70	$32,656	$32,656	
Irrigators	2	$12.56	$3.14	$15.70	$32,656	$65,312	
Maintenance Operator I	6	$11.75	$2.94	$14.69	$30,550	$183,300	
Maintenance Operator II	4	$10.10	$2.53	$12.63	$26,260	$105,040	
Maintenance Operator III	4	$9.22	$2.31	$11.53	$23,972	$95,888	
Labor Subtotal							$598,960
Other Direct Costs							
Fertilizers/Chemicals						$85,000	
Equipment Repair						$35,000	
Petrol,Oil, Lubricants						$12,000	
Sand Material, Top Drsng						$25,000	
Consummable Supplies						$30,000	
Landscape Maintenance Svcs						$9,000	
Other Direct Costs Subtotal							$196,000
TOTAL MAINTENANCE MANAGEMENT COSTS							**$794,960**
TOTAL ESTIMATED ANNUAL MANAGEMENT & MAINTENANCE COSTS FOR GOLF COURSE MAUKA OF QUEEN KAAHUMANU HIGHWAY							**$1,258,280**

Source: Pedersen Planning Consultants. 1995.

TABLE 3-11 **NET PRESENT VALUE ANALYSIS**
HAPUNA BEACH PARK EXPANSION
1993-2015

Year	Total Direct Benefits	Total Indirect Benefits	Total Benefits	Total Costs	Present Value of Annual Net Benefits	*Accumulated Present Value of Annual Net Benefits
1993	$3,092,535	$9,772,411	$12,864,946	$0	$12,864,946	$12,864,946
1994	$3,137,345	$9,914,010	$13,051,355	$0	$13,051,355	$25,916,301
1995	$3,181,370	$10,053,129	$13,234,499	$0	$13,234,499	$39,150,800
1996	$3,249,120	$10,267,219	$13,516,339	$0	$13,516,339	$52,667,139
1997	$3,318,695	$10,487,076	$13,805,771	$0	$13,805,771	$66,472,910
1998	$3,389,310	$10,710,220	$14,099,530	$606,414	$13,493,116	$79,966,026
1999	$3,463,055	$10,943,254	$14,406,309	$627,638	$13,778,671	$93,744,697
2000	$3,536,015	$11,173,807	$14,709,822	$649,605	$14,060,217	$107,804,914
2001	$3,587,075	$11,335,157	$14,922,232	$2,309,913	$12,612,319	$120,417,233
2002	$3,638,655	$11,498,150	$15,136,805	$2,390,760	$12,746,044	$133,163,277
2003	$3,690,755	$11,662,786	$15,353,541	$2,474,437	$12,879,104	$146,042,381
2004	$3,742,855	$11,827,422	$15,570,277	$2,561,042	$13,009,234	$159,051,615
2005	$4,306,936	$13,444,951	$17,751,887	$6,695,542	$11,056,345	$170,107,960
2006	$4,372,366	$13,656,557	$18,028,923	$6,929,886	$11,099,037	$181,206,997
2007	$4,435,553	$13,852,253	$18,287,806	$7,172,432	$11,115,374	$192,322,371
2008	$4,501,870	$14,066,673	$18,568,543	$7,423,467	$11,145,075	$203,467,447
2009	$4,569,229	$14,282,736	$18,851,965	$7,683,289	$11,168,676	$214,636,123
2010	$7,179,425	$16,384,559	$23,563,984	$5,624,743	$17,939,241	$232,575,363
2011	$7,860,013	$16,675,854	$24,535,867	$4,402,487	$20,133,380	$252,708,743
2012	$8,594,522	$16,973,226	$25,567,748	$4,556,574	$21,011,173	$273,719,917
2013	$9,303,501	$17,269,928	$26,573,429	$4,716,054	$21,857,375	$295,577,292
2014	$9,873,244	$17,583,712	$27,456,955	$4,881,116	$22,575,839	$318,153,131
2015	$9,947,212	$17,897,583	$27,844,794	$5,051,955	$22,792,839	$340,945,970

*Note: All annual benefits and costs include a 3.5% annual discount rate beginning in 1994.

Source: Pedersen Planning Consultants, 1995.

Within the first five years of operation, the direct benefits generated by the course are expected to offset capital costs required to build the golf course. By the year 2015, the golf course is expected to annually generate almost $5 million in direct project benefits which will represent 51 percent of all direct benefits created by the entire park expansion.

Anticipated project benefits will be somewhat offset by annual operation and maintenance expenditures which will cost an estimated $1.2 million per year. After deducting these expenditures, direct economic benefits gained at the golf course will still generate roughly $2.3 million of positive input to the local economy each year and about $2.2 million in secondary retail expenditures.

3.5.2 Park Expansion Makai of Queen Kaahumanu Highway

The expansion and improvement of camping, hiking, and beach-related opportunities will require a capital investment of almost $23.2 million over a thirteen-year construction period. Annual direct economic benefits of approximately $4.3 million will be generated via user fees for camping and increased public enjoyment for expanded beach and hiking opportunities. Consequently, estimated capital costs will be offset by direct primary benefits within six years of their completion.

The positive input of direct camping, hiking, and beach activity benefits will be somewhat diminished by park management and operation and maintenance costs of about $1.1 million per year. However, these costs will be offset by a significant contribution of secondary retail expenditures for food, fuel, and recreational equipment for camping and beach related activities. Indirect benefits for camping and beach activities in the local economy will generate roughly $15.7 million per year.

3.5.3 Cumulative Economic Value of the Park Expansion

The cumulative net present value of the project offers a significant positive generation of direct and indirect benefits to the local economy. Overall capital expenditures represent a public expenditure of about $40 million. However, these expenditures will generate direct and indirect retail sales and services fees of about $22 million annually. Using shadow prices assigned for public enjoyment, it is believed that resident and visitor enjoyment has a additional value of almost $3.8 million each year.

Through the discounting of future benefits and operation/maintenance costs to 1993 dollars, the overall project will generate a positive contribution of about $221 million in cumulative project benefits during the 2001-2015 period. The completion of the first phase of park improvements is anticipated in the year 2001.

CHAPTER FOUR
FINANCIAL ANALYSIS

4.1 INTRODUCTION

The potential economic benefits that would be derived from the operation of the proposed golf course prompt an examination of the potential economic opportunity for a private concessionaire to develop and/or operate the proposed golf course. The potential construction of a new golf course would defray an $16.6 million public investment for the construction of a public golf course. Use of a private concessionaire for golf course operations and maintenance would clearly provide direct benefits to the local economy and defray the State of Hawaii's potential expenditure of $1.2 million for golf course operations and maintenance. In contrast, management of the course by a public agency would provide only indirect economic benefits and increase the operational cost of government.

Unlike the previous economic analysis in Chapter Three, the financial analysis examines the viability of private golf course development and operations from a conventional market perspective. This approach evaluates only costs and benefits that have an actual market value. The objective of the analysis is to identify profit potential and financial risk for private investor(s), as well as general cashflow requirements. Ultimately, the analysis of these factors provides the basis for assessing the prospects of the business opportunity.

4.2 MARKET SUMMARY

4.2.1 Demand

Chapter Two evaluates competing recreational areas, recreational demand, and the prospective range of user fees. Assuming a golf course opening in early 2010, the proposed golf course would initially open with a prospective demand of about 316 rounds of golf on weekdays and about 222 rounds on weekends. By the year 2014, weekday demand is expected to increase to about 400 rounds while weekends will draw about 285 rounds. These estimates, which indicate greater play on weekdays, presume that the predominant market will be resident players. Resident golf participation on the Big Island presently doubles on the weekends; however, most weekend play occurs closer to home. As the resident population of South Kohala and an expanded local golf demand emerges, weekend demands at the proposed course will clearly exceed weekday demands.

Golf industry professionals in the South Kohala area indicate that a desirable operating range for the course would be a maximum of about 250 rounds per day. Use of the course beyond this volume is not considered to be cost-effective as greater use will cause greater wear and deterioration of the golf course. From a marketing standpoint, resident players will feel rushed during play and likely frustrated by more frequent delays on the course (Bustamante, 1992).

This level of anticipated demands offers an ample market to operate the golf course. If the course is open for play about 355 days per year, an average of about 200 rounds per day will result in 71,000 rounds per year. While the opening of the course is not expected until 2010, golf demands presented in Chapter Two indicate that considerable demand for more affordable golf play already exists. Forecasts of golf course participation in 1995 suggest an existing demand ranging from 190 to 275 rounds per day.

4.2.2 Affordability

Despite extremely affordable green fees at Hilo Municipal Golf Course, golf course managers in the South Kohala area indicate that a range of $25 to $30 per round would be marketable to resident golfers. Resident golfers in West Hawaii presently cannot play for less than $38 at Waikoloa Village, $40 per round at Mauna Kea's new Hapuna course, $50 at Waikoloa Beach Resort, and $70 at Mauna Lani Bay Hotel.

Golfers in East Hawaii will likely continue to find cheaper rates at the Hilo Municipal Golf Course, Naniloa Country Club and Discovery Harbor Golf and Country Club. More comparable rates for residents golfers are available at Volcano Golf Course and Country Club and Sea Mountain Golf Club.

Consequently, a new public course at Hapuna that offers more affordable rates will be very attractive to resident golfers in West Hawaii. East Hawaii golfers who occasionally play in West Hawaii will also be attracted to more affordable rates.

The attraction to more affordable green fees is also dependent upon the quality of the course. The proposed golf course site is located in the vicinity of some of America's more prestigious courses. Fortunately, the proposed site offers an excellent opportunity to provide affordable golf opportunity in an extremely scenic recreational area. However, the quality of play will be directly dependent upon the level of course maintenance and the volume of play permitted by management.

4.3 PRO FORMA PROJECTION

4.3.1 Introduction

The pro forma projection provides a useful summary of the primary indicators of financial viability. For the purposes of this financial analysis, estimated revenues, expenses, cash flow, and profit (loss) have been incorporated into two separate five-year pro forma projections for the proposed golf course (Tables 4-1 and 4-2)

Table 4-1 examines the potential viability of a privately-financed investment for golf course development and operation. Table 4-2 considers private investment into only golf course operation. The only difference in the two pro forma projections lies in the anticipated debt service for construction of the golf course. It is assumed that the State of Hawaii would lease State land mauka of the Queen Kaahumanu Highway for one dollar per year.

TABLE 4-1
PRO FORMA PROJECTION
GOLF COURSE OPERATION BY PRIVATE DEVELOPER-OPERATOR
HAPUNA BEACH STATE RECREATION AREA

REVENUES	*YEAR 1*	*YEAR 2*	*YEAR 3*	*YEAR 4*	*YEAR 5*
Total Rounds/Year	53,250	62,125	71,000	79,875	88,750
Green Fees	$15.00	$15.00	$18.00	$20.00	$20.00
Golf Cart Fees	$15.00	$15.00	$15.00	$15.00	$15.00
Hand Cart Fees	$5.00	$5.00	$5.00	$5.00	$5.00
Driving Range	$1.50	$1.50	$1.50	$1.50	$1.50
Food & Beverage	$9.00	$10.00	$10.00	$10.00	$10.00
Pro Shop Supplies	$10.00	$12.00	$12.00	$12.00	$12.00
Average Income Per Round:					
W/Golf Cart (75%)	$50.50	$53.50	$56.50	$58.50	$58.50
W/Hand Cart (20%)	$40.50	$43.50	$46.50	$48.50	$48.50
W/O Cart (5%)	$35.50	$38.50	$41.50	$43.50	$43.50
Green Fee Revenues	$798,750	$931,875	$1,278,000	$1,597,500	$1,775,000
Golf Cart Revenues	$652,313	$761,031	$869,750	$978,469	$1,087,188
Driving Range Revenues	$79,875	$93,188	$106,500	$119,813	$133,125
Food & Bev Revenues	$479,250	$621,250	$710,000	$798,750	$887,500
Pro Shop Revenues	$532,500	$745,500	$852,000	$958,500	$1,065,000
GROSS REVENUE	**$2,542,688**	**$3,152,844**	**$3,816,250**	**$4,453,031**	**$4,947,813**
Golf Course Maintenance	$794,960	$794,960	$794,960	$794,960	$794,960
Administration	$108,300	$108,300	$108,300	$108,300	$108,300
Food Concession	$321,805	$358,725	$381,800	$404,875	$427,950
Pro Shop	$407,860	$535,660	$599,560	$663,460	$727,360
Driving Range	$22,090	$22,090	$22,090	$22,090	$22,090
Golf Carts	$199,520	$199,520	$199,520	$199,520	$199,520
TOTAL EXPENSES	**$1,854,535**	**$2,019,255**	**$2,106,230**	**$2,193,205**	**$2,280,180**
NET OPERATING INCOME (CASH FLOW)	**$688,153**	**$1,133,589**	**$1,710,020**	**$2,259,826**	**$2,667,633**
DEV. DEBT SERVICE	$468,000	$468,000	$468,000	$468,000	$468,000
LAND DEBT SERVICE	$0	$0	$0	$0	$0
PROFIT (LOSS)	**$220,153**	**$665,589**	**$1,242,020**	**$1,791,826**	**$2,199,633**

Source: Pedersen Planning Consultants, 1995.

TABLE 4-2
PRO FORMA PROJECTION
GOLF COURSE OPERATION BY PRIVATE OPERATOR
HAPUNA BEACH STATE RECREATION AREA

REVENUES	*YEAR 1*	*YEAR 2*	*YEAR 3*	*YEAR 4*	*YEAR 5*
Total Rounds/Year	53,250	62,125	71,000	79,875	88,750
Green Fees	$15.00	$15.00	$18.00	$20.00	$20.00
Golf Cart Fees	$15.00	$15.00	$15.00	$15.00	$15.00
Hand Cart Fees	$5.00	$5.00	$5.00	$5.00	$5.00
Driving Range	$1.50	$1.50	$1.50	$1.50	$1.50
Food & Beverage	$9.00	$10.00	$10.00	$10.00	$10.00
Pro Shop Supplies	$10.00	$12.00	$12.00	$12.00	$12.00
Average Income Per Round:					
W/Golf Cart (75%)	$50.50	$53.50	$56.50	$58.50	$58.50
W/Hand Cart (20%)	$40.50	$43.50	$46.50	$48.50	$48.50
W/O Cart (5%)	$35.50	$38.50	$41.50	$43.50	$43.50
Green Fee Revenues	$798,750	$931,875	$1,278,000	$1,597,500	$1,775,000
Golf Cart Revenues	$652,313	$761,031	$869,750	$978,469	$1,087,188
Driving Range Revenues	$79,875	$93,188	$106,500	$119,813	$133,125
Food & Bev Revenues	$479,250	$621,250	$710,000	$798,750	$887,500
Pro Shop Revenues	$532,500	$745,500	$852,000	$958,500	$1,065,000
GROSS REVENUE	**$2,542,688**	**$3,152,844**	**$3,816,250**	**$4,453,031**	**$4,947,813**
Golf Course Maintenance	$794,960	$794,960	$794,960	$794,960	$794,960
Administration	$108,300	$108,300	$108,300	$108,300	$108,300
Food Concession	$321,805	$358,725	$381,800	$404,875	$427,950
Pro Shop	$407,860	$535,660	$599,560	$663,460	$727,360
Driving Range	$22,090	$22,090	$22,090	$22,090	$22,090
Golf Carts	$199,520	$199,520	$199,520	$199,520	$199,520
TOTAL EXPENSES	**$1,854,535**	**$2,019,255**	**$2,106,230**	**$2,193,205**	**$2,280,180**
NET OPERATING INCOME (CASH FLOW)	**$688,153**	**$1,133,589**	**$1,710,020**	**$2,259,826**	**$2,667,633**
DEV. DEBT SERVICE	$0	$0	$0	$0	$0
LAND DEBT SERVICE	$0	$0	$0	$0	$0
PROFIT (LOSS)	**$688,153**	**$1,133,589**	**$1,710,020**	**$2,259,826**	**$2,667,633**

Source: Pedersen Planning Consultants. 1995.

The detailed assumptions used to calculate anticipated revenues and expenses are explained more fully in the following paragraphs.

4.3.2 Revenues

4.3.2.1 Annual Volume of Play

Each year of the pro forma projections assume a different amount of play per year. Favorable weather conditions in the South Kohala area permit about 355 days of playable conditions at Hapuna during any given year. Further, it was assumed that year one play will average about 150 rounds per day. In subsequent years, the volume of play is expected to increase to 175, 200, 225, and 250 rounds per day. The maximum amount of play will be 250 rounds per day. While these incremental increases are very conservative given the extent of demand, they are arbitrary. However, they also provide a useful basis for eventually comparing overall profitability at different levels of potential use.

4.3.2.2 Green Fees

As indicated in Chapter Two, golf professionals managing public and private courses on the Big Island believe that an affordable round of golf at the proposed course should be in the $25 to $35 range (including a shared golf cart). However, if a quality course is established, these prices can somewhat exceed this level given the price of golf for resident golfers in West Hawaii.

The pro forma projection assumes a quality course will be established. Green fees are initially established at $15, and gradually rise to $20 in year 5 with greater demand. With a beginning cart rental fee of $15, the recommended marketable price range of $25-$35 can be achieved. In order to maintain this affordable cost range for the public, it is also recommended that a contract provision should be included in any agreement between the State of Hawaii and any prospective operator or developer-operator that would set a maximum cost for green, golf cart, and hand cart fees.

Green fees represent the primary revenue source for the proposed golf course. Anticipated green fees range from almost $0.8 million in year 1 to almost $1.8 million in year 5.

4.3.2.3 Golf Cart Rentals

The golf course will maintain a fleet of, at least, 90 motorized carts and a smaller number of hand carts. It is assumed that 75 percent of the golfers will share a $30 cart, or pay $15 per golfer. The warmer, dry environment is expected to encourage the use of the carts. Resident professionals recommend that, at least, morning play should require the use of two-passenger motorized carts.

Hand carts will be rented for $5. These carts will be permitted during a portion of afternoon play. It is assumed that 20 percent of the golfers will rent hand carts.

Five percent of the golfers will rent no carts. They will bring their own cart to the course, or they will be permitted to walk the course without a cart in the late afternoon.

4.3.2.4 Driving Range

It is assumed that every round of golf will produce one sale of a bucket of practice balls at the driving range. Roughly 70 percent of the driving range use will precede a round of golf; the remaining use will be golfers coming to the course for only practice. Discussions with local golf professionals on the Island of Hawaii suggest that this level of driving range use is achievable under private management (Acia, 1993).

Each bucket of practice balls is assumed to cost $1.50.

4.3.2.5 Food and Beverage

Each golfer coming to the course is expected to purchase between $9 and $10 for food and beverages. Typically, the golfer will purchase at least one beverage and lunch snack during the round of golf, as well as beverages and possibly a meal after completing his or her round of golf.

4.3.2.6 Pro Shop

Despite the growing availability of golf equipment and supply catalogues, local golfers like to obtain golf supplies from a local pro shop where they can receive some advice from their local golf pro (Acia, 1992). The manager of the pro shop at the Hilo Municipal Golf Course indicates that an average of $10 to $12 per round of golf is a likely revenue range given a reasonable aggressive marketing effort.

4.3.3 Expenses

4.3.3.1 Golf Course Maintenance

Based upon discussions with an experienced golf superintendent in the South Kohala area, maintenance of the golf course is expected to require a maintenance crew of 19 persons that will be headed by an experienced golf superintendent. Total maintenance costs are expected to be about $795,000 per year. Almost 75 percent of these costs will represent labor.

No increase in basic labor cost is expected other than inflation during the first five years of operation. The sluggish economy and lack of new job opportunities on the Island of Hawaii are not expected to require management to raise salary and wage rates to maintain original staff or replace job vacancies.

4.3.3.2 Administration

The overall golf course and clubhouse operation will be managed by a golf pro. The golf pro will be supported by an assistant golf pro and an office manager/bookkeeper.

Administration costs will include $99,600 in labor costs and about $8,700 in other direct costs. Other direct costs will include expenses for office supplies, equipment, telecommunications, advertising and postage and delivery.

During the first five years of operation, no increase in basic labor cost is expected other than inflation. The sluggish economy and lack of new job opportunities on the Island of Hawaii are not expected to require management to raise salary and wage rates to maintain original staff or replace job vacancies.

4.3.3.3 Food Concession

The operation of a food concession in the clubhouse will require a 9-person kitchen crew that is supervised by a head cook. The kitchen crew will include cooks, kitchen helpers, a cashier, dishwashers and waiters.

Labor costs are expected to be approximately $197,200 per year. Food and beverage costs will represent about 26 percent of food and beverage revenues.

4.3.3.4 Pro Shop

The pro shop operation will use four clerks, or two shifts of two clerks. The assistant golf pro will supervise the clerks; however, the assistant golf pro is considered as part of administrative expenses in light of his dual management role.

Labor costs for the pro shop will be approximately $88,360 per year. The cost of wholesale merchandise in the shop is assumed to be 60 percent of retail sales.

4.3.3.5 Driving Range

The operational cost of the driving range is minimal as the range turf, practice green, and rough will be part of the maintenance responsibility of the golf maintenance crew. In addition to selling retail golf supplies and collecting golf course fees and cart rentals, pro shop clerks will also sell buckets of balls. Consequently, the only clubhouse personnel assigned a labor cost for this operation will be one cart assistant who will spend a part of his day retrieving balls from the driving range.

The anticipated labor cost for the driving range will be $22,090 per annum.

4.3.3.6 Golf Carts

While cart rentals to the public will be handled at the pro shop, the primary cost associated with the rental of golf carts is their maintenance. It is assumed that the private concessionaire would lease 90 carts for about $95/cart per month from a local golf cart supplier and that a three-person crew at the course will handle maintenance (Acia, 1992).

The three-person crew consisting of a mechanic, mechanic assistant, and cart assistant will cost about $91,520 per year. The leasing of the carts, small parts and consumable supplies will expend approximately $100/cart/per month. Consequently, other direct costs will be approximately $108,000 per year.

4.3.4 Debt Service

This expense applies only to the potential private investment for golf course development and operation.

The annual debt service for golf course development is estimated to be approximately $468.000 per year. This rough estimate assumes a 40-year loan period, three points to a lending institution, and various expenses associated with loan closing, taxes, and insurance.

Given its potential relationship to the State of Hawaii, expenses relating to taxes and insurance may be reduced. The potential reduction of debt service costs will depend upon the types of guarantee provided by the golf course developer and, possibly, the State of Hawaii.

4.3.5 Cash Flow

4.3.5.1 Cash Flow Objectives

The proposed operation should attempt to maintain a cash flow position that is equal to the operating expenses of the following six months of operation. This approach will help ensure that the concessionaire is capable of meeting expenses during unexpected downturns in local golf play or other service revenues.

Since subsequent years of operation are expected to generate an increasing number of golf rounds, the golf course operator or developer-operator should expect to secure and input additional capitalization to maintain the desired six-month cashflow position. For example, the growth between year 1 and year 2 in the pro forma indicate a potential need to further capitalize the operation with some $322,000 before beginning year 2.

4.3.5.2 Cash Flow Requirements for Golf Course Operator

The maintenance of a six-month cash reserve to maintain timely payment of operational expenses will require initial startup capitalization of about $928,000. Initial profits in year one will require an additional $327,000 to maintain the six-month cash reserve. However, anticipated second year profits should cover cash flow needs for year three without additional capitalization.

4.3.5.3 Cash Flow Requirements for Developer-Operator

Greater cash flow requirements will be greater for the developer operator which must amortize long-term construction debt and ongoing golf course operations. In order to reduce project risk and maintain the financial capability to meet annual debt service for golf course development, the developer-operator should begin the first year of operation with an initial capitalization of $234,000 for six months of debt service. In addition, cash flow to support six months of golf course operation expenditures require about $928,000 for an expected 150 rounds per year. Consequently, the developer-operator will desirably begin with an initial capitalization of roughly $1,489,000.

If cost and revenue assumptions are close to actual future conditions, it appears that the cashflow of the operation will be self-sustaining once the course operation averages about 175 rounds per day.

4.3.6 Profitability

4.3.6.1 Golf Course Operator

The pro forma projection for the private concession operation indicates a good to excellent profit potential. The assumed annual rounds of play are conservative in light of the existing and future demands for more affordable golf. The anticipated golf course expenses and revenues are considered reliable because they have been derived from local market conditions and the experience of local golf industry professionals on the Island of Hawaii.

The extent of profitability is the amount of debt service which the private concessionaire may have to assume to capitalize the proposed concession operation. If private venture capital is available from a hui of investors, no debt service requirements may be necessary. Without incurring debt service, it is likely that the concessionaire and/or prospective investors may see returns-on-investment once the operation reaches an average of about 175 rounds per day in the second year of operation. By the end of year four, annual profits will be sizable enough to pay off any debt associated with initial capitalization or enable distribution of about $1 million of profits in dividends to the investor. Beyond year five, the operation will probably not generate distributable profits of over $1.5 million annually in order to maintain the recommended six-month cashflow position.

4.3.6.2 Developer-Operator

A profitable business opportunity is also available to a private investment group that wishes to develop and operate the proposed golf course. As stated earlier, this assumes, however, that a prospective developer-operator would not be burdened with any land lease cost, other than a nominal one dollar per year.

Early profitability, i.e., the end of year one, can be expected. Because of debt service requirements, the size of annual profits do not reach $2 million until the fifth year of operation. However, profit distribution would probably not begin until after the fourth year of operation in order to maintain a six-month cash reserve for operation expenses.

4.4 CONCLUSIONS

4.4.1 State Lease of Golf Course Operation to Private Operator

The State of Hawaii can feasibly lease the golf course operation to a private concessionaire. Local golf industry professionals caution that the concession should include both golf course maintenance and the clubhouse operation. Local golf industry representatives suggest that existing municipal golf course operations on the Island of Hawaii, which are maintained by County personnel, are somewhat inferior to private courses on the Island. More importantly, they warn that potential management problems are invited by mixing a private concessionaire operation with public employee maintenance crews.

Given the recent experience of the County of Hawaii at Kealakehe, it is recommended that the State of Hawaii pursue the use of a local, Hawaii-based concessionaire which is familiar with local market conditions and consumer demands. In addition, the financial capabilities of a Hawaii-based concessionaire and associated investors could also be better evaluated and monitored during the course of the lease agreement period.

On the basis of the pro forma projection and related assumptions, the proposed concession is expected to be a profitable venture during the first year of operation. Since the pro forma assumed an average of 150 rounds per day during the first year of operation, the potential for profits may be significantly greater given that daily rounds could be much higher.

While early profitability is expected, the concessionaire should be advised that additional capitalization may be required to sustain an adequate cashflow. As stated earlier, a recommended cashflow position would be the maintenance of funds adequate to pay the following six months of operating expenses.

4.4.2 State Lease of Lands to Developer-Operator

The State of Hawaii presently suffers from a growing deficit and lack of revenues that apparently are inadequate to meet government operations and modest capital improvements. In this context, the financial viability and realization of the proposed golf course would increase significantly with the State's leasing of lands mauka of Queen Kaahumanu Highway for the private development and operation of the golf course.

For the prospective investor, the developer-operator option is somewhat less profitable at the outset and carries more risk. However, if anticipated levels of play and operational expenditures are realized, a self-sustaining investment with good growth potential can be realized within about four years of operation. A prospective developer-operator would also appreciate greater flexibility in its investment if the investor maintained greater control over initial golf course design and construction.

REFERENCES

Acia, Rodney, President, Golf Resources. November, 1992, and September, 1994. **Personal Communication.** Hilo, Hawaii.

Bustamante, Buster, Golf Superintendent, Mauna Lani Golf Course. October, 1992. **Personal Communication.** Waikoloa, Hawaii.

Community Resources, Inc., and Datametric Research. April, 1990. **Results of 1989 Update Survey for the Hawaii Statewide Comprehensive Outdoor Recreation Plan (SCORP); Volume 1: Visitors (August).** Belt Collins & Associates and State of Hawaii, Department of Land & Natural Resources. Honolulu, Hawaii.

Community Resources, Inc., and Datametric Research. April, 1990. **Results of 1989 Update Survey for the Hawaii Statewide Comprehensive Outdoor Recreation Plan (SCORP); Volume 2: Residents (November).** Belt Collins & Associates and State of Hawaii, Department of Land & Natural Resources. Honolulu, Hawaii.

Cox, Linda J.; Hollyer, James R.; and Schug, Donald M. August, 1991. **An Economic Profile of Hawaii's Landscape Services.** University of Hawaii, College of Tropical Agriculture and Human Resources. Honolulu, Hawaii.

Cox, Linda J.; and Hollyer, James R. **The Linkages Between Landscaping and Selected Sectors of the Economy.** Honolulu, Hawaii.

FXM Associates. 1992. **The Economic Impact of Golf Courses on the Local and Regional Economy.** National Golf Foundation. Jupiter, Florida.

National Golf Foundation. May, 1992. **Golf Participation in the United States.** National Golf Foundation. Jupiter, Florida.

National Golf Foundation. August, 1994. **Guidelines for Financing a Golf Course.** National Golf Foundation. Jupiter, Florida.

National Golf Foundation. August 28-30, 1994. **How to Raise Debt and Equity Capital for Golf Course Development** National Golf Foundation Seminar Program. Boston, Massachusetts.

Ordway, Nicholas; Gilbert, Steven; and Grady, Matthew. March, 1991. **Analyzing the Market and Environmental Impacts of the Golf Industry in Hawaii.** Hawaii Resort Developers Conference. Honolulu, Hawaii.

Texeira, Alan, Golf Professional, Waikoloa Golf Course and Country Club. October, 1992. **Personal Communication.** Honokaa, Hawaii.

APPENDIX B

Recreational Demand and Capacity Analysis
Hapuna Beach Recreation Area

RECREATIONAL DEMAND AND CAPACITY ANALYSIS
HAPUNA BEACH STATE RECREATION AREA

Prepared by:

JAMES PEDERSEN
PLANNING CONSULTANT
P.O. Box 22
Volcano, Hawaii 96785
Tel/Fax: (808) 967-7619

April 1993

RECREATIONAL DEMAND AND CAPACITY ANALYSIS
HAPUNA BEACH STATE RECREATION AREA

RECREATIONAL DEMAND

Introduction

The estimation of future recreational participation at Hapuna Beach State Recreation Area provides a statistical basis for determining the amount of land and water area needed to support coastal recreation, as well as the physical capacity of Hapuna Beach to provide these recreational opportunities. Ultimately, forecasts of anticipated recreational demand and available capacity need to be correlated with clear resource management objectives to identify practical strategies for future park management.

It should also be recognized that other recreational opportunities exist along West Hawaii's popular coastline, and that a portion of future activity by both residents and visitors will be directed to other coastal recreation areas. The dynamics of future recreational activity at Hapuna, in the context of other West Hawaii coastal areas, is discussed in the following paragraphs.

Anticipated Resident and Visitor Population

Resident Population

During the past 20 years, the Island of Hawaii resident population has grown from roughly 63,500 persons in 1970 to over 120,300 persons in 1990. This represents an increased growth rate of about four percent per year. The past two decades include a period characterized by a significant decline and virtual closure of most of the island's sugar industry which was followed by the emergence of an expanded visitor industry.

Forecasts of future resident population on the Island of Hawaii were developed by the State Department of Business and Economic Development and Tourism (DBED) in the late 1980's. These forecasts take into account variable social and economic factors and growth rates, and ultimately project a long-term growth rate of roughly 3.5 percent per year to the year 2010 (Table A–1).

These forecasts were developed during a period of somewhat greater optimism concerning the future economic growth of the State and, more specifically, the Island of Hawaii. The sluggish national economy and related adverse impacts upon Hawaii's fragile visitor industry suggest that future island growth may be more modest. Reduced discretionary income of the nation's population, uncertain national growth, and Hawaii's higher cost-of-living are expected to generate little investment and/or in-migration that would exceed the Big Island's natural growth rate and the impact of some limited economic growth.

TABLE A-1

DBED FORECAST
DE FACTO POPULATION
ISLAND OF HAWAII

Year	Residents	Visitors	Total
1990	121,300	15,000	136,300
1995	142,500	16,100	158,600
2000	160,400	22,600	183,000
2005	180,800	30,200	211,000
2010	206,100	36,900	243,000

Source: State Department of Business & Economic Development, 1991.

On this basis, the recreational demand analysis assumes a flat two percent growth rate for the 1990-2010 resident population (Table A-2). The use of a more conservative rate of growth is recommended in order to avoid costly over-expenditures for recreational facility development.

Visitor Population

One of the more useful visitor industry indicators is the average daily census which indicates the average number of visitors present on-island during any given day of the year. This indicator unites two of the most important visitor industry considerations: the number of visitor arrivals and the length of time they stay. Average visitor daily census can be simply calculated as follows:

Average Daily Census =	$\frac{\text{Number of visitors per year x average length of stay}}{\text{Number of days in the year}}$

Using available information concerning visitor participation in shoreline recreational activities, existing and future estimates of average daily visitor census can be used to calculate the prospective amount of visitor recreation at Hapuna Beach State Recreation Area.

Hawaii Visitors Bureau statistics show that the average daily census of incoming visitors to the State of Hawaii peaked in 1989, but has declined since that time. This decline is believed to be shorter lengths of stay by visitors. For example, the Statewide visitor length of stay dropped 1.3 percent between 1990 and 1991. In the face of uncertain economic times, this statewide trend represents a serious concern to the State of Hawaii's primary industry.

While the Big Island visitor industry is clearly affected by the same economic factors, the average daily census figures for the Island of Hawaii differ somewhat. Total arrivals have increased on the Big Island since 1989; the average daily visitor census for the Big Island also increased in 1989 and 1991. However, the average daily visitor census decreased in 1990 when the average of length of stay decreased (Table A-3).

The prospects for a modest increase in the average daily visitor census are likely. The majority of visitors coming to the State are repeat visitors. Hawaii Visitor Bureau studies in 1989 indicate that frequent repeat visitors to Hawaii include the Big Island and Molokai in their travel itineraries. This factor is likely to increase the core market for the Island of Hawaii.

While the Big Island remains attractive to repeat visitors, uncertain economic times suggest that the number of visitor arrivals may be modest until national economic trends improve on a more long-term basis. The attraction of the Big Island to repeat visitors suggests that, in the long-term, the average length of stay may gradually increase. However, more difficult and uncertain economic conditions can also contribute to shorter vacation periods and decrease the average visitor length of stay.

TABLE A-2

ANTICIPATED RESIDENT POPULATION
ISLAND OF HAWAII
1990-2010

YEAR	NUMBER OF RESIDENTS
1990	120,317
1991	123,325
1992	126,408
1993	129,568
1994	132,807
1995	136,128
1996	139,531
1997	143,019
1998	146,595
1999	150,259
2000	154,016
2001	157,866
2002	161,813
2003	165,858
2004	170,005
2005	174,255
2006	178,611
2007	183,077
2008	187,653
2009	192,345
2010	197,153

Note: Assumed 2% annual growth rate from 1990.

Source: James Pedersen, Planning Consultant, 1992;
U.S. Census of 1990.

TABLE A-3

SELECTED VISITOR INDUSTRY INDICATORS
ISLAND OF HAWAII
1989-1991

YEAR	TOTAL VISITOR ARRIVAL	AVERAGE LENGTH OF STAY (DAYS)	AVERAGE DAILY VISITOR CENSUS
1989	1,120,830	5.8	17,760
1990	1,170,830	5.2	16,970
1991	1,188,630	5.8	18,630

Sources: James Pedersen, Planning Consultant, 1992;
Hawaii Visitors Bureau, 1989-91.

The uncertainty in the national economy and the lack of limited signals for future economic growth in the continental United States suggests considerable variability in future visitor arrivals and the average length of stay. Under these conditions, a forecast of the anticipated average daily visitor census was made for this analysis which assumes a modest to low growth scenario to the year 2010 (Table 3-14). More specifically, it was assumed that the average daily census will increase one percent per year between 1992 and 1995. From 1996 to the year 2000, the average daily census is anticipated to grow two percent per year. Beyond 2001, the growth in the average daily census is assumed to reduce to one percent per year (Table A-4).

The average length of stay is assumed to remain constant at 5.8 days per visitor per year. This assumption recognizes that variability will continue to occur throughout each year due to seasonal changes in potential marketability and changing national economic trends.

Recreational Participation Assumptions

Forecasts of anticipated resident and visitor population were applied to various recreational participation assumptions for both residents and visitors. These assumptions, which are identified in the following paragraphs, closely resemble the participation characteristics identified by the 1989 SCORP surveys. The assumptions also take into account other coastal recreational areas in West Hawaii where similar recreational opportunities are available.

However, the use of 1989 participation characteristics does not reflect potential changes in recreational trends that could occur with the growth in popularity or emergence of one or more new recreational activities during the next 15 years. The forecasts also represent the demand in recreational participation without the development of new or expanded recreational facilities in the Hapuna-Puako area; consequently, the potential impact of new facility development, or the lack of existing facilities, upon future demand is also not considered.

Forecasts were made for coastal recreation activities that are presently taking place at Hapuna and Wailea. Other potential activities, presently not occurring in the project area, were also considered on the basis of the physical characteristics of the nearshore waters and the lands contained in the project area. Jet skiing and windsurfing, were not considered as part of the forecast in light of their anticipated conflicts in nearshore water areas with other existing nearshore activities.

Beach Activities

Beach activities include sunbathing, swimming, picnicking on sand, shoreline fishing, and other beach games. Since these activities are frequently interrelated, it is assumed that future beachgoers in Hapuna and Wailea Bay will participate in one or more activities on the beach and the adjoining inshore waters.

TABLE A-4

AVERAGE DAILY VISITOR CENSUS
ISLAND OF HAWAII
1990-2010

Year	Number of Visitors	Average Length of Stay (Days)
1990	16,680	5.2
1991	18,889	5.8
1992	19,078	5.8
1993	19,269	5.8
1994	19,461	5.8
1995	19,656	5.8
1996	20,049	5.8
1997	20,450	5.8
1998	20,859	5.8
1999	21,276	5.8
2000	21,702	5.8
2001	21,919	5.8
2002	22,138	5.8
2003	22,359	5.8
2004	22,583	5.8
2005	22,809	5.8
2006	23,037	5.8
2007	23,267	5.8
2008	23,500	5.8
2009	23,735	5.8
2010	23,972	5.8

Assumptions:
1. Constant visitor length of stay
2. One percent growth in visitor arrivals from 1992-1995.
3. Two percent growth in visitor arrivals from 1996-2000.
4. One percent growth in visitor arrivals from 2001-2010.

Sources: James Pedersen, Planning Consultant, 1992;
Hawaii Visitors Bureau, 1989-91.

Future participation by residents is expected to represent seven percent of the anticipated resident population on weekend days and one percent on weekdays. The majority of residents engaging in beach activities will tend to use beaches closer to home; consequently, beaches in North and South Kona and Hilo will contain the most beach activity. Similar to 1989 participation and destination trends, it is assumed that 18 percent of the Big Island's beach users will go to the Kohala district on weekend days; 21 percent will use Kohala beach areas on weekdays. It is assumed that 70 percent of the resident beach users coming to Kohala beach areas will go to Hapuna Beach State Recreation Area; the remaining residents will use beaches in Puako Bay and Spencer Beach Park.

For visitors, 32 percent of the average daily visitor census will participate in beach activities on any given weekend day or weekday. Roughly 45 percent of these beachgoers will go to beaches in Kona. Forty percent are expected to use Kohala beaches; the remaining will use beaches in Kau, Puna, and Hilo. Half of the visitors coming to Kohala district beaches will use existing and proposed beach areas at Hapuna Beach State Recreation Area; the other 50 percent will use beaches adjoining existing resort complexes in the Kohala district.

Bodyboarding and Bodysurfing

Bodyboarding and bodysurfing will be the most popular nearshore water activity and will continue to be inter-related with other beach activities. The segregation of this demand is useful to better differentiate the proportion of activities that are expected to occur in the inshore waters versus on the beach.

Roughly two percent of Big Island residents are assumed to participate in this activity on weekend days and 0.7 percent on weekdays. Approximately half of this activity will occur along shoreline areas in Hilo and the Puna districts; the other half will use coastal areas in West Hawaii. Roughly 26 percent of all residents engaging in this activity on weekend days will use the Kohala district shoreline on weekend days while 14 percent will use coastal areas in Kohala on weekdays. It was assumed that all resident bodyboarders and bodysurfers coming to the Kohala district will use the beaches at Hapuna and Wailea.

For Big Island visitors, it was assumed that six percent of all visitors will participate in this activity each day. Over half of the visitor bodyboarding and bodysurfing activity will take place at public beaches in North and South Kona. About 30 percent will participate in this activity in the Kohala district; the remaining in the Kau district. It is assumed that 80 percent of the visiting bodyboarders and bodysurfers using the Kohala coast will use Hapuna Beach State Recreation Area.

Camping

Camping will continue to be a weekend or holiday activity for roughly one percent (0.9 percent) of local residents. Few will camp during the week. Roughly 40 percent of all camping by residents will occur in the Kona area. Twenty percent of weekend camping is expected to take place in Puna, as well as in Kau. About 20 percent of future camping is assumed to occur in the Kohala area.

Less than one percent (0.8%) of visitors are expected to engage in camping activities. About one-third will occur in the Kohala area.

Diving/Snorkeling

Inshore diving and snorkeling activities are expected to maintain the present participation level (0.6%) by Big Island residents on weekend days and only 0.1% on weekdays. About one-third will carry out this activity in the Kohala district. Roughly 75 percent of the activity in the Kohala district will take place at the Hapuna Beach State Recreation Area.

Inshore snorkeling and diving is assumed to sustain its present popularity among visitors. Almost 14 percent of all visitors are expected to participate in diving activities on a given day. About one-third of all snorkeling and diving will occur in the Kohala area. About 65 percent of the Kohala activity will be performed at the Hapuna Beach State Recreation Area.

Golf

Golf will continue to represent an important form of coastal recreation in light of the presence of various private golf courses along the Big Island shoreline. Roughly 1.4% of local residents will participate in this activity on weekend days; however, less than one percent (0.7 %) of residents will play golf during a typical weekday. Less than 10 percent of participating golfers are expected to play in the Kohala area during the weekends. On weekdays, over 25 percent of participating golfers will play on courses in the Kohala area.

The quality and number of golf courses available on the Big Island will continue to encourage significant visitor golf activity. Six percent of all visitors are expected to play golf during two days of their stay on the Big Island. Over 60 percent of all visitor golf activity will take place in the Kohala area. Roughly 96 percent of all visitor play will take place at private golf courses within existing resort areas.

Hiking

Hiking activity is expected to follow present trends that indicate significant participation by Big Island visitors and nominal hiking by residents on the weekends.

Approximately nine percent (9.1%) of all visitors are assumed to participate in hiking on any given day of their stay. About 14 percent of those participating in this activity will carry out their hikes in the Kohala district. It is believed that 95 percent of all hiking in the Kohala district would occur in an expanded Hapuna Beach State Recreation Area where coastal hiking opportunities could exist.

Hiking by local residents is expected to occur almost entirely on the weekend. A participation rate of 0.6 percent was assumed. It is assumed that an expanded Hapuna Beach State Recreation Area would attract roughly 10 percent of this weekend activity. While a limited amount of hiking occurs on weekdays, it is believed to be too small to reflect any recreational demand.

Surfing

Surfing activity will be seasonal and occur at several inshore sites in Wailea Bay. It is believed that surfing activity will take place only during favorable wave conditions and that significant demand will occur on weekends and holidays.

Other Activities

Other recreational activities such as skimboarding, shore fishing, volleyball will be carried out along the shoreline of the expanded Hapuna Beach State Recreation Area. No assumptions were made for other activities since they are not expected to generate any significant demand. These types of recreation will likely be related to other beach and nearshore water activities.

Forecasts of Future Recreational Demand

Anticipated recreational demand for Hapuna Beach State Recreation Area are presented in Tables A–5 through A–9 These forecasts reflect average daily recreational demands on weekdays and weekend days. Anticipated demands are also segregated by residents and visitors to clearly identify the primary user for various activities. No attempt was made to break down these forecasts on a monthly basis to reflect seasonal trends.

Using the assumptions presented in Section 3.6.3, the forecasts were calculated by multiplying anticipated resident and visitor populations by the 1989 rates of both weekday and weekend participation and related destination characteristics for each recreational activity.

Activities on the Beach and Nearshore Waters

The focus of future coastal recreation at Hapuna Beach State Recreation Area will continue to include activities such as sunbathing, swimming, picnicking and other beach related activities at Hapuna Beach, Wailea Beach, and Beach 68. Nearshore water activities will include bodysurfing/ bodyboarding, snorkeling/diving, and shoreline pole fishing. Interrelated beach and water activities will account for about 76 percent of all recreational activities on weekends and approximately 68 percent on weekdays.

Bodyboarding and bodysurfing will continue to represent an important attraction to the Hapuna Beach State Recreation Area, particularly residents. About two-thirds of residents spending time at the beach will engage in these activities. In contrast, less than one-fourth of visitors using the beach will participate. When combined, bodyboarding and bodysurfing is believed to represent about 45 percent of the future weekend day demand for activities on the beach and inshore waters. During weekdays, the demand for bodysurfing is expected to decline to about 30 percent of beach and nearshore water activities when there is a greater proportion of visitor users.

Future weekend day use of the park will include some 3,100 people along the beach and adjoining inshore waters by the year 2010. During weekdays, anticipated use of these areas will decrease to about 1,650 persons. If present trends continue, roughly 40 percent of those coming to the beach will be in the water during any daytime period.

Peak beach use will continue to represent about 40 percent of the total daily demand, which suggests that an ultimate beach turnover rate of about 2.0 to 2.5 times per day. With park expansion, 85 percent of future beach and water activities will occur at Hapuna; the remaining will take place at Wailea Bay. Peak hour beach demands in the year 2010 will include about 1,479 persons at Hapuna Beach and 261 persons at Wailea Bay.

TABLE A-5
ANTICIPATED WEEKDAY RECREATIONAL DEMAND
HAPUNA BEACH STATE RECREATION AREA
BIG ISLAND RESIDENTS
1990-2010

Year	Beach Activity	Camping[a]		Golf	Bodybrdng/ Bodysurfing
		Group	Family		
1990	177	0	0	227	118
1991	181	0	0	233	121
1992	186	0	0	239	124
1993	191	0	0	245	127
1994	195	0	0	251	130
1995	200	0	0	257	134
1996	205	0	0	263	137
1997	210	0	0	270	140
1998	216	0	0	277	144
1999	221	0	0	284	147
2000	227	0	0	291	151
2001	232	0	0	298	155
2002	238	0	0	305	159
2003	244	0	0	313	163
2004	250	0	0	321	167
2005	256	0	0	329	171
2006	263	0	0	337	175
2007	269	0	0	345	180
2008	276	0	0	354	184
2009	283	0	0	363	189
2010	290	0	0	372	193

[a] Assumes that virtually no residents will engage in camping activities on the weekdays.

Source: James Pedersen, Planning Consultant, 1992.

TABLE A-6

ANTICIPATED WEEKEND DAY RECREATIONAL DEMAND
HAPUNA BEACH STATE RECREATION AREA
BIG ISLAND RESIDENTS
1990-2010

Year	Beach Activity	Camping		Golf	Bodyboardng/ Bodysurfing	Surfing	Hiking
		Group	Family				
1990	1061	75	74	152	688	40	72
1991	1088	77	76	156	705	41	74
1992	1115	79	78	160	723	42	76
1993	1143	81	80	164	741	42	78
1994	1172	83	82	168	759	43	80
1995	1201	85	84	172	778	44	82
1996	1231	87	86	176	798	45	84
1997	1262	89	88	181	818	46	86
1998	1293	91	91	185	838	47	88
1999	1326	93	93	190	859	48	90
2000	1359	96	95	195	881	49	92
2001	1393	98	98	199	903	50	95
2002	1427	100	100	204	925	51	97
2003	1463	103	102	210	948	52	100
2004	1500	106	105	215	972	53	102
2005	1537	108	108	220	996	54	105
2006	1576	111	110	226	1021	55	107
2007	1615	114	113	231	1047	56	110
2008	1655	116	116	237	1073	57	113
2009	1697	119	119	243	1100	58	115
2010	1739	122	122	249	1127	59	118

Source: James Pedersen, Planning Consultant, 1992.

TABLE A-7

ANTICIPATED WEEKEND OR WEEKDAY RECREATIONAL DEMAND
HAPUNA BEACH STATE RECREATION AREA
BIG ISLAND VISITORS
1990-2010

Year	Beach Activity	Camping		Golf	Bodyboarding/ Bodysurfing	Hiking
		Group	Family			
1990	1068	0	44	25	240	213
1991	1079	0	44	29	242	241
1992	1090	0	45	29	245	243
1993	1100	0	45	29	247	245
1994	1111	0	46	29	250	248
1995	1123	0	46	30	252	250
1996	1145	0	47	30	257	255
1997	1168	0	48	31	262	261
1998	1191	0	49	32	268	266
1999	1215	0	50	32	273	271
2000	1239	0	51	33	279	276
2001	1252	0	52	33	281	279
2002	1264	0	52	33	284	282
2003	1277	0	53	34	287	285
2004	1290	0	53	34	290	288
2005	1303	0	54	34	293	291
2006	1316	0	54	35	296	293
2007	1329	0	55	35	299	296
2008	1342	0	55	36	302	299
2009	1355	0	56	36	305	302
2010	1369	0	56	36	308	305

Source: James Pedersen, Planning Consultant, 1992.

TABLE A-8
COMBINED RESIDENT AND VISITOR DEMAND ON TYPICAL WEEKEND DAY
HAPUNA BEACH STATE RECREATION AREA
1990-2010
(Number of Persons)

Year	Beach Activity	Bodyboarding/ Bodysurfing[a]	Surfing[b]	Camping		Golf	Hiking
				Group	Family		
1990	2129	928	40	75	118	175	285
1991	2167	947	41	77	120	185	315
1992	2205	968	42	79	123	189	319
1993	2243	988	42	81	125	193	323
1994	2283	1009	43	83	128	197	328
1995	2324	1030	44	85	130	202	332
1996	2376	1055	45	87	133	206	339
1997	2430	1080	46	89	136	212	347
1998	2484	1106	47	91	140	217	354
1999	2541	1132	48	93	143	222	361
2000	2598	1160	49	96	146	228	368
2001	2645	1184	50	98	150	232	374
2002	2691	1209	51	100	152	237	379
2003	2740	1235	52	103	155	244	385
2004	2790	1262	53	106	158	249	390
2005	2840	1289	54	108	162	254	396
2006	2892	1317	55	111	164	261	400
2007	2944	1346	56	114	168	266	406
2008	2997	1375	57	116	171	273	412
2009	3052	1405	58	119	175	279	417
2010	3108	1435	59	122	178	285	423

[a] Bodyboarding and bodysurfing is an activity related to beach activities. Consequently, this data is presented to better understand how many beachgoers use the nearshore waters.
[b] Surfing activity is expected to be performed almost exclusively by local residents who will continue to surf primarily during the winter months and when favorable surf conditions prevail.

Source: James Pedersen, Planning Consultant, 1993.

TABLE A-9
COMBINED RESIDENT AND VISITOR DEMAND ON TYPICAL WEEKDAY
HAPUNA BEACH STATE RECREATION AREA
1990-2010
(Number of Persons)

Year	Beach Activity	Bodyboarding/ Bodysurfing[a]	Surfing[b]	Camping[c]		Golf	Hiking[d]
				Group	Family		
1990	1245	358	0	0	44	252	213
1991	1260	363	0	0	44	262	241
1992	1276	369	0	0	45	268	243
1993	1291	374	0	0	45	274	245
1994	1306	380	0	0	46	280	248
1995	1323	386	0	0	46	287	250
1996	1350	394	0	0	47	293	255
1997	1378	402	0	0	48	301	261
1998	1407	412	0	0	49	309	266
1999	1436	420	0	0	50	316	271
2000	1466	430	0	0	51	324	276
2001	1484	436	0	0	52	331	279
2002	1502	443	0	0	52	338	282
2003	1521	450	0	0	53	347	285
2004	1540	457	0	0	53	355	288
2005	1559	464	0	0	54	363	291
2006	1579	471	0	0	54	372	293
2007	1598	479	0	0	55	380	296
2008	1618	486	0	0	55	390	299
2009	1638	494	0	0	56	399	302
2010	1659	501	0	0	56	408	305

[a] Bodyboarding and bodysurfing is an activity related to beach activities. Consequently, this data is presented to better understand how many beachgoers use the nearshore waters.
[b] Surfing activity is expected to be performed almost exclusively by local residents who will continue to surf primarily during the winter months and when favorable surf conditions prevail.
[c] Camping activity on weekdays is expected to be done almost exclusively by island visitors.
[d] Hiking activity on weekdays is assumed to represent only visitor activity.

Source: James Pedersen, Planning Consultant, 1993.

Camping

Group and family camping will continue to be a demand for both residents and visitors; group sizes will range from 10 to 200 persons. Group campers are expected to represent resident extended families, church groups, Scout organizations, trail clubs, and environmental organizations.

Family camping by smaller-extended family groups and nuclear families is expected to take place on weekends. Visitor camping will continue to primarily include couples.

The anticipated weekend recreational demands for this activity is estimated to be 300 persons per day in the year 2010. Roughly 80 percent of that demand is expected from local residents. Weekday camping will average about 56 persons per day and will almost exclusively include visitors. These forecasts should be viewed as conservative since they are, in part, based on 1989 participation rates. There may be a suppressed demand due to the limited availability of public campsites on the Island of Hawaii.

Hiking

If lands south of the present State recreation area are developed, it is expected that shoreline hiking opportunities along a designated trail will attract up to 420 persons on a given weekend day. During the week, shoreline hiking opportunities will generally be limited to about 300 persons per day; most of these hikers will be visitors.

Surfing

Wailea Bay will continue to be a popular surfing destination during the winter season. By the year 2010, weekend day demand will be about 60 surfers. However, this level of demand for surfing will occur only during favorable surf conditions.

Golfing

Established golf courses in the South Kohala area will continue to attract most visiting golfers. However, the affordability of a public course will clearly attract resident golfers who will be the primary users.

Assuming a continuation of 1989 resident recreational trends, an affordable public course in Kohala has a potential market for some 400 golfers on weekdays and 300 golfers on weekends. The anticipated trend of greater weekday play may reverse as more affordable weekend rates become available to resident golfers. The overall anticipated demand may also be conservative as the availability of a more affordable public course may stimulate considerably more play by West Hawaii resident golfers.

RECREATIONAL CAPACITY

Introduction

The determination of recreational capacity is a method of evaluating and correlating different factors influencing the development of recreational facilities. Typically, a recreational capacity analysis provides a technical basis for assessing the "capability" of an existing or expanded site to accommodate ongoing and/or future activities.

For the purposes of this project, the following factors were evaluated:

1. location and general size of existing and potential recreational areas;
2. spatial standards from Fogg and the 1990 State Comprehensive Outdoor Recreation Plan;
3. anticipated recreational demands of residents and visitors to the year 2010;
4. concerns expressed during a public information meeting on August 4, 1992;
5. correspondence from and informal discussions with several residents and property owners in the Wailea Bay area; and
6. existing resource management objectives.

Ultimately, this analysis provides State Parks Division planners and the Big Island community with some insight concerning how much of the proposed expansion area is needed to support future recreation in the Hapuna-Wailea Bay area.

The capacity analysis also provides a useful basis for identifying and selecting alternate strategies for future park management. Typically, the type and degree of park management reflect a response to the density of activities, potential user conflicts, human safety considerations, and natural resource management objectives.

Existing and Potential Recreational Opportunities

A preliminary August, 1992 master plan for the expansion of Hapuna Beach State Recreation Area was used to locate and determine the amount of available land area suitable for various recreational opportunities. This layout, prepared by Belt Collins & Associates, was based on an evaluation of variable site elevations; existing topographic features such as existing vegetation, roads and trails; existing recreational activities; and opportunities identified by State Department of Land and Natural Resources and County of Hawaii Department of Parks and Recreation. These analyses suggest the Hapuna Beach State Recreation Area could be used to feasibly provide the following recreational opportunities and support facilities:

* Beach and swimming activities at Hapuna Beach, Beach 68 and Wailea Beach
* Bodyboarding, surfboarding, and windsurfing
* Shorefishing
* Snorkeling and diving
* Overnight lodging
* Family picnicking mauka of Hapuna Beach, Wailea Beach, Ohai Point, and the northern end of Puako Bay
* Group picnic rental pavilions mauka of Ohai Point
* Family/group campground

* Organized group camp
* An 18-hole municipal golf course
* Small boat launching activity at Puako Bay
* Coastal hiking trails south of Hapuna Beach
* Park headquarters and maintenance base yard
* Wildland buffer areas
* Vehicular parking

Determination of Selected Spatial and Capacity Standards

Spatial and capacity standards were evaluated and identified for beach activities, picnicking, camping and golf using park planning criteria available from Mr. George Fogg, a recognized landscape architect and park planning consultant, and the 1990 Hawaii State Comprehensive Outdoor Recreation Plan (SCORP). These criteria and standards were evaluated in light of comments received at a public information meeting in August, 1992 and by mail. Based on these evaluations, spatial and capacity standards were modified and subsequently used to calculate the potential maximum capacity of both the existing and expanded Hapuna Beach State Recreation Area.

Beach and Swimming Activities

Fogg Guidelines

Guidelines for beach development, determined by Mr. Fogg, suggest low, medium, and high density standards which are expressed in the amount of square feet needed per person. Fogg's standards also provide recommended densities for nearshore water area, beach area, and adjoining back-up and buffer area (Table A-10). In addition, the guidelines indicate that the first 10 to 40 feet of dry beach area is an active use area that is not suitable for sunbathing or picnicking.

Selected Standard

The medium density standard was selected for Hapuna Beach and Wailea Beach. Due to its smaller size, location and general environs, the density standard for Beach 68 was established as low. It was also assumed that the initial 10-feet of dry beach area is not suitable for sunbathing or picnicking.

A modified set of beach, water, and back-up area standards was seriously considered for Wailea Beach based upon public expressions of preference for lower density uses, the observed density of existing activities, Wailea Bay's status as a Marine Life Conservation District, and recommendations contained in the 1990 Hawaii SCORP report. However, it is clear that the diverse coastal resources in the Hapuna-Puako area will gradually make Hapuna Beach State Recreation Area the State's primary recreation attraction during, at least, the next 15 years. As West Hawaii's resident and visitor populations continue to grow, the anticipated popularity of this recreational attraction will ultimately generate a higher density of beach use at both Hapuna and Wailea Bay. Consequently, the use of medium density standards was determined to be more practical for: 1) determining the physical capacity of existing beaches, and 2) estimating the capability of Wailea and Hapuna beaches to serve future beach activity demands.

TABLE A-10

MAXIMUM CAPACITY OF EXISTING HAPUNA BEACH STATE RECREATION AREA TO SUPPORT VARIOUS TYPES OF COASTAL RECREATION

Location	Land Area (Sq. Feet) or No. of Facilities	Selected Standard	Number of Persons
Hapuna Beach			
Water[a]	370,000	40 sq ft/person	9,250
Beach	351,500	60 sq ft/person	5,858
Buffer	675,000	800 sq ft/person	844
Hapuna Picnic Shelters	8 shelters	8 persons/shelter	64
Hapuna Pavilions	2 pavilions	48 persons/pavilion	96
Hapuna Outdoor Picnic Tables	8 tables	8 persons/picnic table	64
Hapuna Cabins	6 cabins	4 campers/cabin	24
Total[a]			6,106

[a] Total excludes number of persons in water since water users will also use the beach. At Hapuna, roughly 40 per cent of those going to the beach use the adjoining nearshore water area.

Source: James Pedersen, Planning Consultant, 1993.

The capacity analysis of beach and water activities also requires the definition of peak hour criteria given the nature of these activities at Hapuna and the potential use of two additional beaches in Wailea Bay. Peak hour activity was assumed to represent 40 percent of the total daily demand on weekdays or weekend days. It is expected that 85 percent of future users will go to Hapuna Beach while the remaining 15 percent will use either Beach 68 or Wailea Beach.

Picnicking

Fogg and SCORP Guidelines

NRPA guidelines suggest that approximately 225 square feet should be provided for a typical family group of 3.5 to 8 people and that a minimum table spacing of 20 to 40 feet on-center is desirable. The Hawaii SCORP report suggests that roughly 80 to 100 square feet be provided for each person, and typical picnic shelters should accommodate 8 persons.

For group picnicking, Fogg's standards recommend a minimum of 25 persons and a maximum that should reflect local demands and available space. The typical size of extended family and other social gatherings on the Big Island dictate the need for a larger sheltered facility that would be large enough to accommodate 50 persons to 100 persons.

Selected Standards

It was assumed that shelters for family picnics would accommodate eight persons given the design of existing shelters behind Hapuna Beach. Picnic shelters would be situated at least 100 feet apart. Picnic tables, which typically seat approximately six persons, would be installed behind Wailea Beach. Tables would be placed about 100 feet apart to encourage the low density feeling of the area.

For group picnicking, the capacity analysis assumed the development of three shelters. Two of these pavilions would accommodate 50 persons; the third pavilion would accommodate 100 persons.

Camping

Fogg Guidelines

According to Fogg's guidelines, family campsites should accommodate from four to eight persons while groups may vary in size from 10 to 200 persons. Fogg's standards also provide some guidance concerning maximum distances from campsites to support facilities such as restrooms and showers, as well as recommended separation between adjoining campsites.

Selected Standards

Family Camping:

Family camping on the Island of Hawaii typically involves roughly two to six persons. The majority of visiting campers are couples; resident camping by families and smaller groups typically include a family of four plus two friends (Miyao, 1991). However, a somewhat larger family

campsite, with adequate area for about five small tents, could serve up to 10 campers. This standard is recommended to meet the variable demands of both couples and smaller family groups.

The existing recreation area includes lodging in six A-frame shelters that can each accommodate four persons. If incorporated into the proposed park expansion, it was assumed that the capacity of future cabin shelters would remain the same.

Group Camping:

Hawaii County Department of Parks and Recreation staff indicate that there is considerable demand for groups or larger extended family gatherings ranging from 30 to 40 persons, as well as larger groups up to 100 persons (Iyo, 1992). Because of the variability in group sizes, group camping areas should consist of several clusters of campsites that can accommodate several smaller groups or one larger group.

For this reason, it was assumed that the State would develop one or more group campgrounds. Each campground would contain three group camp sites. A typical group camp site would contain from five to eight cabins. Each cabin would accommodate up to 16 persons; it is assumed that four bunkbeds would be provided inside each cabin. Using this criteria, each group camp site would accommodate 80 to 128 persons; used in combination, three group camp sites would be used by a peak population of about 300 persons.

Golf

A comfortable operating capacity of up to 200 rounds per day was assumed for an 18-hole golf course. This is a desirable maximum daily use based upon the experience of various public and private golf courses in Hawaii (Wright, 1992).

Hiking

Various hiking guidelines and standards were examined to identify possible criteria for determining the capacity of a hiking trail.

State Na Ala Hele Standards

The 1991 Na Ala Hele Program Plan provides no capacity standards for hiking trails. However, the Plan provides trail guidelines for wheelchair, pedestrian, equestrian, and bicycle access. These guidelines recommended tread width, materials, as well as horizontal and vertical clearances.

U.S. Forest Service Standards

The Design Guide for Accessible Outdoor Recreation (interim draft), published by the U.S. Department of Agriculture, Forest Service, also provides useful trail design criteria and specifications that are aimed to address the needs of disabled persons. These guidelines identify specific criteria concerning distance, grade and cross slope, trail width, gates, surface material, rest areas, curbs, and handrails. However, no guidelines are provided for establishing capacity criteria.

Staff and consultants working at the Bob Marshall Wilderness Complex in Montana developed a set of capacity criteria via a task force of researchers, Forest Service personnel and special interest group representatives. The capacity of wilderness trails in this recreational complex was determined by the task force which used a variable standard of the "number of trail encounters per day". The number of trail encounters ranged from 0 to 5 encounters per day for four recreational opportunity classes (Stankey, McCool, and Stokes, 1984).

Selected Standard

The coastal trails between Hapuna and Wailea Bay is not comparable to the considerably more remote trails of the Bob Marshall Wilderness Complex. However, the standard does provide a sense of the potential type of recreational experience for an individual hiker. This type of standard can be applied to the project area; however, in order to determine the extent of available capacity, the definition of the number of users over a potential hiking distance is also required.

A variety of activities is feasible in the potential expansion area. Any potential hiking activity will not represent a highly remote experience. In addition, hiking will likely be a secondary activity to other activities such as camping. For this reason, the number of trailer encounters would probably range from 5 to 7 encounters for each individual hiker. Given this type of recreational experience, a maximum capacity of 50 persons per 1,000 linear feet of trail is assumed to be a desirable and realistic density for future hiking activity.

Determination of Maximum Capacity

For the purposes of this analysis, maximum capacity refers to a desirable number of people that can be accommodated by existing and potential activity areas and/or facilities. Maximum capacity is an essential calculation needed to determine the amount of available recreational capacity at Hapuna.

Using the selected standards outlined in Table A-10, it was determined that the existing Hapuna Beach State Recreation Area is capable of serving up to 3,700 people who can enjoy existing recreational opportunities for sunbathing, swimming, picnicking, bodyboarding/bodysurfing, snorkeling/diving, and various beach activities. The potential number of users that can be accommodated for each of the primary activities are summarized in Table A-11.

If the Hapuna Beach State Recreation Area is expanded to incorporate lands south of Hapuna Beach and mauka of Queen Kaahumanu Highway, the maximum user population could increase to about 6,000 people. The potential number of users that could be accommodated for various recreational opportunities in an expanded Hapuna Beach State Recreation Area are presented in Table A-11.

Available Capacity Using Existing Recreation Area

Available capacity (AC) is the number of people that a recreational area can accommodate before reaching its estimated maximum capacity. Available capacity is expressed both as the number of people and as a percentage in order to help visualize what proportion of an area's capacity remains available for potential public use.

TABLE A-11
MAXIMUM CAPACITY OF PROPOSED
HAPUNA BEACH STATE RECREATION AREA EXPANSION
TO SUPPORT VARIOUS TYPES OF COASTAL RECREATION

Location	Land Area (Sq Ft) or No. of Facilities	Selected Standard	Number of Persons
Hapuna Beach			
Water[a]	370,000	40 sq ft/person	9,250[a]
Beach	351,500	60 sq ft/person	5,858
Backup[b]	675,000	800 sq ft/person	844[b]
Hapuna Picnic Shelters	8 shelters	8 persons/shelter	64
Hapuna Pavilions	2 pavilions	48 persons/pavilion	96
Hapuna Outdoor Picnic Tables	8 tables	8 persons/table	64
Hapuna Cabins	6 cabins	4 campers/cabin	24
Group Cabins	19 cabins	16 campers/cabin	304
Family Campsite Clusters	80 campsites	10 persons/campsite	800
Group Picnic Rental Grounds	3 pavilions	50 persons/pavilion 100 persons/pavilion	200
Wailea Picnic Tables	6 tables	8 persons/table Tables 100 ft on-center	48
Wailea Beach			
Water[a]	255,000	40 sq ft/person	6,375[a]
Beach	85,000	60 sq ft/person	1,417
Backup[b]	15,000	800 sq ft/person	19[b]
Beach 68			
Water[a]	0	60 sq ft/person	0[a]
Beach	3,500	90 sq ft/person	39
Golf Course	18 holes	200 rounds/day	200
Coastal Trail	10,000 LF	50 persons/1000 LF	500
TOTAL[a/b]			9,584[a/b]

[a] Persons in water are excluded since water users will also use the beach. At Hapuna, 40 percent of beachgoers use the adjoining nearshore water area.
[b] Persons in beach backup areas usually represent about 35% of the persons in both the water and nearshore waters. Since the backup area includes considerable picnicking area, persons in these areas have been excluded to avoid double-counting.

Sources: James Pedersen, Planning Consultant, 1993;
Clark, 1991; Fogg, 1990.

The capability of the existing recreation area to meet future recreation demands was calculated by subtracting anticipated weekday and weekend day demands (Tables A-8 and A-9) from the estimated maximum capacity of the existing recreation area (Table A-10).

AC = Future Recreation Demand (persons) - Maximum Capacity (persons)

Remaining AC = Peak Hour AC (persons)
(%) Maximum Capacity (persons)

Available beach capacities reflect the same calculations, as well as peak hour participation assumptions defined in the section on beach and swimming activities which begins on page A-17.

Peak Hour AC = Maximum Beach Capacity (persons) - [Future Demand for beach activity (persons) x (persons) Peak Hour Demand (40% on weekday or weekend)]

Remaining AC = Peak Hour AC (persons)
(%) Maximum Capacity (persons)

Available water capacities were calculated as follows:

Peak Hour AC = Maximum Water Capacity (persons) - [Future demand for beach activity (persons) x (persons) Peak Hour Demand (40% on weekday or weekend) x Water Use (30% weekdays,45% weekends)]

Remaining AC = Peak Hour AC (persons)
Maximum capacity (persons)

The calculation of available capacity, assuming the use of only the existing recreation area, is summarized in Table A-12 and Table A-13 for each of the primary activities occurring in the Hapuna Beach State Recreation Area. This approach enables a more practical evaluation of the area's capability to serve future recreational demands.

Water and Beach Activities

This calculation demonstrates that the existing Hapuna Beach is physically capable of accommodating considerably more use than it presently receives and could provide adequate beach and inshore water area to meet beach activity demands to the year 2010. Weekday capacities suggest considerable remaining capacity while weekends indicate a potential need for somewhat greater management.

A significant amount of available nearshore water area at Hapuna provide sufficient capacity to accommodate future water activities such as bodyboarding and bodysurfing. Other water activities, e.g., snorkeling and diving, will absorb little of the remaining water capacity.

TABLE A-12
AVAILABLE PEAK HOUR CAPACITY
EXISTING HAPUNA BEACH STATE RECREATION AREA
TO SERVE ANTICIPATED BEACH AND WATER ACTIVITY DEMANDS
1990-2010

Year	Beach Activity				Water Activity			
	Weekend Day		Weekday		Weekend Day		Weekday	
	Persons	% Capacity	Persons	% Capacity	Persons	% Capacity	Persons	% Capacity
1990	5006	85	5360	91	8867	96	9101	98
1991	4991	85	5354	91	8860	96	9099	98
1992	4976	85	5348	91	8853	96	9097	98
1993	4961	85	5342	91	8846	96	9095	98
1994	4945	84	5336	91	8839	96	9093	98
1995	4928	84	5329	91	8832	95	9091	98
1996	4908	84	5318	91	8822	95	9088	98
1997	4886	83	5307	91	8813	95	9085	98
1998	4864	83	5295	90	8803	95	9081	98
1999	4842	83	5284	90	8793	95	9078	98
2000	4819	82	5272	90	8782	95	9074	98
2001	4800	82	5264	90	8774	95	9072	98
2002	4782	82	5257	90	8766	95	9070	98
2003	4762	81	5250	90	8757	95	9068	98
2004	4742	81	5242	89	8748	95	9065	98
2005	4722	81	5234	89	8739	94	9063	98
2006	4701	80	5226	89	8729	94	9060	98
2007	4680	80	5219	89	8720	94	9058	98
2008	4659	80	5211	89	8710	94	9056	98
2009	4637	79	5203	89	8701	94	9053	98
2010	4615	79	5194	89	8691	94	9051	98

Source: James Pedersen, Planning Consultant, 1993.

TABLE A-13
AVAILABLE DAILY CAPACITY
EXISTING HAPUNA BEACH STATE RECREATION AREA
TO SERVE ANTICIPATED CAMPING DEMAND
1990 - 2010

Year	WEEKEND DAY				WEEKDAY			
	Group		Family		Group		Family	
	No. of Persons	% Capacity	No. of Persons	% Capacity	No. of Persons	% Capacity	No. of Persons	% Capacity
1990	- 51	< 0	- 94	< 0	24	100	- 20	< 0
1991	- 53	< 0	- 96	< 0	24	100	- 20	< 0
1992	- 55	< 0	- 99	< 0	24	100	- 21	< 0
1993	- 57	< 0	- 101	< 0	24	100	- 21	< 0
1994	- 59	< 0	- 104	< 0	24	100	- 22	< 0
1995	- 61	< 0	- 106	< 0	24	100	- 22	< 0
1996	- 63	< 0	- 109	< 0	24	100	- 23	< 0
1997	- 65	< 0	- 112	< 0	24	100	- 24	< 0
1998	- 67	< 0	- 116	< 0	24	100	- 25	< 0
1999	- 69	< 0	- 119	< 0	24	100	- 26	< 0
2000	- 72	< 0	- 122	< 0	24	100	- 27	< 0
2001	- 74	< 0	- 126	< 0	24	100	- 28	< 0
2002	- 76	< 0	- 128	< 0	24	100	- 28	< 0
2003	- 79	< 0	- 131	< 0	24	100	- 29	< 0
2004	- 82	< 0	- 134	< 0	24	100	- 29	< 0
2005	- 84	< 0	- 138	< 0	24	100	- 30	< 0
2006	- 87	< 0	- 140	< 0	24	100	- 30	< 0
2007	- 90	< 0	- 144	< 0	24	100	- 31	< 0
2008	- 92	< 0	- 147	< 0	24	100	- 31	< 0
2009	- 95	< 0	- 151	< 0	24	100	- 32	< 0
2010	- 98	< 0	- 154	< 0	24	100	- 32	< 0

Source: James Pedersen, Planning Consultant, 1993.

Camping

The limited capacity of the existing cabins is inadequate to meet existing weekend and weekday demands which presently generate a shortage of camping opportunities for about 190 persons per day on weekend days and about 30 campers of weekdays.

Weekend camping demands in the year 2010 will increase the shortage of camping opportunities to approximately 285 persons per day. Unmet weekday demand in the year 2010 will be significantly less, about 41 persons per day.

Available Capacity for an Expanded Hapuna State Recreation Area

The same type of calculations of available capacity was made for an expanded Hapuna Beach State Recreation Area (Tables A-14, A-15 and A-16). The available capacity was generally calculated by subtracting anticipated recreational demands for weekend days and weekdays (Tables A-8 and A-9) from the estimated maximum capacity of the expanded recreation area (Table A-11).

AC = Future Recreation Demand (persons) - Maximum Capacity (persons)

Remaining AC = $\frac{\text{Peak Hour AC (persons)}}{\text{Maximum Capacity (persons)}}$ (%)

However, water and beach activities involved additional assumptions that were made for alternate beach and water destinations, peak hour participation, and the proportion of beach users involved in nearshore water activity. Available beach capacities were calculated as follows:

Peak Hour AC = Maximum Beach Activity Capacity (persons) - [Future Demand for beach activity (persons) (persons) x peak hour demand factor (Hapuna: 30% weekday and 45% weekend; Wailea: 40% weekday/weekend) x destination factor (85% to Hapuna or 15% to Wailea Bay)]

Remaining AC = $\frac{\text{Peak Hour AC (persons)}}{\text{Maximum Capacity (persons)}}$ (%)

Available water capacities were calculated as follows:

Peak Hour AC = Maximum Water Activity Capacity (persons) - [Future Demand for beach activity (persons) (persons) x Peak Hour Demand (40% on weekday or weekend) x destination factor (85% to Hapuna or 15% to Wailea Bay) x Water Use (30% weekdays,45% weekends at Hapuna and 40 % at Wailea)]

Remaining AC = $\frac{\text{Peak Hour AC (persons)}}{\text{Maximum capacity (persons)}}$ (%)

TABLE A-14
AVAILABLE PEAK HOUR CAPACITY
EXPANDED HAPUNA BEACH STATE RECREATION AREA
TO SERVE ANTICIPATED BEACH AND WATER ACTIVITY DEMAND
1990-2010

Year	Beach Activity								Water Activity					
	Hapuna Beach				Wailea Beach (Beach 68)				Hapuna Beach				Wailea Beach	
	Weekend Day		Weekday		Weekend Day		Weekday		Weekend Day		Weekday		Weekday/Weekend	
	Persons	% Cap	Persons	% Cap	Persons	% Cap	Persons	% Cap	Persons	% Cap	Persons	% Cap	Persons	% Cap
1990	5044	86	5541	95	1289	91	1342	95	8924	96	9123	99	6345	99
1991	5029	86	5537	95	1287	91	1341	95	8918	96	9121	99	6345	99
1992	5015	86	5533	94	1285	91	1340	95	8912	96	9120	99	6344	99
1993	5000	85	5529	94	1282	91	1340	95	8907	96	9118	99	6344	99
1994	4985	85	5525	94	1280	90	1339	94	8901	96	9117	99	6344	99
1995	4969	85	5521	94	1278	90	1338	94	8894	96	9115	99	6343	99
1996	4949	84	5514	94	1274	90	1336	94	8886	96	9112	99	6343	99
1997	4929	84	5507	94	1271	90	1334	94	8878	96	9109	98	6342	99
1998	4908	84	5499	94	1268	89	1333	94	8870	96	9106	98	6341	99
1999	4886	83	5492	94	1265	89	1331	94	8861	96	9104	98	6341	99
2000	4864	83	5484	94	1261	89	1329	94	8853	96	9100	98	6340	99
2001	4846	83	5480	94	1258	89	1328	94	8845	96	9099	98	6339	99
2002	4829	82	5475	93	1256	89	1327	94	8838	96	9097	98	6339	99
2003	4810	82	5470	93	1253	88	1326	94	8831	95	9095	98	6338	99
2004	4791	82	5465	93	1250	88	1325	93	8823	95	9093	98	6338	99
2005	4772	81	5460	93	1247	88	1323	93	8815	95	9091	98	6338	99
2006	4752	81	5455	93	1243	88	1322	93	8808	95	9089	98	6337	99
2007	4732	81	5451	93	1240	88	1321	93	8800	95	9087	98	6337	99
2008	4712	80	5445	93	1237	87	1320	93	8791	95	9085	98	6336	99
2009	4691	80	5440	93	1234	87	1319	93	8783	95	9083	98	6336	99
2010	4669	80	5435	93	1231	87	1317	93	8774	95	9081	98	6335	99

Source: James Pedersen, Planning Consultant, 1993.

TABLE A-15

AVAILABLE CAPACITY OF EXPANDED HAPUNA BEACH STATE RECREATION AREA TO SERVE ANTICIPATED CAMPING, GOLF AND HIKING WEEKDAY DEMANDS 1990-2010

Year	Camping				Golf		Hiking	
	Group		Family					
	No. of Persons	% Capacity	No. of Persons	% Capacity	No. of Persons	% Capacity	No. of Persons	% Capacity
1990	304	100	780	94	- 52	< 0	287	57
1991	304	100	780	94	- 62	< 0	259	52
1992	304	100	779	94	- 68	< 0	257	51
1993	304	100	779	94	- 74	< 0	255	51
1994	304	100	778	94	- 80	< 0	252	50
1995	304	100	778	94	- 87	< 0	250	50
1996	304	100	777	94	- 93	< 0	245	49
1997	304	100	776	94	-101	< 0	239	48
1998	304	100	775	94	-109	< 0	234	47
1999	304	100	774	93	-116	< 0	229	46
2000	304	100	773	93	-124	< 0	224	45
2001	304	100	772	93	-131	< 0	221	44
2002	304	100	772	93	-138	< 0	218	44
2003	304	100	771	93	-147	< 0	215	43
2004	304	100	771	93	-155	< 0	212	42
2005	304	100	770	93	-163	< 0	209	42
2006	304	100	770	93	-172	< 0	207	41
2007	304	100	769	93	-180	< 0	204	41
2008	304	100	769	93	-190	< 0	201	40
2009	304	100	768	93	-199	< 0	198	40
2010	304	100	768	93	-208	< 0	195	39

Source: James Pedersen, Planning Consultant, 1993.

TABLE A-16

AVAILABLE CAPACITY OF EXPANDED HAPUNA BEACH STATE RECREATION AREA TO SERVE ANTICIPATED CAMPING, GOLF AND HIKING WEEKEND DEMANDS 1990-2010

Year	Camping				Golf		Hiking	
	Group		Family					
	No. of Persons	% Capacity	No. of Persons	% Capacity	No. of Persons	% Capacity	No. of Persons	% Capacity
1990	229	75	706	85	- 52	< 0	287	57
1991	227	75	704	85	- 62	< 0	259	52
1992	225	74	701	85	- 68	< 0	257	51
1993	223	73	699	85	- 74	< 0	255	51
1994	221	73	696	84	- 80	< 0	252	50
1995	219	72	694	84	- 87	< 0	250	50
1996	217	71	691	84	- 93	< 0	245	49
1997	215	71	688	83	-101	< 0	239	48
1998	213	70	684	83	-109	< 0	234	47
1999	211	69	681	83	-116	< 0	229	46
2000	208	68	678	82	-124	< 0	224	45
2001	206	68	674	82	-131	< 0	221	44
2002	204	67	672	81	-138	< 0	218	44
2003	201	66	669	81	-147	< 0	215	43
2004	198	65	666	80	-155	< 0	212	42
2005	196	64	662	80	-163	< 0	209	42
2006	193	63	660	80	-172	< 0	207	41
2007	190	63	656	79	-180	< 0	204	41
2008	188	62	653	79	-190	< 0	201	40
2009	185	61	649	78	-199	< 0	198	40
2010	182	60	646	78	-208	< 0	195	39

Source: James Pedersen, Planning Consultant, 1993.

Water and Beach Activities

With the proposed expansion, beach and water activities at Hapuna Beach would be supplemented by medium density uses at Wailea Beach. Enhanced recreational opportunities at Wailea Beach would encourage the future diversion of 15 percent of the users from Hapuna Beach.

Beach use at Beach 68 would be extremely low because of its limited beach capacity of less than 40 persons. Consequently, the potential use of this beach is considered insignificant to the available capacity at Wailea and Hapuna.

The distribution of beach activities to two major beaches, instead of only Hapuna, will help maintain a somewhat less-crowded recreational experience at Hapuna (Table A-14). The proposed park expansion would decrease the remaining capacity of beach activities at Hapuna from 85 percent in 1993 to about 80 percent available capacity in the year 2010. In contrast, the available beach capacity at Wailea Bay will only slightly diminish with increased public use. In 1993, Wailea Beach is estimated to have about 99 percent of available capacity. By the year 2010, the remaining capacity at Wailea Beach will remain about 99 percent since only 15 percent of all beach users at Hapuna Beach State Recreation Area are expected to use Wailea Beach. In a cumulative sense, the forecasts of available peak hour capacity suggest that both beaches will have considerable amount of remaining capacity that can be used to accommodate long-term public use. However, the use of medium-density standards for beach capacity also presumes a somewhat greater density of persons using the beach.

The proposed expansion would also maintain the existing capacity of nearshore water area at Hapuna. The limited number of future nearshore water users at Wailea Bay would not reduce the capacity of the nearshore water areas in the year 2010.

Camping

Camping opportunities would be greatly enhanced by the development of new group and family campsites. There will be ample remaining capacity on both weekdays and weekends (Tables A0-15 and A-16) with the addition of new camping facilities.

Golf

The presence of a new public golf course will clearly meet a portion of the West Hawaii resident and visitor demand. Residents are expected to be the primary users of the course. More of the available capacity of the course will be absorbed during the weekdays when most resident play occurs in the Kohala district.

An important assumption influencing the potential amount of remaining capacity is the potential marketability of the course to local residents. If, as expected, local residents primarily use this course rather than other private courses in the Kohala area, little remaining capacity will be available.

With the addition of a new public course at Hapuna, the forecasts of available capacity (Tables A-15 and A-16) indicate that the golf course will quickly saturate its maximum capacity and that an unmet demand will still exist. It is important to note that the maximum capacity of the course is

assumed to be 200 rounds per day. Using this capacity standard, the potential development of an additional public course in West Hawaii, e.g. Kealakehe, would probably not be required until the year 2007; consequently, two public golf courses in West Hawaii are not warranted. In addition, the maximum capacity of the public golf course at Hapuna Beach State Recreation Area could reasonably be expanded to 250 rounds per day (Wright, 1992) when golf activity levels generate demands for more rounds of play.

When the proposed public course becomes too crowded and its maximum capacity is reached, nearby private courses offer an alternative. While these opportunities will be less affordable than the proposed public course, local golf demands will not be suppressed as long as these courses are open for some public play.

Hiking

The formal designation of a coastal hiking trail will address a substantial visitor demand for hiking opportunities on the Big Island. The amount of capacity remaining after development will be more than adequate to meet demands through the year 2010. However, the extent of long-term demand, particularly by visitors, is gradually expected to diminish the remaining capacity which assumes a low-density use of about 50 persons per 1,000 feet of trail.

APPENDIX C

Geotechnical Consultation
Hapuna Beach State Recreation Area Expansion

A Report Prepared for

Harrison Associates
711 Kapiolani Boulevard, Suite 1442
Honolulu, Hawaii 96813

GEOTECHNICAL CONSULTATION
HAPUNA BEACH STATE RECREATION AREA EXPANSION
SOUTH KOHALA, ISLAND OF HAWAII

HLA Job No. 20360.001.06

by

Sylvia Y. Newsom
Project Geologist

Damon R. Runyan
Civil Engineer - 3121

Harding Lawson Associates
803 Kamehameha Highway, Room 404
Pearl City, Hawaii 96782

June 21, 1991

0226R

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS iii

I INTRODUCTION 1

II GEOLOGY 2

A. Regional Geology 2
B. Field Investigation 3
C. Description of A'a Lava Flows 4
D. Soils 5
E. Groundwater 5

III GEOLOGIC HAZARDS 8

A. Lava Flows 8
B. Deposition of Tephra 8
C. Pyroclastic Surges 9
D. Volcanic Gases 9
E. Fractures and Subsidence 9
F. Earthquakes 10
G. Tsunamis 11

IV REFERENCES 12

V ILLUSTRATIONS 13

DISTRIBUTION

LIST OF ILLUSTRATIONS

Plate	1	Location Map
Plate	2	Project Site and Soil Map
Plate	3	Geologic Map of the Island of Hawaii
Plate	4	Geologic Map

I INTRODUCTION

This report presents an overview of the geologic characteristics, history and hazards of the Hapuna Bay and Waialea Bay area. We performed a two-day site reconnaissance to evaluate and record soil and geologic conditions and to produce a geologic map.

The project area, which is to be developed for passive recreation, consists of approximately 900 acres extending from the coastline at Hapuna Bay and Waialea Bay inland east of Queen Kaahumanu highway. The location of the area is shown on Plate 1, and the project boundaries are shown on the site map, Plate 2.

The site is on the lower northwest slopes of Mauna Kea. Elevations in the area range from sea level at the shoreline to a maximum elevation of about 320 feet above mean sea level. The average slope at the site is about 4.5 percent. The area is covered with sparse grass and occasional kiawe trees. Two drainage channels cut through the site and terminate at Hapuna Bay and Waialea Bay. These channels appear to flow only when there are heavy rains and are usually dry. They are overgrown with kiawe trees and brush.

II GEOLOGY

A. Regional Geology

A geologic map (Stearns, 1985) of the island of Hawaii is shown on Plate 3. Stearns and Macdonald (1946) classify the basaltic lava flows in the Hapuna and Waialea Bay area as part of the Hamakua Volcanic Series, capped with a thin layer of Pahala ash.

The volcanic rocks of Mauna Kea are divided into two series, the older Hamakua Volcanic Series and the younger Laupahoehoe Volcanic Series. The Hamakua series has been further divided into upper and lower members. The lower (older) member of the Hamakua series is exposed only in the lower part of the sea cliffs along the Hamakua Coast north of Hilo. The lower member grades upward into alkalic olivine basalts, hawaiites and ankaramites that make up the upper member of the series. The Laupahoehoe series consists predominantly of thick, very hummocky hawaiite flows. Eruptions of the Laupahoehoe series were usually restricted to the upper slopes of Mauna Kea, but several flows extend to the shoreline along the Hamakua coast.

A layer of Pahala ash blankets the upper member of the Hamakua series. Several different sources have probably contributed to the Pahala ash deposits. On the dry northwestern flank of Mauna Kea near Waimea, some of the ash is fresh and has the same chemical composition as the late lavas of Mauna Kea. It is believed that most of the ash on Mauna Kea came from eruptions on that mountain, and that the ash layer becomes thinner toward the north because the trade winds carried most of the ash southwestward from the erupting vents. A map showing the distribution of Pahala ash on Hawaii (Macdonald et al., 1983) indicates that the ash is 4 feet or less thick near Waimea, the closest reported value to the project area.

B. Field Investigation

Aerial photographs covering the project area were flown earlier this year. The photos (with scales of 1 inch equals 300 feet, 1 inch equals 275 feet, and 6 inches equals 1,600 feet) and an older ortho-photo quad map (with a scale of 1 inch equals 40 feet) were used to supplement our field observations. Based on our field reconnaissance and aerial photos, the lava covering the project area was found to be the a'a type. The U.S. Soil Conservation Service maps (Sato et al., 1973) indicate that the site is underlain by predominantly pahoehoe lava with 10 to 20 percent of the area underlain by a'a lava. This does not agree with our field observations.

In most places, the a'a has weathered to form a very stony, sandy silt soil that varies from 0 to 3 feet thick. Good exposures of the a'a rock were only found along the shoreline, the deepest drainage paths and along road cuts. Cross-sectional exposures of the a'a flows in this area commonly have 5 to 10 feet of dense, dark gray basalt with little to no vesicles, occasional phenocrysts of olivine, and few to many phenocrysts of plagioclase. This massive layer is underlain and overlain by discontinous clinker layers composed of volcanic rubble. The rubble contains gravel- to large cobble-sized pyroclastic material such as red-brown and black pumice, scoria and fragments of dark-gray, highly vesicular basalt with abundant phenocrysts of olivine and plagioclase. Lava balls of dense, gray basalt up to 3 feet in diameter were also observed within the clinker layer. The clinker layers vary in thickness from 1 to 8 feet in roadway exposures.

A white- to cream-colored carbonate coating (1/8 to 2 inches thick) covers the a'a rock along joints in many places. This travertine-like rock is dense, finely crystalline and layered. It is likely formed by precipitation of calcium carbonate from solution in infiltrating surface water.

Pockets of a yellowish, weathered volcanic ash layer were observed overlying the a'a basalt in several road cuts and along the shoreline. The ash layer varies from 1 to 4 feet thick and may be part of the Pahala ash deposits. The basalts that cover the project area are probably part of the upper member of the Hamakua Volcanic Series, as mapped by Stearns and MacDonald (1946).

A geologic map of the area is shown on Plate 4. No significant geologic structures such as faults, lava tubes, collapse areas or flow structures were found at the project site. Two caves were found at the site and are shown on the geologic map (Plate 4). The caves were found along a deeply cut drainage path and along the shoreline. In both cases, the caves appear to have formed from erosion of the less resistant clinker layer by wave action and surface water runoff. The cave at the shore is approximately 10 feet high, 30 feet wide and 15 feet deep. The cave along the drainage path is approximately 20 feet high, 15 to 20 feet wide and 10 to 15 feet deep. An arch structure formed in the same way was found along the shoreline and is also located on the geologic map. The arch is approximately 15 to 20 feet high and 10 to 15 feet wide. There may be other caves along the major drainage paths or along the steep shoreline that were not observed. Several sections of the drainage paths are very steep and thickly vegetated making them inaccessible.

C. Description of A'a Lava Flows

A'a basalt is deposited as a molten mass that moves so slowly that a rough, jagged clinker layer forms on its surfaces. The layer is carried forward and cascades down the front of the flow so that a clinker pavement typically is formed over which the molten interior flows. Thus, in cross-section, a'a basalt has a dense interior sandwiched between layers of volcanic clinker. The proportions of these two types of

material in an a'a flow can vary greatly, however, so that it is impossible to anticipate exact subsurface conditions at a specific location. Cavities and lava tubes are uncommon in a'a flows, although clinker pockets can consist of loose gravel- to cobble-sized fragments. The interior rock typically has fewer vesicles than pahoehoe and is therefore more dense; the vesicles are usually stretched as a result of the highly viscous nature of the lava before it solidified. A'a flows tend to be significantly thicker than pahoehoe flows, sometimes several tens of feet.

D. Soils

Two types of soil were reported at the site by the U.S. Soil Conservation Service (Sato, 1973). Their distribution is shown on the site map, Plate 2. Kawaihae extremely stony very fine sandy loam (KNC) covers the entire project area except at Hapuna Bay and Waialea Bay where beach sand (BH) occurs near the shoreline. The sandy loam was reported (Sato, 1973) to average about 33 inches in depth in this region. In profile, the Kawaihae loam consists of 2 inches of a dark reddish-brown extremely stony very fine sandy loam underlain by a dark reddish-brown and dusky red stony silt loam and loam (Sato, 1973). We interpret these soils to be a mixture of wind-deposited Pahala ash and weathered clinker on the a'a flow surfaces. Our experience from nearby projects indicates that these soils contain soluble sulfates in concentrations great enough to be potentially detrimental to concrete in contact with them.

E. Groundwater

Mink and Sumida (1984) classified the aquifers of the Hawaiian Islands. The island of Hawaii is divided into sectors with similar hydrogeologic properties. The project site is located within the area of the Mauna Kea-Waimea aquifer system which

is part of the basal, unconfined aquifer in the flank lavas of Mauna Kea. Basal aquifers are those in which fresh water is floating on sea water. Stearns and Macdonald (1946) mapped the Hapuna area as having brackish basal groundwater.

Water wells located within a one-half mile radius of the project area are shown on Plate 2. Available information for each well from the Department of Land and Natural Resources and the U.S. Geological Survey is presented in the following table.

Macdonald et al. (1983) reported fresh groundwater springs discharging into the shallow surf at Hapuna Beach. These basal springs are probably fed by groundwater that becomes channelized in flow structures in the rock, such as lava tubes and large cracks.

Wells Located Within a One-Half Mile Radius of the Hapuna Beach State Recreation Area Expansion

Well Identification (latitude, longitude-well no.)	Owner or User Year Drilled Use	Ground Elevation (feet above MSL)	Static Water Level (feet above MSL)	Well Casing diameter (inch) /depth (feet)	—Chemical Data from Pump Test Results— Chlorides	Total Alkalinity	pH	Turbidity (NTU)	Temperature	Conductivity (uMHOS/cm)
5948-01 Hapuna Beach Park	State Parks 1970 irrigation	244	2.6	10/266	420-430 ppm	78 ppm as $CaCO_3$	7.3	ND	ND	1,670
5949-01 Camp Drewes	USMC 1944 unused	90	ND	ND	ND	ND	ND	ND	ND	ND
6048-02 Mauna Kea Beach Hotel 1	Mauna Kea Beach Hotel 1963 irrigation	340	4.5	10/ND (total depth drilled = 376 ft.)	550.0 ppm	78.0 ppm as $CaCO_3$	7.7	10	28°C	ND
6049-01 Mauna Kea Beach Hotel 2	Mauna Kea Beach Hotel 1963 irrigation	188	2.0	12/218	640 ppm as NaCl	ND	ND	ND	77°F	ND
6049-05 Ouli A	Dlohana Corp. 1979 irrigation	300	3.2	14/322	ND	ND	ND	ND	ND	ND

MSL = Mean sea level.
ND = No data.

0226R

III GEOLOGIC HAZARDS

The geologic hazards that could affect the site and its location with respect to active volcanism are discussed in the following sections. These hazards include lava flows, deposition of tephra (volcanic ash), pyroclastic surges (explosive eruptions), volcanic gases, ground fracture, subsidence and locally mapped cavities and collapse features. These hazards have been addressed and evaluated for the island of Hawaii in a recent publication (Mullineaux et al., 1987). In general, the site has not been significantly affected in historical times by any of these volcanic hazards.

A. Lava Flows

The site is located in Zone 8 (the eighth least hazardous of nine zones) relative to lava flow hazards. As defined by Mullineaux et al., Zone 8 is a large area on the lower flanks of Mauna Kea that has not been affected by lava flows for at least 10,000 years. Even though the hazard is low for this region, there still remains a remote possibility of future eruptions from Mauna Loa or Mauna Kea.

B. Deposition of Tephra

Mullineaux et al. placed the project site in Zone 3 (the least hazardous of three zones) for tephra fall hazards. Tephra is a general term that includes all fragmental volcanic products which are ejected through a vent into the air before deposition. On the island of Hawaii, tephra is produced most frequently by lava fountains in the summit areas and rift zones of Kilauea and Mauna Loa. Eruptions such as these have occurred at least once every few years in historical time, and they have produced tephra as much as 3.3 feet thick at a distance of 0.6 miles from the vents and 4 inches thick at about 1.2 miles (Richter et al., 1970). Tephra hazard Zone 3 includes areas in

which only thin deposits of tephra erupted from Kilauea, Mauna Loa, or Hualalai are likely to fall.

C. Pyroclastic Surges

Deposits from pyroclastic surges have been recognized on Hawaii only adjacent to Kilauea's caldera, so Mullineaux et al. consider a hazard zone to exist only within 6 miles from the caldera of Kilauea which is nearly 35 miles from the project site.

D. Volcanic Gases

The hazard zones for volcanic gases shown by Mullineaux et al. are the same as for tephra falls. Gases are distributed by winds, and their effects decrease with distance. Volcanic gases are emitted primarily from the summit areas and rift zones of Kilauea and Mauna Loa, which are 35 and 50 miles, respectively, from the project site.

E. Fractures and Subsidence

Ground fractures, subsidence, and earthquakes commonly occur together as a result of magma movement. Most fractures on Hawaii of historical age are found in the summit areas and rift zones of Kilauea and Mauna Loa.

Ground subsidence occurs throughout Hawaii at different scales: 1) long-term gradual subsidence of the entire island; 2) subsidence of a volcano's flanks; 3) settling of small areas due to magma movement; and 4) local collapse of the roofs of lava tubes.

Long-term gradual subsidence is occurring on the entire island of Hawaii. The rate of subsidence, which differs from place to place on the island, has been calculated as 1.4 to 4.1 mm/yr (Moore, 1987; Apple and Macdonald, 1966; Moore and Fornari,

1984). With a worldwide rise in sea level of 1 to 2 mm/yr, the island is submerging at approximately 3 to 6 mm/yr or 1 to 2 feet per century.

Rapid subsidence of the flanks of volcanoes is most likely to occur on the most recently active Kilauea and Mauna Loa Volcanoes. Steep scarps and stair-step topography along fault zones on the flanks of both volcanoes were formed by the instability of the volcanoes' flanks caused in part by intrusion of magma into rift zones and in part by the load of the flanks of the growing volcanoes. Because the project site is located on the northwestern flank of the dormant Mauna Kea Volcano, it is considered to be in an area of low risk for this type of subsidence.

The subsidence caused by withdrawal of magma is restricted to summit areas and rift zones and also does not affect the Hapuna Beach area. Local areas associated with collapsed lava tubes or cavities are a minor subsidence hazard, and these small scale features were not observed at the site.

F. Earthquakes

The island of Hawaii is seismically active and is in Seismic Zone 3 of the Uniform Building Code. Most Hawaiian earthquakes result from the movement of magma at shallow depth. The greatest number of earthquakes on the island of Hawaii originates beneath the summit areas or near the rift zones of Kilauea and Mauna Loa.

Although the most recent large earthquakes have taken place under the southern part of the island, a large earthquake offshore from Kealakekua Bay, roughly 37 miles south of the site, occurred on August 21, 1951. Its magnitude was between 6.75 and 7.0, and its Modified Mercalli intensity at the site was estimated to be IV (Macdonald and Wentworth, 1952). This intensity level corresponds to nondestructive ground motion felt by many people indoors. The closest large earthquake to the site probably

was the magnitute 6.5 event on October 6, 1929, centered under Hualalai Volcano. Intensity levels in the site vicinity for this earthquake were not recorded. Hualalai Volcano is approximately 20 miles south of the Hapuna Beach site.

Structures designed for the site should recognize the likelihood that they will undergo strong seismic ground motion. Design provisions required by the Uniform Building Code generally take this into account.

G. Tsunamis

Tsunamis, also called seismic sea waves, are large rapidly moving ocean waves associated with earthquakes. They are generated when an abrupt movement of the ocean floor displaces a large mass of water. They can originate at great distances from Hawaii (i.e., Alaska, Peru, Chile) and have destructive effects similar to those that originate locally. The maximum recorded height reached by a tsunami in Hawaii has been 53 to 56 feet (Tilling et al., 1976). Tsunamis have been reported in Hawaii about fifty times since the early nineteenth century (Macdonald et al., 1947).

Loomis (1976) reported tsunami runup data for the shorelines of the islands of Hawaii for the years 1946, 1952, 1957, 1960, and 1964. The closest runup data to the Hapuna Beach site is reported for Waiulaula Point and Kawaihae. These areas lie along the shore approximately 2.5 to 3 miles north of Hapuna and Waialea Bays. At Waiulaula Point, the maximum intrusion of water onto the land is 10 feet above mean sea level in 1946. There were no reported values for the other four events. The maximum heights at Kawaihae were 12 feet in 1946; 2 feet in 1952; 5 feet in 1957; 9 feet in 1960; and 3 feet in 1964.

IV REFERENCES

Apple, R.A. and Macdonald, G.A., 1966, *The rise of sea level in contemporary times at Honaunau, Kona, Hawaii*, Pacific Science, v. 20, no. 1.

Loomis, Harold G., 1976, *Tsunami wave runup heights in Hawaii*, Hawaii Institute of Geophysics, University of Hawaii, Tech. Report 76-5.

Macdonald, G.A., Abbott, A.T., and Peterson, F.L., 1983, *Volcanoes in the sea, the geology of Hawaii*, Honolulu, University of Hawaii Press.

Macdonald, G.A., Shepard, F.P., and Cox, D.C., 1947, *The tsunami of April 1, 1946, in the Hawaiian Islands:* Pacific Science, v. 1, pp 21-37.

Macdonald, G.A., and Wentworth, C.K., 1952, *The Kona earthquake of August 21, 1951, and its aftershock*, October, Pacific Science, v. VI

Mink, J.F. and Sumida, S.T., 1984, *Aquifer classification, state of Hawaii*, Water Resources Research Center, University of Hawaii, Tech. Mem. Report No. 75.

Moore, James G., 1987, *Subsidence of the Hawaiian ridge*, Volcanism in Hawaii, USGS Professional Paper 1350, v. 1, p. 85.

Moore, J.G., and Fornati, D.J., 1984, *Drowned reefs as indicators of the rate of subsidence of the island of Hawaii*, Journal of Geology, v. 92.

Mullineaux, D.R., Peterson, D.W., and Crandell, D.R., 1987, *Volcanic hazards in the Hawaiian Islands, volcanism in Hawaii*, USGS Professional Paper 1350, v. 1, p. 599.

Richter, D.H., Eaton, J.P., Murata, K.J., Ault, W.V., and Krivoy, H.L., 1970, *Chronological narrative of the 1959-60 eruption of Kilauea volcano, Hawaii*, USGS Professional Paper 539-E, p. 73.

Sato, Harry H., Ikeda, W., Paeth, R., Smyth, R., and Takehiro, Jr., M., 1973, *Soil survey of island of Hawaii, state of Hawaii*, Soil Conservation Service, U.S. Department of Agriculture.

Stearns, Harold T., 1985, *Geology of the state of Hawaii*, Palo Alto, Pacific Books, Publishers.

Stearns, H.T. and Macdonald, G.A., 1946, *Geology and groundwater resources of the island of Hawaii*, Hawaii Division of Hydrography, Bulletin 9.

Tilling, R.I., Koyanagi, R.Y., Lipman, P.W., Lockwood, J.P., Moore, J.G., and Swanson, D.A., 1976, *Earthquake and related catastropic events, Island of Hawaii*, November 29, 1975, A Preliminary Report: U.S. Geological Survey Circular 740, 33 p.

V ILLUSTRATIONS

DOCUMENT CAPTURED AS RECEIVED

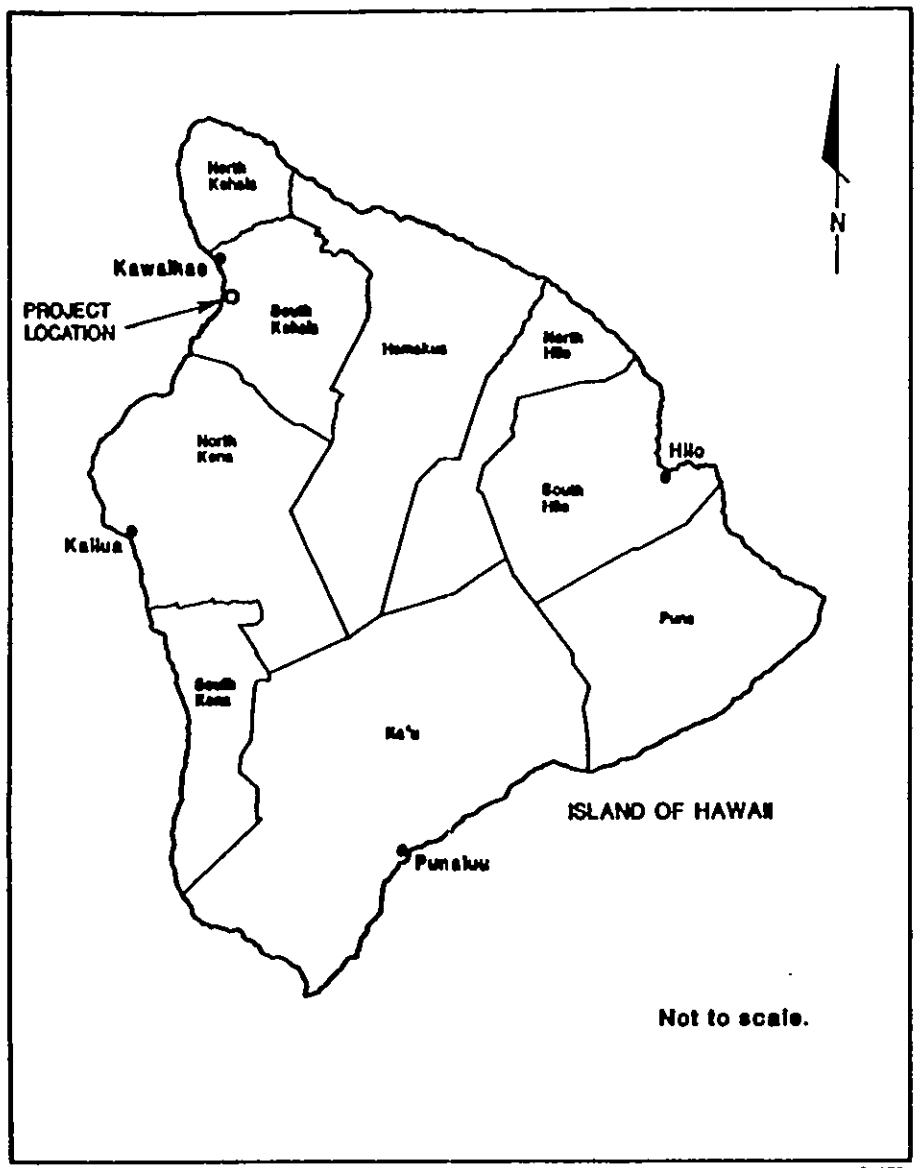


PLATE 1

Harding Lawson Associates
Engineering and Environmental Services

Location Map
Hapuna Beach State Rec Area Exp.
South Kohala, Hawaii

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
kar	20360,001.06	DRL	4/91	

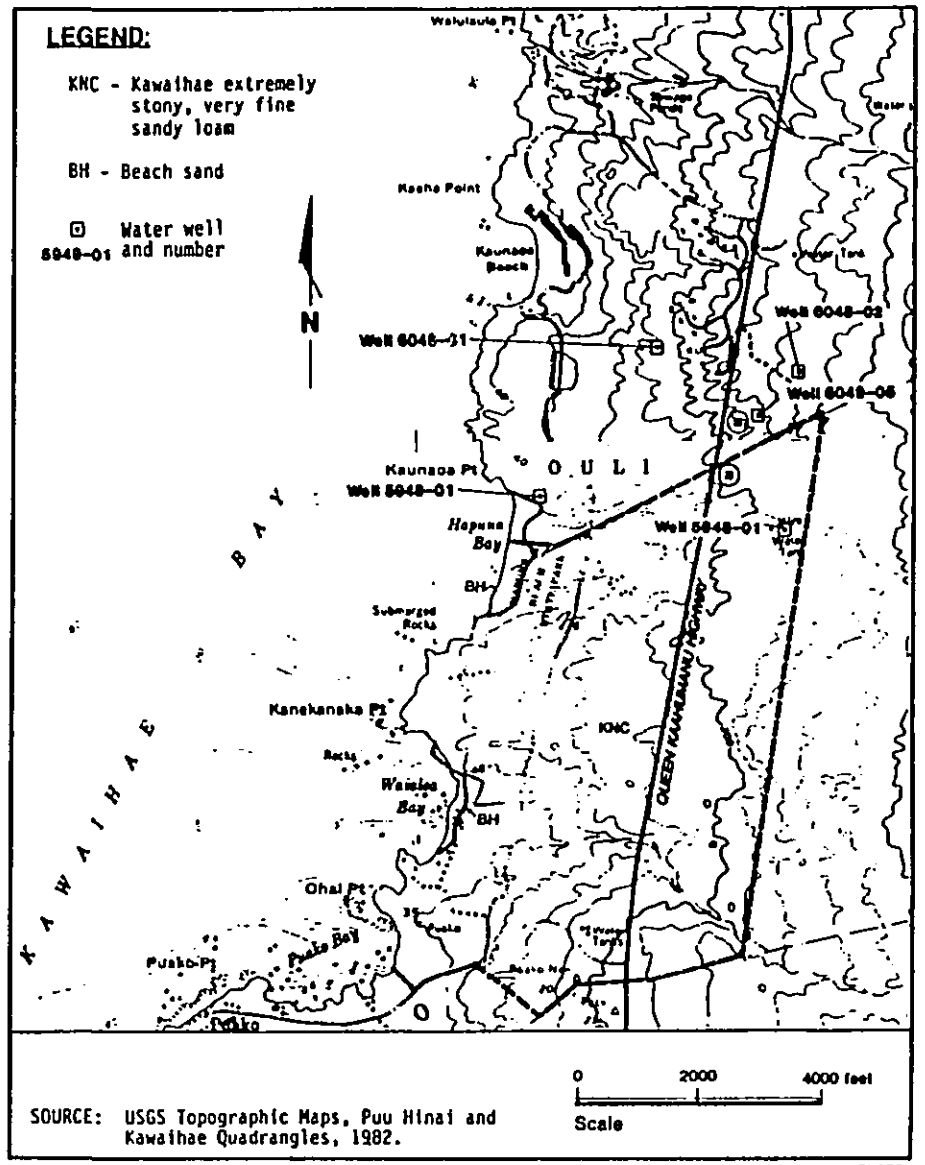


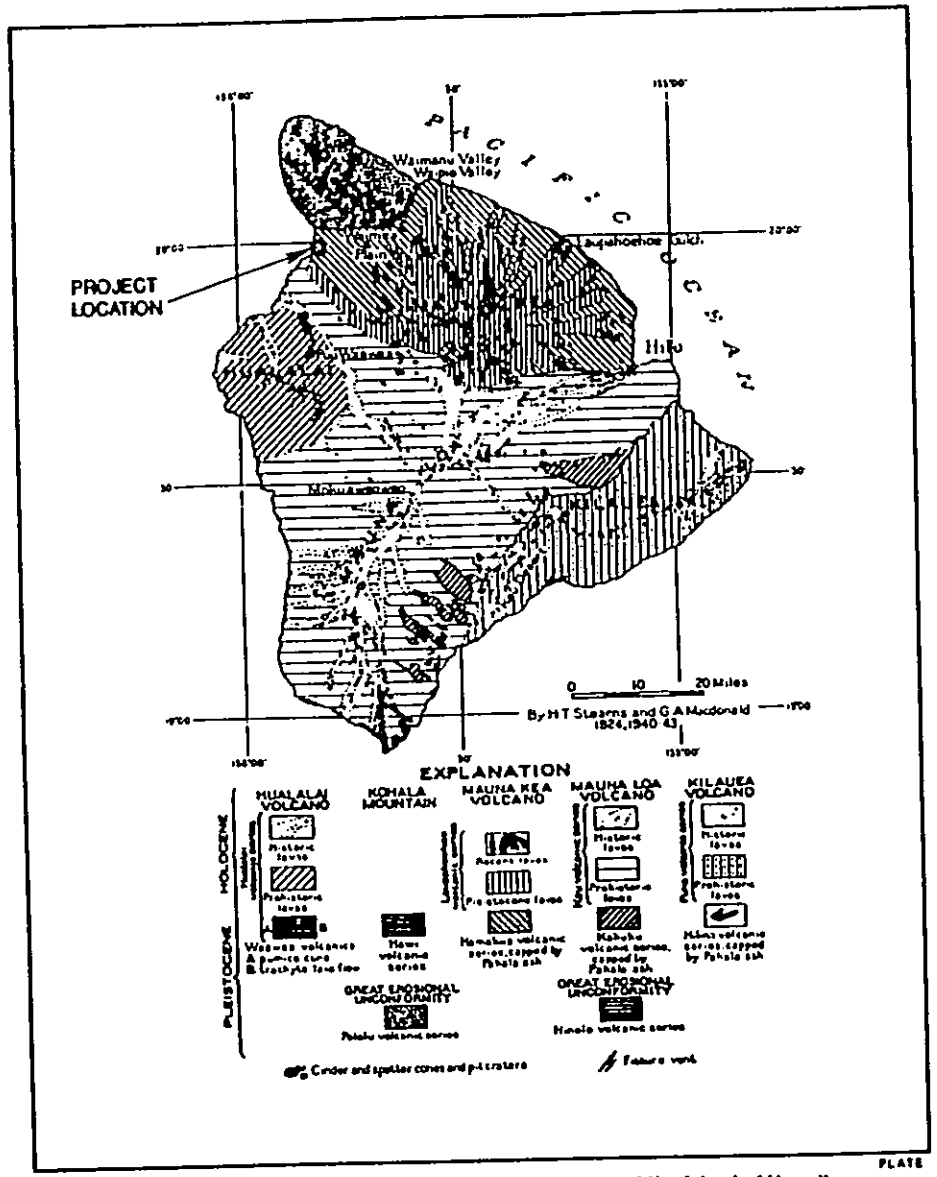
PLATE 2

Harding Lawson Associates
Engineering and Environmental Services

Project Site and Soil Map
Hapuna Beach State Rec Area Exp.
South Kohala, Hawaii

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
kar	20360,001.06	DRL	4/91	

DOCUMENT CAPTURED AS RECEIVED

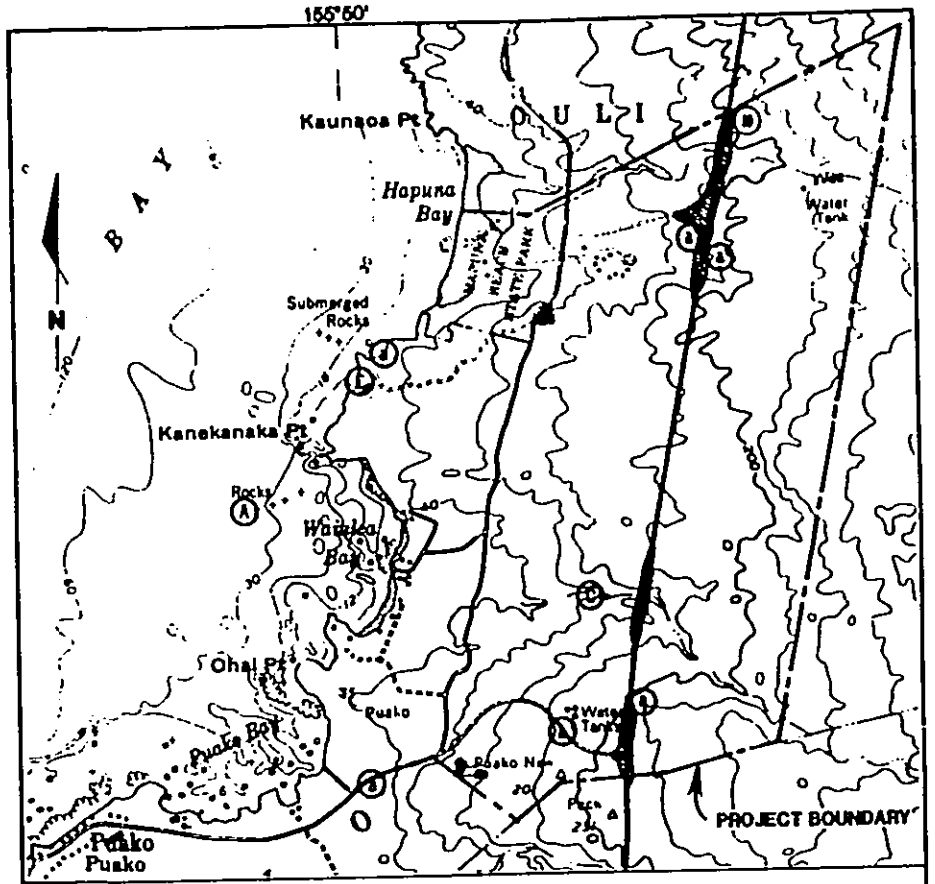


Geologic Map of the Island of Hawaii
Hapuna Beach State Rec Area Exp.
South Kohala, Hawaii

PLATE 3

Harding Lawson Associates
Engineering and Environmental Services

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
kar	20360,001.06	DLR	4/91	



LEGEND

- Beach Sand
- A'a Lava with Soil Cover
- Areas of Disturbed Soil and Rock
- (a) Ash Deposits

GEOLOGIC STRUCTURES

- (A) Arch
- (C) Cave

0 1500 3000 feet
Scale

REFERENCE: USGS Topographic Maps, Puu Hinai and Kawaihae Quadrangles, 1982.

Geologic Map
Hapuna Beach State
Recreation Area Expansion
Hapuna, Hawaii

PLATE 4

Harding Lawson Associates
Engineering and Environmental Services

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
kar	20360,001.06	DLR	6/91	

APPENDIX D

Baseline Assessment of the Marine Environment
in the Vicinity of
Hapuna Beach Recreation Area
South Kohala, Hawaii

BASELINE ASSESSMENT OF THE MARINE ENVIRONMENT IN THE VICINITY OF THE HAPUNA BEACH RECREATIONAL AREA, SOUTH KOHALA, HAWAII

Prepared for

Warren Harrison Associates
711 Kapiolani Blvd. Suite 1442
Honolulu, HI 96813

by

Marine Research Consultants
217 Prospect St. F-2
Honolulu, HI 96813

INTRODUCTION AND PURPOSE

The State of Hawaii is currently preparing plans to augment recreational facilities at Hapuna Beach in the South Kohala District of the Island of Hawaii. The site for future development extends from the present northern boundary of Hapuna Beach (fronting the South Kohala Resort property) to the Puako boat ramp. The western border of this land parcel consists of approximately 1.25 miles of coastline. The property is currently in a planning stages for development of an 18-hole golf course, as well as other passive recreational uses. None of the planned land uses include any alteration of the existing shoreline or nearshore marine environments.

A concern regarding construction and operation of the planned development is the potential for environmental degradation of the nearshore ocean resulting from the project. This concern is especially critical for the South Kohala area owing to the pristine nature of the marine environment, and the close proximity of the project site to Hapuna Beach, which is used extensively as a recreational facility by visitors and residents. The most important questions include the potential impacts from runoff of soil, and leaching of fertilizers and other chemicals to groundwater which could cause alterations to water quality and marine life.

In the interest of addressing these concerns and assuring maintenance of environmental quality, it has been deemed appropriate to conduct a marine environmental survey and potential impact analysis of the nearshore region in the vicinity of the Hapuna Recreational Area. In brief, the baseline assessment is designed to establish the existing character of the marine environment at a single point in time. The characterization includes quantification of both water chemistry parameters that define water quality, and biotic assemblages. It should be noted, however, that the baseline does not presently consider the effects of temporal (seasonal) variability. Seasonal differences can be evaluate by subsequent follow-up studies. These baseline surveys can also represent the initial increments in a continuing monitoring program designed to assess any alteration to the marine environment resulting from construction of the planned development. Presented below are the objectives, methods, and results of the initial phase of the baseline assessment program.

Objectives

1) To establish a quantitative baseline set of water chemistry parameters that delineate the present environmental conditions of the nearshore ocean offshore of the site planned for development. Chemical composition of the environment will be evaluated by analysis of all parameters specified by State of Hawaii, Department of Health (DOH) water quality standards, as well as several other parameters that are not listed by DOH, but provide important information. Particular attention will be given to evaluating the influence of groundwater entering the marine environment. Such a baseline will provide information as to the potential susceptibility of the area to the proposed project, as well as revealing if there are effects to nearshore water quality from factors associated with current land usage. Identification of such existing conditions is important in order to accurately differentiate effects from the future land uses. As changes in biotic community structure are frequently a result of altered water quality, identification of changes in chemical constituents provides an early warning of possible impending alterations to biota.

2) To establish a descriptive and quantitative baseline of biotic communities in the vicinity of the site where shoreline development may take place. Such a characterization of biotic assemblages will provide a basis for estimating alteration of community structure as a result of changes in land use. This baseline will also serve to identify any specific biotic communities that may be especially susceptible (or resistant), to the potential alterations that may result from the planned development.

3) To evaluate the degree of natural stresses (sedimentation, wave scour, freshwater input, etc.) that influence the nearshore marine environment in the area that could be potentially influenced by the proposed project. Typically, water quality and the composition of nearshore marine communities are intimately associated with the magnitude and frequency of these stresses, and any impacts caused by the proposed project may either be mitigated in large part, or amplified, by natural environmental factors. Therefore, evaluating the range of natural stress is a prerequisite for assessing the potential for additional change to the marine environment owing to shoreline modification.

4) To utilize existing evaluations of water chemistry and biotic community structure that delineate the responses of marine environments to similar development projects in Hawaii. While minor site-specific differences will undoubtedly occur between the areas, comparing water quality and community structure data will allow the best possible assessment of potential effects from the proposed activity at the Hapuna site.

5) To offer recommendations on scheduling and construction procedures to minimize impacts, based on the characteristics of the environment determined by the baseline.

METHODS

Water Chemistry

Five survey stations were established in the vicinity of the Hapuna area: Stations C-I, C-II, and C-III were located at the north, central, and southern portions of Hapuna Bay; Station C-IV was located off of Waialea Bay, and Station C-V was located in the northern part of Puako Bay (see Figure 1).

Water quality was evaluated at each station on transects that were oriented perpendicular to the shoreline and depth contours. Water samples were collected at 6 locations on each transect from just seaward of the shoreline to approximately 250 meters (m) offshore. Such a sampling scheme was designed to span the greatest range of salinity with respect to potential freshwater efflux at the shoreline. Sampling was more concentrated in the nearshore zone because this area is most likely to show the effects of shoreline modification.

With the exception of the two locations nearest to shore, samples were collected at two depths; a surface sample was collected within approximately 10 centimeters (cm) of the sea surface, and a bottom sample was collected within 1 m of the sea floor. When possible water samples were also collected from sources behind the shoreline: at Station C-III a groundwater spring seeping from the beach above the low tide mark; at Station C-IV a tide pool that was largely separated from the intertidal area; at Station C-V a drainage pipe that was apparently discharging groundwater. Groundwater from potable wells located upslope from the Hapuna area was also sampled.

Water quality parameters evaluated included the specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (Open Coastal waters) of the State of Hawaii Department of Health (DOH) Water Quality Standards. These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen (NO_3^- + NO_2^-, hereafter referred to as NO_3^-), ammonium nitrogen (NH_4^+), total phosphorus (TP), chlorophyll a (Chl a), turbidity, temperature, pH and salinity. In addition, orthophosphate phosphorus (PO_4^{-3}) and silica (Si) were also reported because these parameters are sensitive indicators of biological activity and the degree of groundwater mixing.

All fieldwork was conducted on March 16-17 and 23-24, 1991, working from a small boat or swimming from shore. Water samples were collected by opening 1-liter polyethylene bottles at the desired depth at each sampling location. Subsamples for nutrient analyses were

immediately placed in 125-milliliter (ml) acid-washed, triple rinsed, polyethylene bottles and stored on ice. Analyses for NH_4^+, PO_4^{3-}, and NO_3^- were performed using manual spectrophometric techniques on a Brinkman fiber-optic colorimeter. TN and TP were analyzed in a similar fashion following digestion. Dissolved organic nitrogen (DON) and dissolved organic phosphorus (DOP) were calculated as the difference between TN and dissolved inorganic N, and TP and dissolved inorganic P, respectively. The chemistry procedures were performed according to standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983).

Water for other analyses was subsampled from 1-liter polyethylene bottles and kept chilled until analysis. Turbidity was determined on 60-ml subsamples fixed with HgCl to terminate biological activity. Fixed samples were kept refrigerated until turbidity was measured on a Monitek Model 21 nephelometer, and reported in nephelometric turbidity units (NTU). Chl a was measured by filtering 300 ml of water through glass-fiber filters; pigments on filters were extracted in 90% acetone in the dark at -5° C for 12-24 hours. Fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer. Salinity was determined using an AGE Model 2100 laboratory salinometer with a readability of 0.0001 °/₀₀.

In-situ field measurements included water temperature (measured with a hand-held mercury thermometer readable to 0.1° C), and pH (measured with portable meter with a readability of 0.01 pH units).

Biological Communities

Marine biological community structure can be defined as the abundance, diversity, and distribution of stony and soft corals, motile forms such as echinoderms, and pelagic species such as reef fish. In the context of time-series surveys, the most useful biological assemblages for direct evaluation of environmental impacts to the offshore marine environment are benthic (bottom-dwelling) communities. Because benthos are generally long-lived, immobile, and can be significantly affected by exogenous input of sediments and other potential pollutants, these organisms must either tolerate the surrounding conditions within the limits of adaptability or die. As members of the benthos, stony corals are of particular importance in nearshore Hawaiian environments. Corals compose a large portion of the reef biomass and their skeletal structures are vital in providing a complex of habitat space, shelter, and food for other species. Since corals serve in such a keystone function, coral community structure is considered the most "relevant" group in the use of reef community structure as a means of evaluating past

and potential impacts associated with land development. For these reasons, and because alterations in coral communities are easy to identify, characterization of coral community structure is a major component of the baseline assessment. Observable change in coral population parameters is a practical and direct method for obtaining the information for determining the effects of stress in the marine environment. In addition, because they comprise a very visible component of the nearshore environment, detailed investigations of reef fish assemblages were also performed.

Biotic structure of benthic communities was evaluated by establishing a descriptive and quantitative baseline. Initial qualitative reconnaissance surveys covered the area off the Hapuna Recreational Area from the shoreline out to the 20 meter (m) (~60 foot) depth contour. The reconnaissance surveys were conducted by towing a diver at slow speed in a zig-zag pattern across the region of interest. Such surveys are extremely useful in making relative comparisons between areas, identifying any unique or unusual biotic resources, and providing a general picture of the physiographic structure and benthic assemblages occurring throughout the region of study.

Following the preliminary survey, three quantitative transect stations were selected offshore of the development area (see Figure 1). Station B-I was located near the southern boundary of Hapuna Bay; Stations B-II was located off Waialea Beach; and Station III was located off the northern end of Puako Bay. At each station, three transect sites were selected, one in each of the dominant reef zones. Each transect was oriented parallel to depth contours so as to bisect a single reef zone. Care was taken to place transects in random locations within the zone that were not biased toward either peak or low coral cover. In total, nine quantitative transects were conducted.

Quantitative benthic surveys were conducted by stretching a 50-m long surveying tape in a straight line over the reef surface. An aluminum quadrat frame, with dimensions of 1 m by 0.66 m, was sequentially placed over 10 random marks on the transect tape so that the tape bisected the long axis of the frame. At each quadrat location a color photograph recorded the segment of reef area enclosed by the quadrat frame. In addition, a diver knowledgeable in the taxonomy of resident species visually estimated the percent cover and occurrence of organisms and substratum type within the quadrat frame. No attempt was made to disturb substrata to observe organisms, and no attempt was made to identify and enumerate cryptic species dwelling within the reef framework. Only macrofaunal species greater than approximately 2 cm were noted.

Following the period of fieldwork, quadrat photographs were projected onto a grid and units of bottom cover for each benthic faunal species and bottom type were recorded. Results of the photo-quadrats were combined with the in-situ cover estimates and community structure parameters (percent cover, species diversity) were calculated. The photo-quadrat transect method is a modification of the technique described in Kinzie and Snider (1978), and has been employed in numerous field studies of Hawaiian reef communities (e.g. Dollar 1979, Grigg and Maragos 1974), and has proven to be particularly useful for quantifying coverage of attached benthos such as corals and large epifauna (e.g., sea urchins, sea cucumbers). While this methodology is quantitative for the larger exposed fauna, many coral reef invertebrates are cryptic or nocturnal. Coupled with the generally small size of cryptic invertebrates, quantitative assessment of these groups requires methodologies that are beyond the scope of the present baseline assessment.

Quantitative assessment of reef fish community structure was conducted in conjunction with the benthic surveys. As the transect tape was being laid along the bottom, all fish observed within a band approximately 2 meters wide along the transect path were identified by species name and enumerated. Care was taken to conduct the fish surveys so that the minimum disturbance was created by divers, ensuring the least possible dispersal of fish. Only readily visible individuals were included in the census. No attempt was made to seek out cryptic species or individuals sheltered within coral. This transect method is an adaptation of techniques described in Hobson (1974).

RESULTS

WATER CHEMISTRY ANALYSES

Horizontal and Vertical Stratification

Table 1 shows results of all water chemistry analyses for samples collected at the five stations off the Hapuna Recreational site. Relationships of water chemistry constituents with respect to horizontal (distance from shore) and vertical stratification are shown in Figures 2-5.

Concentrations of eight dissolved nutrient constituents in surface samples are plotted as functions of distance from the shoreline in Figure 2. Values of salinity, turbidity, Chl a and temperature as functions of distance from the shoreline are shown in Figure 3. Several patterns of distribution are evident in Figures 2 and 3. It can be seen that the dissolved

nutrients Si, NO_3^-, PO_4^{3-}, TP and TN, display a marked elevation in concentration in the many of the samples collected within 100 m of the shoreline. Concentrations were markedly higher within the zone 10 m from the shoreline. Salinity displays the opposite trend, with sharply lower concentrations near the shoreline. These gradients were strongest at Station C-III, followed by Stations C-I and C-IV. At Station C-II, in the center of Hapuna Bay, horizontal gradients are weakest.

These patterns appear to be a result of concentrated input of groundwater at the shoreline. Low salinity groundwater, which contains high concentrations of Si, NO_3^-, and PO_4^{3-} (see values for potable well water in Table 1), percolates to the ocean at the shoreline, resulting in a nearshore zone of mixing. Within the zone of mixing groundwater percolation results in horizontal gradients of increasing salinity and decreasing nutrients moving seaward. It can also be seen in Table 1 that samples collected from behind the shoreline (spring, tide pool, and drainpipe), which are composed primarily of groundwater, all contained high concentrations of Si, NO_3^-, and PO_4^{3-}.

Groundwater efflux also creates surface layers of lower salinity, higher nutrient content water "floating" on denser, more saline oceanic water. Such vertical stratification is evident in Figures 4 and 5. Nutrient constituents listed above that are normally found in high concentrations in groundwater show the strongest vertical stratification in nearshore waters, especially at Station C-III.

Water chemistry parameters that are not associated with groundwater input do not show the same pattern of decreasing concentration with respect to distance from the shoreline. At all of the stations except IV, NH_4^+ exhibits lower values at the nearshore sampling sites relative to the more oceanic samples. Likewise, DOP and DON appear to be lower in concentration in the samples collected very close to the shoreline. Beyond this distance, these constituents do not appear to display any recognizable pattern with respect to horizontal or vertical stratification, and are essentially invariant with distance from the shoreline (Figures 2 and 4). Data from well water (Table 1), and the low concentrations in the nearshore samples, indicates that these constituents are normally found in higher concentrations in coastal oceanic water than in groundwater.

Turbidity and Chl a exhibit highest concentrations at nearshore samples at Station C-III at the southern end of Hapuna Beach. The remainder of the sampling sites show no apparent pattern with respect to distance from shore or location in the water column. Temperature is lowest at the nearshore sampling sites, and increases moving offshore (Figure 3). Beyond the nearshore

zone (10 m from the shoreline) the water column was slightly stratified with the surface layer slightly cooler than the deeper layer. The cooler surface layer may be a result of evaporative cooling caused by extremely strong trade winds that prevailed during the sample collection.

Conservative Mixing Analysis

A useful treatment of water chemistry data for interpreting the extent of material inputs from land is application of a hydrographic mixing model. In the simplest form, such a model consists of plotting the concentration of a dissolved chemical species as a function of salinity. Comparison of the curves produced by such plots with conservative mixing lines provides an indication of the origin and fate of the material in question. Figure 6 shows plots of concentrations of four constituents (Si, NO_3^-, NH_4^+, PO_4^{3-}) as functions of salinity for the samples collected off the Hapuna area. Each graph also shows conservative mixing lines that are constructed by connecting the endpoint concentrations of open ocean water and groundwater from a potable well located in upslope South Kohala.

If the nutrient constituent in question displays purely conservative behavior (no input or removal resulting from any process other than physical mixing), data points should fall on, or near, the conservative mixing line. If, however, external material is added to the system through processes such as leaching of fertilizer nutrients to groundwater, data points will fall above the mixing line. If material is being removed from the system by processes such as biological uptake, data points will fall below the mixing line.

Dissolved Si represents a check on the model as this material is present in high concentration in groundwater, but is not a major component of fertilizer, and is not utilized rapidly within the nearshore environment by biological processes. It can be seen in Figure 6 that when Si concentrations are plotted versus salinity, data points fall in a relatively straight line, but slightly above, the conservative mixing line. The apparent straight line distribution and close agreement of the measured mixing line with the theoretical conservative mixing line indicates that the high concentrations of Si in the nearshore area are the result of mixing of groundwater and ocean water.

The plot of NO_3^- versus salinity in Figure 6 reveals a similar distribution as Si. The overall distribution indicates that the samples with lower salinity have higher NO_3^- concentrations. The close fit of the theoretical mixing line and the line created by the data points indicates that

NO_3^- in the nearshore zone is the result of input of uncontaminated groundwater, with no apparent additional sources or sinks.

The distribution of PO_4^{3-} data points as functions of salinity reveals different patterns than Si and NO_3^-. Many of the data points, especially from Stations C-I, C-III, and C-IV fall below the conservative mixing line, while data points from Stations C-II and C-V are above the mixing line. These variations suggest that the PO_4^{3-} content of water reaching the shoreline and mixing in the nearshore zone is either slightly different in composition between station locations, or is undergoing various processes of uptake and input in the nearshore zone. At the stations where data points fall well below the mixing line, it is possible that uptake by plants near the air-sea interface is responsible for the apparent draw down of PO_4^{3-}. Such a possibility of high uptake is corroborated by the relatively high concentrations of Chl a at the nearshore area at Station C-III. It is apparent, however, that these processes are not resulting in a similar uptake of NO_3^-.

The distribution of the other form of dissolved inorganic nitrogen, NH_4^+, does not show the linear inverse relationship with respect to concentration and salinity. The conservative mixing line is essentially "flat" with similar concentrations in groundwater and open ocean water. Most of the data points fall above the conservative mixing line, with some of the highest concentrations in samples of highest salinity (i.e. most oceanic). These factors indicate that the relatively high concentrations of NH_4^+ are not a result of input to the nearshore ocean from land. Rather, it is likely that the measured NH_4^+ concentrations are the result of biologically induced chemical reactions (e.g. metabolic processes) within the nearshore zone.

Compliance with DOH Criteria

Also shown in Table 1 are samples that exceed DOH water quality standards for open coastal waters under "wet" conditions. The criteria for wet conditions are applied to the Hapuna site as this area probably receives more than 3 million gallons of groundwater input per mile per day (T. Nance, personal communication). Samples collected from behind the shoreline are not considered with relation to open coastal water standards.

Comparing water chemistry results from the Hapuna samples to DOH standards reveals that 27 measurements of NO_3^- exceeded the "not to exceed more than 10% of the time" standards. As discussed above, NO_3^- is a normal constituents of groundwater. Scaling NO_3^- to salinity reveals that concentrations found in waters off the survey sites are the result of

groundwater discharge at the shoreline. NO_3^- measurements that exceed DOH standards occur at all of the sampling stations, and extend from the shoreline out to a maximum of 100 m from shore (Station C-V). While numerous NO_3^- measurements exceed DOH standards, it is important to note that the highest value encountered in the ocean (15 μM) is only about 17% of the concentration found in drinking water.

Thus, by comparison of the water chemistry constituents with DOH criteria, it is apparent that under the present conditions (prior to any new construction activities), natural processes can cause measurements of water quality that exceed specified DOH limits.

BIOLOGICAL COMMUNITY STRUCTURE

Descriptive Assessment of Reef Structure

The main structural feature of the shoreline between Hapuna Bay and Puako Bay is a basaltic ledge of pahoehoe lava with interspersed pockets of white calcareous sand. In most of the areas examined, the nearshore subtidal areas not fronting sand beaches are composed of basaltic boulders and sharp lava fingers. The seaward edge of the lava shoreline is composed of either a relatively flat basaltic bench, or vertical sea cliffs 1-2 m feet in height. Hapuna Beach, composed of a wide expanse of white sand is the major exception to the predominantly rocky shoreline.

The underwater zonation scheme consists of several predominant regions. Beginning at the shoreline and moving seaward, the shallowest zone beyond the shoreline is comprised of a seaward extension of the basaltic shoreline bench covered with a limestone veneer, along with scattered basaltic boulders that have entered the ocean after breaking off from the shoreline. Areas of sandy bottom are also common throughout the nearshore zone. A dominant characteristic of the bench is extensive pitting by the bioerosional action of the sea urchins *Echinometra matheai*, and *Echinostrephus aciculatus*. The pitted structure of the nearshore reef platform is most pronounced in the inner areas of Waialea Bay. Also abundant on the shallow nearshore area is extensive encrustations of calcareous red algae. *Pocillopora meandrina*, a sturdy hemispherical coral is the dominant colonizer of the nearshore area. This species is able to flourish in areas that are physically too harsh for most other species, particularly due to wave stress. Other coral species are limited in growth form to small, flat encrustations of several species. Water conditions are often turbid, and substantial freshwater input from groundwater discharge is evident. Within Puako Bay (Station B-III), the shallow

nearshore zone was most extensive, as was the degree of bioerosional activity. The relatively barren nature of the inner areas of Puako Bay suggest that the area may have recently been impacted by recent events which may have increased siltation to the point of killing reef corals. The shallow transect at each station was conducted in the nearshore zone. In areas fronting sand beaches, the most shoreward reef zones are essentially absent, with bottom structure consisting of an expanse of white sand.

Within 25-50 m of the shoreline, the reef platform undergoes a transition from a flat bench (0-3 m) to uneven hummocky surfaces separated by sand patches. Coral coverage increases gradually with distance from shore. The predominant species are *Porites compressa*, and *P. lobata*. The former species is commonly known as "finger coral" and often occurs as interconnected mats that spread laterally over large areas of the sea floor. The latter species commonly occurs as large dome-shaped hemispheres up to 2 m in height. The occurrence of such large colonies in the Kawaihae-Puako corridor indicates that this area does not appear to be subjected to periodic devastating wave forces that occur in other areas. In ore exposed regions, wave forces cause breakage and overturning of living colonies, preventing corals from reaching the large size observed off the survey area. Tops of the hummocks extend approximately 1-3 m off the sand flats, and are covered predominantly with large colonies of *Porites lobata* and mats of *P. compressa*. The mid-depth transects were conducted in the hummocky area.

Beyond the reef platform described above, structure of the offshore environment between Kawaihae and Puako is very different from the general physiographic pattern that has been documented as characterizing much of the west coast of the Island of Hawaii (Dollar 1982). The predominant pattern along most of the coast from South Kona to North Kohala consists of a narrow nearshore reef bench and steep reef slope. Between Kawaihae and Puako, however, bottom topography lacks the sharp nearshore reef slope. Instead, bottom topography consists of a gently sloping face from the shoreline out to abyssal depths. As a result, reef structure extends much further offshore than in areas to the north and south with sharp reef slopes. The broadened reef terrace is clearly evident in Figure 1. It can be seem that the horizontal distance between depth contours is substantially greater between Hapuna and Puako compared to the area south of Puako Point.

Without the reef slope, the outer reef area (groater than 10 m) displays a rather unique structure. Moving seaward, the coral hummocks gradually change orientation from random pattern to a series of elongated fingers with the long axes perpendicular to the shoreline. At the 10-20 m depth, the fingers have the appearance of elongated knolls or ridges that rise off

the bottom by as much as 5 m. These ridges are up to 50 m long, and are generally 10 to 15 m wide. In cross-section the knolls are semi-circular, with rounded tops and sides. Such finger knolls are regularly spaced, and are separated by channels of fine white sand. *Porites compressa* covers the tops and upper flanks of the ridges; overlapping platelike colonies of *P. lobata, P. (Synaraea) canvexa*, and *Montipora spp.* occupy the vertical areas of the lower ridge walls. *P. compressa* branches are noticeably longer and thinner in this region compared to the shallow nearshore platform, where branches are shorter and thicker. It appears that the finger knolls are not composed of an underlying core of basalt, but are the result of bioaccumulation of calcium carbonate through active reef building processes. The deep transect at each station was conducted across a coral ridge.

Quantitative Analysis of Benthic Community Structure

Table 2 shows abundance estimates of invertebrates observed throughout the region of study. The predominant taxon of macrobenthos (bottom-dwellers) throughout the reef zones off the Hapuna area are Scleractinian (reef-building) corals. Results of quantitative line transects conducted within the three dominant reef zones provide a data base characterizing coral community structure. Table 3 shows the quantitative summary of coral community structure, while Appendix A is comprised of individual transect results.

In total, 13 species of "stony" corals, and two "soft corals" were encountered on transects, while the number of coral species on a single transect ranged from 3 to 9. *Pocillopora eydouxi, Porites brighami, Cyphastrea ocellina,* and *Fungia scutaria* were observed in the study area, but did not occur on any transects (see Table 1). The dominant species on the transects were *Porites compressa*, which accounted for about 58% of total coral cover, and *P. lobata*, which comprised about 30% of coral cover. Thus, these two species comprised about 88% of living coral cover, and 44% of total bottom cover. Total coral cover comprised about 50% of bottom cover for the areas transected, and represents a mean coral cover of the entire reef zonation pattern.

With respect to zonation of coral cover, the most abundant species on the shallow transects were *P. lobata* and *P. meandrina*. The exception was at Station B-III, where *P. compressa* was abundant in the nearshore shallow zone of Puako Bay. While having the lowest coral cover, the shallow zone had the highest species diversity, and among the highest numbers of species. The mid-depth hummock zone was dominated by *P. lobata*, with intermediate coral cover compared to shallower and deeper areas. Numbers of species in the mid-depth area was

the highest of all of the zones. The deep finger knoll zone contained the highest percentage of living coral, predominantly in the form of mats of *P. compressa*. However, transects were oriented so as to not sample the wide sand channels separating the fingers.

Species diversity (see Table 3) showed an inverse relationship with depth. The shallow transects at each station had the highest diversity (lowest cover), while the deep transects had the lowest diversity (highest cover). Such a pattern indicates that on the shallow reefs, rigorous physical conditions prevent a single species from dominating coral cover. Conversely, on the deeper areas beyond the forces of wave stress and other physical factors that can limit coral growth, the fragile, but rapidly growing mats of *P. compressa* monopolize solid substrata, and reduce the equitability of species distribution.

The other dominant group of macroinvertebrates are the sea urchins (Class Echinoidea) (see Table 2). The most common urchin is *Echinometra matheai*, which occurred in all reef zones. *E. matheai* are small urchins that are generally found within interstitial spaces bored into basaltic and limestone substrata. This species is most abundant in the shallow nearshore zone, and least abundant on the finger knoll transects where solid substrata was not common.

Tripneustes gratilla, and *Heterocentrotus mammillatus* are other species of urchins that occurred commonly throughout the reef. Both of these urchins occur as larger individuals (compared with *E. matheai*) that are generally found on the reef surface, rather than within interstitial spaces. *Tripneustes gratilla* and *Echinothrix spp.* are the predominant echinoids found on the coral ridges, but overall urchin abundance is reduced compared to the shallower areas.

Sea cucumbers (Holothurians) observed during the survey consisted of three species, *Holothuria atra*, *H. nobilis*, and *Actinopyga obesa*. Individuals of these species were distributed sporadically across the mid-reef and deep reef zones, and were most abundant within Waialea Bay (Table 2). The most common starfish (Asteroidea) observed on the reef surface were *Linckia spp.*. Several crown-of-thorns starfish (*Acanthaster planci*) were observed feeding on colonies of *Pocillopora meandrina*. Numerous sponges were also observed, predominantly under ledges and in interstitial spaces.

Frondose benthic algae are conspicuously rare on many of the reefs of West Hawaii. The most common algae were the encrusting red calcareous genera (*Porolithon spp.*, *Peysonellia rubra*, *Hydrolithon spp.*). These algae were abundant on bared limestone surfaces, and on the nonliving parts of coral colonies. Frondose algae observed on the reef included *Valonia sp.*,

Lyngbya majuscula, and *Halimeda spp.*. *Lyngbya* was especially abundant on the shallow inshore reefs at Station B-III in Puako Bay. In some areas of high groundwater flow at the shoreline, such as at the corners of Hapuna Bay, algae of several species (*Ulva spp.*, *Ahnfeltia concinna*) was observed on rocks in the intertidal zone.

The design of the reef survey was such that no cryptic organisms or species living within interstitial spaces of the reef surface were enumerated. Since this is the habitat of the majority of mollusks and crustacea, detailed species counts were not included in the transecting scheme. No dominant communities of these classes of biota were observed during the reef surveys at any of the study stations.

Reef Fish Community Structure

Reef fish community structure was largely determined by the topography and composition of the benthos. Transect results are presented in Table 4. On individual transects, the number of individual fish ranged from 176 to 351, number of species ranged from 26 to 37, and species diversity ranged from 2.52 to 3.06. A total of 2,253 individuals representing 75 species were noted.

The reef fish community off the Hapuna area is typical of that found along most of the Kona Coast (Hobson 1974, Walsh 1984), and can be grouped into five general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwelling fish, swarming tetrodonts, and surge-zone fish.

Juvenile fish belonged mostly to the family Acanthuridae (surgeon fish), with representatives from the families Labridae (wrasses), Mullidae (goat fish) and Chaetodontidae (butterfly fish). Juveniles were most abundant on the deepest transects (50-60 ft.) in areas dominated by finger coral (*Porites compressa*) or basalt rocks. The complex habitat created by the growth form of *P. compressa* provides shelter for small fish. Juvenile fishes were also common near large heads of *Porites lobata*. Many juvenile parrotfish (uhu, *Scarus spp.*) were noted at the inshore transect at Station B-III.

Planktivorous damselfish, principally of the genus *Chromis* were abundant in all areas surveyed. Agile chromis (*Chromis agilis*) were abundant along the margins of coral rich areas in deeper water, whereas blackfin chromis (*C. vanderbilti*) was the primary shallow water species.

Herbivores, primarily the yellow tang (lau'i-pala, *Zebrasoma flavescens*) and goldring surgeonfish (kole, *Ctenochaetus strigosus*) were also abundant. On the shallower reef terrace, adult whitebar surgeonfish (maikoiko, *Acanthurus leucopareius*), orangeband surgeonfishes (na'ena'e, *A. olivaceus*), brown surgeonfish (ma'i'i'i, *A. nigrofuscus*) and parrotfish (uhu, *Scarus spp.*) were also common. In areas where coral rubble was abundant, common fish included potters angelfish (*Centropyge potteri*), and several species of wrasses, notably fourline wrasse (*Psuedochilinus tetrataenia*), eightline wrasse (*P. octotaenia*), and yellowtail wrasse (keki-lolo, *Coris gaimard*).

Fish directly adjacent to the shoreline were not quantitatively assessed because of the difficulty in working on the shallow wave-swept habitat that these fish inhabit. Visual observations, however, revealed that this biotope supported a large number of fish, principally herbivores such as rudderfish (nenue, *Kyphosus bigibbus*), surgeonfish (*Acanthurus spp.*), and unicornfish (mostly umaumalei, *Naso lituratus*). Saddle wrasse (hinalea lau-wili, *Thallassoma trilobatum*) and surge wrasse (hou, *T. purpureum*) were also abundant in the surge zone. Large numbers of black durgon (humuhumu-ele'ele, *Melanichthys niger*) and pinktail durgon (humuhumu-hi'u-kole, *M. vidula*) were also observed congregating in the water column over various parts of the reef platform.

Only a few species of "food fish" (taken by subsistence and/or recreational fishermen) were observed during the survey. A few schools of goatfish (weke, *Mulloidichthys flavolineatus*), and blue-lined snapper (taape, *Lutjanus kasmira*) were observed. A few grand-eyed porgeys (mu, *Monotaxis grandoculis*) were observed at some deeper locations. Large coral heads sheltered fair numbers of squirrelfish (u'u, *Myripristes berndti*). Other food fish included parrotfish (uhu, *Scarus spp.*) and grouper (roi, *Cephalopholus argus*). None of these species were particularly abundant. Orange-eyed surgeonfish (kole, *Ctenochaetus strigosus*), while abundant, were generally not large enough to be considered suitable for "food fish". The relative scarcity of food fish indicates that the area has been subjected to a fair amount of fishing pressure.

DISCUSSION

Potential Impacts to the Marine Environment from Erosion

An objective of this assessment is to estimate the potential for impact to the marine environment from construction and operation of a golf course at Hapuna. Implementation of

the proposed project would involve grading, vegetation removal, new construction, and other land use changes. There are no plans, however, for any alteration of the shoreline or offshore environment. Because the project does not entail any shoreline modification, potential problems could arise only from changes in input to the marine environment from erosion of soils, or chemical subsidies from fertilizers and pest control agents.

A literature review compiled by the Golf Course Superintendents Association of America (GCSAA) (November 1988) summarizes the impacts of existing golf courses on environmental quality. Overall, the findings indicate that golf courses do not pose a significant pollution threat to the nation's water supplies. With respect to impacts from erosion, golf courses actually help reduce sedimentation pollution by increasing soil stability through thick layers of grass thatch. Carefully managed golf course turf grasses have been found to have 15 times less runoff than does a lower quality lawn. Studies have also shown that grasslands experience 84 to 668 times less erosion than areas planted in wheat or corn (DeBoot and Grabriels 1980). Golf courses can also greatly reduce erosion and runoff effects compared to other land uses, such as roadways, buildings, or parking lots.

Construction of the proposed golf course project may cause temporary increase in terrigenous sediment runoff during the period of grading, topsoil placement, and turf "grow-in". While the potential for erosional impacts in the nearshore marine environment appears to be low, the "worst case" situation must be considered where sediment input to the ocean does occur. As described above, the keystone component of the benthos is reef corals. The effects of sediment stress to corals has been extensively reviewed by Johannes (1975), Dodge and Vaisnys (1977), Bak (1978), Brown and Howard (1985) and Grigg and Dollar (1990). In summary, these reviews indicate that increased sedimentation can have a deleterious effect on corals by restricting available light for photosynthetic activity, and by burying living colonies. However, sediments must be considered components of normal environmental settings. Because sediments are suspended by natural processes in many reef environments, most corals can withstand a certain level of sediment supply to the living surface. Many species have the ability to remove sediment from their tissues by distension of the coenosarc, or ciliary action which can nullify lethal effects of sedimentation (Yonge 1931). Branching species appear to have a distinct advantage over flat plating growth forms in remaining viable in situations of prolonged sediment deposition.

In case studies of the effects of sedimentation, the range of environmental effects varies through the entire spectrum of stress. Severe reduction of corals within a 1-mile radius of sugar mills on the Hamakua Coast of Hawaii has resulted from continual discharge of

washwater containing high loads of particulate terrigenous materials (Tetra Tech 1989). The zones of influence, however, are limited to the areas where sediment buries corals, and has not changed in dimension since government regulations required removal of 90% of the particulate material. Other cases where effects of dredging have caused mortality have been generally limited to areas of confined circulation such as Castle Harbor, Bermuda (Dodge and Vaisnys 1977), and Kaneohe Bay, Hawaii (Banner 1974).

In areas of unrestricted circulation such as South Kohala, however, there have been instances of increased sedimentation reported that do not appear to cause any substantial effects to reefs. Sheppard (1980) reported that following dredging and blasting for a military harbor in Diego Garcia Lagoon, coral cover appeared to show no effects from increased siltation. Roy and Smith (1970) assessed coral community structure in Fanning Lagoon which contains both areas of turbid and clear water. The presence of very turbid water and muddy bottoms did not prohibit the growth of viable reefs. Reefs in the turbid areas were ecologically different from those in clear water, but were nevertheless "normal" living reefs. Branching corals dominated the communities in the turbid water, while massive corals predominated in the areas of low sediment resuspension.

Several scenarios around the Hawaiian Islands can also be drawn upon to substantiate that impacts from sedimentation do not always result in substantial, irreversible damage to neighboring marine environments. Studies conducted at Princeville, Kauai (Grigg and Dollar 1980), French Frigate Shoals (Dollar and Grigg 1981), and Hilo Bay (Dollar 1985), all revealed no impacts to reef coral communities subjected to seemingly high levels of sediment stress. Monitoring of beach construction at Makaiwa Bay (Dollar 1987), located in South Kohala, Hawaii, showed that while substantial sediment plumes in the water column were created by excavation of the shoreline, there were no temporary or permanent negative effects to benthos and fish communities. Rapid flushing of the bay by normal current exchange, and the ability of live corals to exercise sediment removal behavior appeared to prevent measurable changes in community structure parameters. Results of these studies indicate that Hawaiian reef communities possess the adaptive ability to maintain community integrity under conditions of substantial sediment loading, as long as corals are not continually buried.

While the literature clearly documents that sediment subsidies do not necessarily result in deleterious impacts to corals, it is stressed that for the present project, all engineering and construction considerations should aim to exclude as much as possible the addition of sediment runoff to the coastal ocean. Such potential can be mitigated in part by minimizing

acreage that is exposed at any one time, and timing of construction to avoid seasonal periods of heaviest rain.

While temporary increases may not result in any substantial or permanent alteration to the biotic communities, water chemistry analyses (as well as observation) indicates that water quality and clarity in the South Kohala area is of the highest caliber found in Hawaii. Inputs of erosional sediment would likely result in some temporary reduction in water quality that may effect neighboring areas of substantial recreational usage.

Effects From Fertilizer Chemicals

The development and operation of the proposed golf course will undoubtedly require some application of fertilizers to supply essential nutrients to turfgrasses, and pesticides to control weeds, plant diseases and insect pests. Fertilization may be accomplished either from commercial mixes, or application of treated sewage effluent. Under some conditions, these chemicals may be subject to movement from the site of application, principally by leaching to the groundwater aquifer. As groundwater efflux to the ocean is a characteristic of the entire coast of Hawaii, consideration of the potential impacts to the marine environment from golf course operation are considered below. It is important to note, however, that the principal components of fertilizers are plant nutrients, which occur in abundance in uncontaminated groundwater. Thus, the considerations for these materials is clearly different than for pest control agents, which do not occur naturally in the environment. As such, pest control agents will not be considered in this discussion.

Fertilizer nutrients of concern for contamination of groundwater are nitrogen and phosphorus. Nitrogen is the nutrient of concern for several reasons; its use as a major component of most fertilizers, its essential solubility in the nitrate-nitrite form, and its potential role in the eutrophication of open bodies of water receiving high levels of infiltrate from land. Ammonium nitrogen (NH_4^+) moves little in soils. NH_4^+, however, is converted to nitrate (NO_3^-) which is not bound tightly to soils, and moves readily with water. Normally, when golf course management matches evapotranspiration with irrigation, NO_3^- will be used rapidly after application in the production of new turfgrass. Usage of slow release nitrogen in fertilizers also reduces the potential for NO_3^- leaching to groundwater. Under some conditions, however, such as overfertilization and overirrigation, or when excessive rainfall occurs soon after application of a soluble nitrogen source, there is potential for excessive loss by surface runoff or by leaching below the root zone.

Phosphorus, primarily as orthophosphate (PO_4^{3-}) is usually attached very tightly to soil colloids and moves little, if any, from the site of application. Because of the mineralogic composition, most of the soils used for golf courses in Hawaii can immobilize large amounts of phosphorus. However, the porous basalt underlying the South Kohala area is more permeable to PO_4^{3-} than soil. As a result there is potential for phosphorus to leach to groundwater owing to golf course operation at the subject site.

Soil retention studies conducted on a golf course in Hawaii indicated that upwards of 90% of the applied fertilizer N and 100% of P is taken up by the thatch/soil complex (Chang and Young 1977). Data from Brown et al. (1977) and Tavares (1983) showed that for soluble N sources at high rates of application and high irrigation rates, about 10% of the total N applied was leached in the first 2 to 4 days after application, after which the leaching loss dropped to about 2% of the applied N per day for about 2 to 3 weeks. Two to three weeks after application, essentially all of the applied N was used by plants, leached, or lost as gas (denitrified). A study by Brown et al. (1982) on highly porous sand golf greens in Texas compared the amount of nitrogen lost by leaching from various nitrogen sources. Irrigation was applied at relatively high rates to provide leaching opportunity. Results of their study showed that over a five-month period, approximately 23% of the nitrogen applied as a soluble N source (ammonium nitrate) was leached.

Impacts from fertilization of golf courses using treated sewage effluent have been a subject of study as both an effective alternative to ocean sewage disposal and as a means of recycling fresh water. California grass (paragrass) irrigated with effluent from secondarily treated domestic sewage showed excellent results as a means of disposal of large amounts of water, and for effective removal of nitrogen. Under irrigation rates as great as 98 mm/day, the monthly effluent nitrogen content ranged from 17 to 59 mg/l with an average level of 34 mg/l. Of the applied nitrogen, an average of 69% was harvested in the grass, 3% percolated, nearly 28% was denitrified, while the soil nitrogen status remained unchanged or decreased slightly. Even with the highest effluent irrigation rates, nitrate nitrogen levels in the percolate remained less than the 10 mg/l recommended maximum for potable water (Handley and Ekern 1981). The results of these studies suggest that there is potential for a relatively small percentage of fertilizer nitrogen to leach to groundwater.

A survey of the effects of existing golf course irrigation and fertilization on nearshore marine waters off the west coast of the Island of Hawaii showed that existing courses (Mauna Lani, Waikoloa, Mauna Kea) are not causing alteration in water quality or biological community

function and structure (Dollar and Smith 1988, Marine Research Consultants 1990). Courses located upslope from open coastlines, such as at Hapuna, showed little effect on nutrient concentrations in the nearshore ocean. These results suggest that normal fertilization does not result in undesirable nutrient enrichment in nearshore waters. An exception, however, appeared in a semi-enclosed inlet (Keauhou Bay) located directly downslope from a 27-hole golf course. Owing to a residence time in the Bay that is substantially longer than in an equivalent area of open coastline, and to the "focusing" of groundwater efflux, increases in dissolved nitrogen measured in Keauhou Bay appear to be attributable to golf course fertilization (Dollar and Smith 1988, Dollar and Atkinson, submitted). However, the nutrient subsidy was restricted to a surface layer of low salinity water that is rapidly transported out of the bay. As a result, the benthos within the bay were never exposed to the excess nutrients, and plankton populations in the surface layer did not increase substantially owing to the short residence time within the bay.

It should also be stressed that naturally occurring groundwater contains extremely high concentrations of NO_3^- in relation to marine waters. Groundwater efflux is a natural phenomenon, and it must be assumed that the nearshore communities are adapted to nutrient concentrations contained in groundwater. It therefore follows that subsidies of NO_3^- to groundwater, should they occur as a result of golf course operation, do not change the qualitative nature of the groundwater, and do not necessarily represent a potential pollutant to receiving environments. Brock et al. (1987) presents evidence of such nutrient subsidy in anchialine ponds owing to the Waikoloa golf course; however the increases are within the natural range of fluctuations of nutrient content in the ponds, and native aquatic pond biota do not appear to be sensitive to the increased nutrient values.

It appears that golf courses constructed inland from open coastlines, or embayments that do not cause substantial reduction in water residence time (such as at Puako and Hapuna), do not cause potentially detrimental nutrient input into the nearshore region. If a proportion of nutrients added to the golf courses situated on open coasts is reaching the shoreline, it appears that "normal" rates of water mixing are sufficient to reduce the increased input function to below detection limits within a short distance from the shoreline. As the golf courses sampled in the studies cited above have been operating for a time period of 10 to 25 years, it appears safe to conclude that any cumulative impacts, should they be occurring, would be discernible at the present time.

As long as nutrient loading rates from irrigation do not overwhelm the carrying capacity of the golf course (i.e. extreme over irrigation) there does not appear to be any indication that the

quality of nearshore waters will be affected. Thus, with prudent management practices that preclude intense over-irrigation and fertilization, there does not appear to be potential for negative alteration of nearshore water quality.

It can be concluded that as long as reasonable steps are taken in construction practices and operational procedures, the project does not involve substantial changes in material delivery to the nearshore ocean, there should be no adverse impacts to the marine environment. It is recommended that this baseline assessment constitutes the first phase of an ongoing monitoring program conducted before, during, and after construction to assess if shoreline activities at the Hapuna Recreational Area are resulting in changes to nearshore water quality. Such changes in water quality would be warning signals of potential changes to marine community structure. Thus, any changes in water quality owing to shoreline development should trigger mitigative action, hopefully at a level below that capable of inducing change in biotic structure.

SUMMARY

1. Evaluation of nearshore water chemistry off the proposed Hapuna Recreational Area was carried out in March, 1991. Fifty-seven water samples were collected from five stations located offshore of the project. Water samples were collected on transects perpendicular to depth contours, extending from the shoreline to a distance of approximately 250 m offshore. Analysis of 13 water chemistry constituents included all parameters specified in DOH water quality standards.

2. Several dissolved nutrients (NO_3^-, TN, PO_4^{3-}, TP and Si) displayed horizontal gradients with highest values closest to shore and lowest values at the most seaward sampling sites. Correspondingly, salinity was lowest closest to the shoreline. These patterns indicate that groundwater is entering the marine environment near the shoreline and mixing with oceanic water. This pattern was especially evident at Stations C-III, off the southern end of Hapuna Bay, and least developed at Station C-II in the center of Hapuna Bay.

3. Along with horizontal gradients in water chemistry constituents, there is an indication of vertical stratification within the water column. Such stratification is the result of incomplete mixing of a low density surface layer originating from groundwater and stream water, with an underlying layer of denser oceanic water.

4. Other water chemistry constituents that are not related to groundwater efflux (DON, DOP, NH_4^+) do not display the steep gradients with respect to distance from the shoreline. Turbidity and Chl a are elevated at Station C-III, possibly as a result of planktonic populations that may be trapped within the corner of Hapuna Bay.

5. Application of a conservative mixing model which relates the concentration of dissolved nutrients to salinity reveals most of the nutrient content (with the exception of NH_4^+) in the coastal area is the result of mixing of groundwater with ocean water. There is no indication of subsidy of NO_3^- to natural groundwater input from any activities on land. Scaling PO_4^{3-} to salinity indicates uptake at Station C-III, corroborating the conclusion that increased Chl a concentrations may be a result of increased plankton growth.

6. Numerous water samples exceeded State DOH standards for NO_3^-. These samples appear to contain dissolved materials in excess of DOH standards primarily as a result of natural processes of groundwater efflux.

7. Assessment of the benthic and reef fish community structure off the Hapuna Recreational Area was conducted in conjunction with the water quality survey. Nine transects were evaluated at three stations located offshore of the property.

8. Physical structure of the nearshore region consists rocky basaltic shorelines that form the land-sea interface. Several white sand beaches also compose sections of the shoreline. The reef area is divided into three major zones; a shallow nearshore zone characterized by a flat reef platform; a mid-reef zone composed of irregular bottom topography characterized by extensive reef growth; and a deep reef zone composed of dome-shaped elongated ridges composed of accumulated coral growth that are separated by sand channels. Such a zonation scheme is atypical of the West Hawaii area in that a deep reef slope does not occur.

9. Coral community structure differs substantially in each zone. The shallow reef bench is typified by small encrustations of corals that can withstand the rigors of sediment, freshwater input, and water motion. The mid-depth reef is characterized by very large coral colonies of *P. lobata* that indicate that the area is relatively protected from severe wave stress. The deep reef ridges appear to be composed of biogenic accumulation of upward growth of predominantly one species (*P. compressa*). Coral cover of hard bottom area increases moving seaward, while diversity decreases.

10. Reef fish community structure at the Hapuna area is fairly typical of the assemblages found in undisturbed Hawaiian reef environments, and is characterized by six general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwellers, swarming tetrodonts, and surge-zone fishes. The relative scarcity and timid behavior of some food fishes indicates that the area has been subjected to moderate fishing pressure.

11. Construction and operation of the proposed golf course does not appear to present the potential to cause permanent adverse impacts to the marine environment. The absence of plans to modify the shoreline or nearshore environment eliminates the potential for direct alteration of ecosystems. Stresses from natural forces that are presently factors in influencing community structure (e.g. freshwater and sediment input) may actually be reduced with shoreline development. Secondary impacts associated with runoff of materials associated with the development do not appear to present the potential for changes based on similar, existing projects. The successful elimination of such impacts, however, is predicated on proper construction and management scenarios.

12. While this evaluation does not present great potential for alteration of the marine environment from the proposed project, it is recommended that the present baseline survey serve as the initial increment in an ongoing monitoring program. The monitoring program should be designed to establish a preconstruction baseline of conditions in order to evaluate any changes that might occur during the construction and operational phases of the project. Such a monitoring program should also be designed so that if environmental alterations are identified, mitigative measures can be applied prior to degradation of water quality and biotic community structure.

REFERENCES CITED

Banner, A. H. 1974. Kaneohe Bay, Hawaii: Urban pollution and a coral reef ecosystem. Proc. 2nd. Int. Coral Reef Symp. 2:685-702.

Bak, R. P. M. 1978. Lethal and sublethal effects of dredging on coral reef. Mar. Poll. Bull. 2:14-16.

Brock, R. E., J. E. Norris, D. A. Zieman and M. T. Lee. 1987. Characteristics of water quality in anchialine ponds of the Kona, Hawaii, Coast. Pac. Sci. 41:200-208.

Brown, B. E. and L. S. Howard. 1985. Assessing the effects of "stress" on reef corals. Adv. in Mar. Biol. 22:1-63.

Brown, K. W., J. C. Thomas and R. L. Duble. 1982. Nitrogen source effect on nitrate and ammonium leaching and runoff losses from greens. Agronomy Journal. 74:947-950.

Chang, S. Y. K. and R. H. F. Young. 1977. An investigation into environmental effects of sewage effluent reuse at the Kaneohe Marine Corps Air Station Klipper golf course. Tech. Mem. Rep. No 53. Water Resources Research Center, University of Hawaii.

DeBoot, M. and D. Grabiels (eds). 1980. Assessment of erosion. John Wiley and Sons, New York. pp. 219-221.

Dodge, R. E. and J. R. Vaisnys. 1977. Coral populations and growth patters: Responses to sedimentation and turbidity associated with dredging. J. of Mar. Res. 35:715-730.

Dollar, S. J. 1979. Ecological response to relaxation of sewage stress off Sand Island, Oahu, Hawaii. Water Resources Research Center Tech. Rpt. No. 124. Water Resources Research Center, University of Hawaii.

Dollar, S.J. 1982. Wave stress and coral community structure in Hawaii. Coral Reefs 1:71-81.

Dollar S. J. and R. W. Grigg. 1981. Impact of a kaolin clay spill on a coral reef in Hawaii. Coral Reefs 1:71-81.

Dollar, S. J. and S. V. Smith. 1988. The effects of golf course irrigation and fertilization on nearshore marine waters off West Hawaii. Prepared for Helber, Hastert & Kimura, Planners.

Dollar, S. J. and M. A. Atkinson. 1990. Effects of nutrient subsidies in groundwater to nearshore marine ecosystems off the Island of Hawaii. submitted.

Grasshoff, K. 1983. Methods of seawater analysis. Verlag Chemie, Weinheim, 419 pp.

Grigg, R. W. and S. J. Dollar. 1980. Environmental impact assessment of nearshore marine life at Princeville, Kauai, Hawaii. Prepared for Princeville Development Corporation.

Grigg, R. W. and S. J. Dollar. 1990. Natural and anthropogenic disturbances on coral reefs. In: Ecosystems of the World 25; Coral reefs. Z. Dubinsky (ed.). Elsevier Publishers, Amsterdam.

Grigg, R. W. and J. E. Maragos. 1974. Recolonization of hermatypic corals on submerged lava flows in Hawaii. Ecology 55:387-395.

Handley, L. L. and P. C. Ekern. 1981. Irrigation of California grass with domestic sewage effluent: water and nitrogen budget and crop productivity. Water Resources Research Center, University of Hawaii, Tech. Rpt. No. 141.

Hobson, E. S. 1974. Feeding relationships of teleostean fishes on coral reefs in Kona, Hawaii. Fishery Bull. 72:915-1031.

Johannes, R. E. 1975. Pollution and degradation of coral reef communities. In: Tropical Marine Pollution, E. J. Ferguson Wood and R. E. Johannes (eds.) Elsevier Scientific Publishing, Amsterdam. pp. 13-50.

Kinzie, R. A. III and R. H. Snider. 1978. A simulation study of coral reef survey methods. In:Coral reefs: research methods. UNESCO, eds: D. R. Stoddart and R. E. Johannes.

Sheppard, C. 1980. Coral fauna of Diego Garcia lagoon following harbor construction. Mar. Poll. Bull. 11:227-230.

Strickland J. D. H. and T. R. Parsons. 1968. A practical handbook of sea-water analysis. Fisheries Research Bd. of Canada, Bull. 167. 311 p.

TetraTech. 1989. Hawaii Sugar Mill marine environmental study. Prepared for: Assessment and watershed protection division, Office of water regulations and standards, U. S. Environmental Protection Agency, Washington, D. C., U. S. EPA Contract 68-C8-001, TC-4100-14.

Tavares, W. J. 1983. The effect of N source, N rate and a vascular-arbuscular mycorrhizal fungus on nitrogen leaching and elemental composition in bermudagrass turf. M.S. Thesis, Horticulture Dept., University of Hawaii.

Walsh, W. J. 1984. Aspects of nocturnal shelter, habitat space, and juvenile recruitment in the Hawaiian coral reef fishes. Ph.D.. Dissertation, University of Hawaii, 475 pp.

Yonge, C. M. 1931. The biology of reef building corals. Sci. Rept. Brit. Mus. (N. H.), I:353-391.

TABLE 1 Water chemistry constituents all the Hapuna Beach Recreational Project site collected on March 17, 1991. Boxed values exceed DOH criteria for open coastal waters under "wet" conditions. Abbreviations as follows: distance from shore (DFS), surface (S), deep (D). For sampling locations, see Figure 1.

STATION	NO	DFS (m)	PO4 (µM)	NO3 (µM)	NH4 (µM)	Si (µM)	DOP (µM)	DON (µM)	TP (µM)	TN (µM)	TURB (NTU)	SALINITY (o/oo)	CHL a (µg/L)	TEMP. (deg C)	pH
HAPUNA-1-	1-S	1	0 23	5 80	0 11	75 66	0 16	4.29	0 39	10 20	0 09	32 371	0.14	22 5	8 21
	2-S	5	0 29	5 44	0 18	72 08	0.14	4 99	0.43	10 61	0 09	32.465	0.09	22.5	8.24
	2-D	5	0 20	3 95	0 42	53 26	0.16	5 83	0 35	10 20	0 07	33 141	0 27	22 6	8 23
	3-S	10	0 20	3 27	0.18	41 03	0.14	4 58	0.34	8 03	0 06	33 550	0.10	22.7	8 20
	3-D	10	0 14	0 87	0.18	10 92	0 16	5 21	0 30	6 26	0.06	34.573	0.11	22.6	8.21
	4-S	50	0 26	5 66	0 16	74 53	0 14	5 20	0 40	11.02	0 07	32 407	0 09	22.7	8 20
	4-D	50	0 10	0 73	0.13	9 03	0.17	4 99	0.27	5 85	0 08	34 662	0.11	22 6	8 20
	5-S	100	0.11	0 44	0.16	6 96	0.19	6 20	0.30	6 80	0.12	34.738	0 09	22 6	8 21
	5-D	100	0 10	0 19	0 13	4 52	0 16	5 26	0.26	5 58	0 08	34 806	0.10	22 6	8.20
	6-S	250	0.13	0 22	0 20	3 01	0 20	5.70	0.33	6.12	0.11	34 869	0.11	23 4	8 20
	6-D	250	0.11	0 16	0.18	3 01	0.18	4 97	0 29	5 31	0 08	34 864	0.10	23 3	8 20
HAPUNA-2-	1-S	1	0 24	2 97	0 22	30 49	0.15	5 38	0.39	8 57	0 11	34 066	0.15	22 5	8.21
	2-S	5	0 20	1.50	0 20	17.50	0.16	6 05	0 36	7.75	0 09	34.396	0 05	22.5	8.21
	3-S	10	0 16	0 95	0 36	11.48	0 15	6 31	0 31	7.62	0.12	34 599	0 10	22.7	8 21
	3-D	10	0 11	0 82	0.16	10 92	0 16	5 28	0 27	6.26	0.10	34.585	0 10	22 6	8 21
	4-S	50	0 13	0 38	0 25	4 89	0.17	6 85	0 30	7.48	0 06	34 804	0.10	22.7	8 21
	4-D	50	0 13	0 38	0 20	5 27	0.17	5 68	0 30	6 26	0 06	34.799	0 10	22 6	8.21
	5-S	100	0 11	0 33	0 25	4 33	0 18	5 68	0 29	6 26	0 06	34 825	0.11	22 6	8 21
	5-D	100	0 17	0 33	0 18	4 52	0 16	5 20	0 33	5.71	0 07	34 832	0.12	22 6	8 21
	6-S	250	0 13	0 30	0 27	3 95	0 14	5 28	0 27	5 85	0 06	34 848	0.10	23 4	8.21
	6-D	250	0.11	0 27	0 16	4.14	0 19	5 56	0 30	5 99	0 05	34 855	0 07	23 3	8 20
HAPUNA-3-	Spring	0 1	2 07	83 32	0 04	835 90	0.03	5 48	2.10	88 84	0 08	1.572	0 09	24 3	7.94
	1-S	1	0 31	15 17	0 04	159 25	0 08	2 59	0 39	17 80	0 15	29 018	0 27	22 5	8 24
	2-S	5	0 29	11.86	0 04	123 57	0 12	3 83	0 41	15 73	0 15	30 357	0 20	22 5	8 24
	3-S	10	0 25	9 08	0 06	97 28	0 16	3 69	0 41	12 83	0 26	31.417	0 19	22 7	8 24
	3-D	10	0 17	2.79	0 11	30 24	0 15	4 14	0 32	7.04	0 18	33 892	0 19	22 6	8 22
	4-S	100	0 17	3 17	0 06	35 87	0 15	4 08	0 32	7.31	0.10	33.723	0 19	22 7	8 23
	4-D	100	0 14	1.16	0 06	12 39	0 17	4 57	0 31	5 79	0 07	34 534	0 16	22 6	8.23
	5-S	200	0 14	1.05	0 04	11 83	0 14	4 70	0 28	5 79	0 07	34 561	0 11	22 6	8 22
	5-D	200	0 15	0 91	0 04	9 58	0 16	4 57	0 31	5 52	0 06	34 647	0 16	22 6	8.22
	6-S	250	0 11	0 69	0 06	7 70	0 17	5 18	0 28	5 93	0 08	34 719	0 12	23 4	8 23
	6-D	250	0 13	0 50	0 04	6 76	0 18	4 70	0 31	5 24	0 06	34 730	0 11	23 3	8 23
HAPUNA-4-	Tide Pool	0 1	1 13	52 28	1 90	561 15	0 07	5 14	1 20	59 32	0 13	12 859	0 72	23 0	8 41
	1-S	1	0 24	7.73	0 49	90 71	0 12	5 57	0 36	13 78	0 12	31.920	0 16	22 6	8 23
	2-S	3	0 25	7 86	0 11	86 95	0 16	3 89	0 41	11 86	0 09	31 934	0 05	22 6	8 23
	3-S	5	0 25	7 86	0 11	83 20	0 10	3 48	0 35	11 45	0 11	31 973	0 13	22 5	8 23
	3-D	5	0 17	1 85	0 19	22 35	0 14	3 89	0 31	5 93	0 10	34 238	0 07	22 4	8 23
	4-S	10	0 15	1.19	0 36	14 65	0 14	4 11	0 29	5 66	0 11	34 501	0 12	22 5	8 23
	4-D	10	0 15	0 61	0 11	7 70	0 14	3 97	0 29	4 69	0 10	34 721	0 15	22 5	8 22
	5-S	50	0 17	1.57	0 11	19 91	0 11	3 42	0 28	5 10	0 08	34 318	0 14	22 6	8 23
	5-D	50	0 15	0 69	0 09	8 08	0 16	3 63	0 31	4 41	0 06	34 699	0 17	22 5	8 22
	6-S	100	0 15	0 91	0 11	11 64	0 16	5 33	0 31	6 35	0 08	34 579	0 13	22 9	8 23
	6-D	100	0 15	0 74	0 09	8 45	0 13	5 38	0 28	6 21	0 08	34 882	0 10	23 0	8 22
	7-S	250	0 15	0 66	0 09	6 76	0 14	5 46	0 29	6 21	0 07	34 739	0 11	23 1	8 22
	7-D	250	0 17	0 61	0 11	6 76	0 14	5 76	0 31	6 48	0 06	34 743	0 10	23 1	8 22
HAPUNA-5-	Drain Pipe	0 1	1 82	80 23	0 06	826 51	0 03	4 77	1 85	85 06	0 14	2 401	0 03	23 0	7 74
	1-S	1	0 25	3 86	0 24	50 33	0 11	5 14	0 36	9 24	0 11	33.404	0 16	22 5	8 18
	2-S	3	0 22	2.73	0 21	35 87	0 14	5 47	0 36	8 41	0 10	33 805	0 14	22 6	8.18
	3-S	10	0 21	1.55	0 26	21 97	0 11	5 78	0 32	7 59	0 10	34 244	0 12	22 6	8 17
	3-D	10	0 17	0 86	0 21	13 33	0 15	6 79	0 32	7 86	0 09	34 508	0 17	22 6	8 16
	4-S	50	0 18	1.49	0 15	17 65	0 14	5 95	0 32	7 59	0 08	34 361	0 08	22 6	8 20
	4-D	50	0 17	1.52	0 19	18 71	0 12	6 43	0 29	8 14	0 07	34 390	0 02	22 7	8 20
	5-S	100	0 18	1.71	0 13	21 22	0 13	5 47	0 31	7 31	0 08	34 237	0 07	23 1	8 22
	5-D	100	0 18	1.19	0 09	12 96	0 11	5 76	0 29	7 04	0 07	34 572	0 09	23 2	8 21
	6-S	200	0 17	0 77	0 09	7 89	0 12	5 62	0 29	6 48	0 11	34 733	0 11	23 6	8 20
	6-D	200	0 17	0 63	0 09	6 76	0 12	5 76	0 29	6 48	0 07	34 730	0 07	23 6	8 20
WELL			2.75	87.46	0 06	842 85	0 02	4.77	2.77	92.29	3.40	0 278			
DOH WATER QUAL. STDS.															
NOT TO EXCEED 10%				1.00	0 61				1.29	17.85	1.25		0 90		
NOT TO EXCEED 2%				1.78	1.07				1.93	25.00	2.00		1.75		

TABLE 2. Marine macroinvertebrate occurrence at Survey stations in the vicinity of the Hapuna Beach Recreation Area. For station locations, see Figure 1.

Abundance code:
"R" = rare (0 – 5 individuals or colonies sited on station)
"O" = occasional (5 – 20 individuals or colonies sited on station)
"C" = common (more than 20 individuals or colonies sited on station)

	TRANSECT								
	I	I	I	II	II	II	III	III	III
	8'	15'	50'	10'	20'	60'	5'	30'	55'
SCLERACTINIA									
(Reef-Building Corals)									
Porites lobata	C	C	C	C	C	C	C	C	C
Porites compressa	R	C	C	O	C	C		C	C
Porites brighami		R			R				
Porites canvexa	R			O					
Pocillopora meandrina	C	C	R	C	C	R	C	C	R
Pocillopora eydouxi		R			O			R	
Montipora verrucosa	C	C	C	C	C	C	C	C	C
Montipora patula	C	C	C	C	C	C	C	C	C
Leptastrea purpurea	O	C		O	C		O	C	
Cyphastra ocellina	O	R		O	R		R	R	
Pavona varians	O	C	O	C	C	O	C	C	O
Pavona duerdoni		R		R	R		R	R	
Fungia scutaria		R		R	R			R	
ZOANTHINIARIA									
(Colonial "soft" corals)									
Palythoa tuberculosa	O	C		O	O		O	C	
ALCYONACEA									
(Colonial "soft" corals)									
Anthelia edmondsoni			R			R			R
HOLOTHUROIDEA									
(Sea Cucumbers)									
Actinopyga obesa		R							
Holothuria atra	R	C	R	R	O		R	R	
Holothuria nobilis	O	O	R	O	C	R	C	R	R
ECHINOIDEA									
(Sea Urchins)									
Diadema paucispinum		O	O		O	R	O	O	
Echinothrix diadema	R	C	R	R	C	R	O	C	R
Echinothrix calamaris		R	R	R	R			R	
Tripneustes gratilla	C	C	O	C	C	R	C	C	R
Echinometra mathaei	C	C	C	C	C	O	C	C	R
Echinometra oblonga	C	O		O			C	C	
Echinostrephus aciculatus	C	R	R	C	R		C	R	
Heterocentrotus mammillatus	C	C	C	C	C	R	C	C	O
ASTEROIDEA									
(Starfish)									
Linckia multifora		R			R				
Linckia diplax									
Acanthaster planci	R				R				
PORIFERA									
Iotrocha protea				R	C		O	R	
misc. sponges	C	C	O	C	C	O	C	C	O

TABLE 3. Coral species percent cover, non-coral substrata cover, and coral community parameter for transects off the Hapuna Beach area.
For transect station locations, see Figure 1.

	TRANSECT								
CORAL SPECIES	I 8'	I 15'	I 50'	II 10'	II 20'	II 60'	III 5'	III 30'	III 55'
Porites lobata	10.0	29.2	11.8	8.5	30.7	5.1	8.3	27.9	4.3
Porites compressa		7.0	62.1		12.0	65.2	6.9	29.0	78.3
Pocillopora meandrina	3.4	4.1	0.4	3.7	3.0		2.8	4.0	
Montipora patula	1.1	1.4		1.6	2.9		0.9	2.6	
Montipora verrucosa	0.2	0.5		1.4	2.5		0.2	1.0	0.6
Pavona varians	0.9	0.9	0.5	0.5	0.6	0.6	2.3	1.6	0.6
Leptastrea purpurea	0.5	0.4		0.3	0.5		0.3	0.4	
Pavona duerdoni		0.2		0.2	0.3				
Palythoa tuberculosa		0.2		0.3	0.2		0.7	0.8	
TOTAL CORAL COVER	16.1	43.9	74.8	16.5	52.7	70.9	22.4	67.3	83.8
NUMBER OF SPECIES	6	9	4	8	9	3	8	8	4
CORAL COVER DIVERSITY	1.31	1.12	0.51	1.42	1.26	0.31	1.56	1.25	0.25
NON-CORAL SUBSTRATA									
Limestone	44.8	37.3	16.2	67.5	26.5	2.5	57.6	5.0	10.2
Sand	2.5	1.3	6.5	3.6	11.6		6.4	4.7	
Basalt	35.0	6.5							
Rubble	1.6	11.0	2.5	13.0	9.2	26.6	14.0	23.0	6.0

TABLE 4. Reef fish abundance off the Hapuna Beach Recreational area.
For transect station locations, see Figure 1.

FAMILY	TRANSECT								
Species	I 8'	I 15'	I 50'	II 10'	II 20'	II 60'	III 5'	III 30'	III 55'
MURAENIDAE									
Gymnothorax meleagris					1				
AULOSTOMIDAE									
Aulostomus chinensis			1		1			1	1
KYPHOSIDAE									
Kyphosus bigibbus	17						6		
CIRRHITIDAE									
Cirrhitops fasciatus					1				
Cirrhitus pinnulatus	1						1		
Paracirrhites arcatus			2		2	2	2	2	3
P. forsteri			1		1				1
MULLIDAE									
Mulloides flavolineatus	100			4	12	12	12		25
M. vanicolensis									
Parupeneus multifasciatus	7	8	5	8	7	7	17	9	8
P. bifasciatus								2	
SERRANIDAE									
Cephalopholis argus			1	1	1			2	1
LUTJANIDAE									
Lutjanus kasmira			20						8
L. fulvus							1		
Aphareus furcatus	1								
LETHRINIDAE									
Monotaxis grandoculis							5		
CHAETODONTIDAE									
Chaetodon lunula	2			2	2			2	
C. quadrimaculatus		1							
C. miliaris					2			2	
C. ornatissimus	2	3	2	2	2	2	3	2	
C. unimaculatus				2					
C. multicinctus	5	4	9	5	8	4	7	9	8

TABLE 4. continued

FAMILY / Species	TRANSECT I 8'	I 15'	I 50'	II 10'	II 20'	II 60'	III 5'	III 30'	III 55'
CHAETODONTIDAE									
C. fremblii									1
C. trifasciatus				2	2		2		
C. auriga							2		
Forcipiger flavissimus	1	4	5		4	2		5	3
POMACANTHIDAE									
Centropyge potteri			2			4			
POMACENTRIDAE									
Abudefduf abdominalis	18	26			6				12
A. sordidus				2					
Plectro. johnstonianus		2						1	
P. imparipennis				4	2		2		
Stegastes fasciolatus	2			6			6		
Dascyllus albisella			4					44	
Chromis agilis			37			25			45
C. hanui						3			12
C. vanderbilti	35	25		17	12		27	12	
LABRIDAE									
Cheilinus unifasciatus			1					1	1
C. bimaculatus						2			2
Pseudocheilinus octotaenia			2						
P. tetrataenia						1			
Bodianus bilunulatus		1	1		1				
Coris galmard					2		2	1	
Thalassoma duperrey	12	8	6	13	12	4	12	8	7
T. trilobatum	2								
Gomphosus varius		2		3	2		4		2
Labroides phthirophagus		1	1		2	1	1		
Macropharyngodon geoffroy						1			
Stethojulis balteata	3								
Halichoeres ornatissimus		1		1			1		
SCARIDAE									
Scarus sordidus	6	15	3	8	7	3	28	28	2
S. perspicillatus		2							
S. psittacus		1				1			
S. rubroviolaceus	2			3	28				1
juvenile Scarus	14	8	10	12	12		15	12	

TABLE 4. continued

FAMILY / Species	TRANSECT I 8'	I 15'	I 50'	II 10'	II 20'	II 60'	III 5'	III 30'	III 55'
ACANTHURIDAE									
Zebrasoma flavescens	12	13	32		16	22	2	32	26
Z. veliferum	2			2			2		
Acanthurus achilles			4		3	2	2	6	
A. triostegus				28			15		
A. leucopareius	30			24					
A. olivaceus			3	12	38		3		
A. dussumieri		1							
A. blochii					9		3	5	
A. nigrofuscus	43	27	14	33	27	8	47	33	17
Ctenochaetus strigosus	23	32	38	11	23	36	21	44	42
Naso lituratus	5	3	7	8	21	8		8	12
N. unicornis	1				2				
ZANCLIDAE									
Zanclus cornutus	2	2	4		2	2	2	2	
MONOCANTHIDAE									
Pervagor spilosoma							1		
P. aspricaudus		1				1			
BALISTIDAE									
Rhinecanthus rectangulus	1			2			1		
Sufflamen bursa		2	3		4	3		6	4
Melichthys vidua		6						7	
M. niger			7		12	12			11
OSTRACIONTIDAE									
Ostracion meleagris				1					
TETRADONTIDAE									
Canthigaster jactator	2		2		1	3	1	1	1
NUMBER SPECIES	28	26	29	27	37	27	32	28	26
NUMBER INDIVIDUALS	351	199	227	216	290	176	251	287	256
SPECIES DIVERSITY	2.52	2.65	2.73	2.83	3.06	2.72	2.81	2.71	2.68

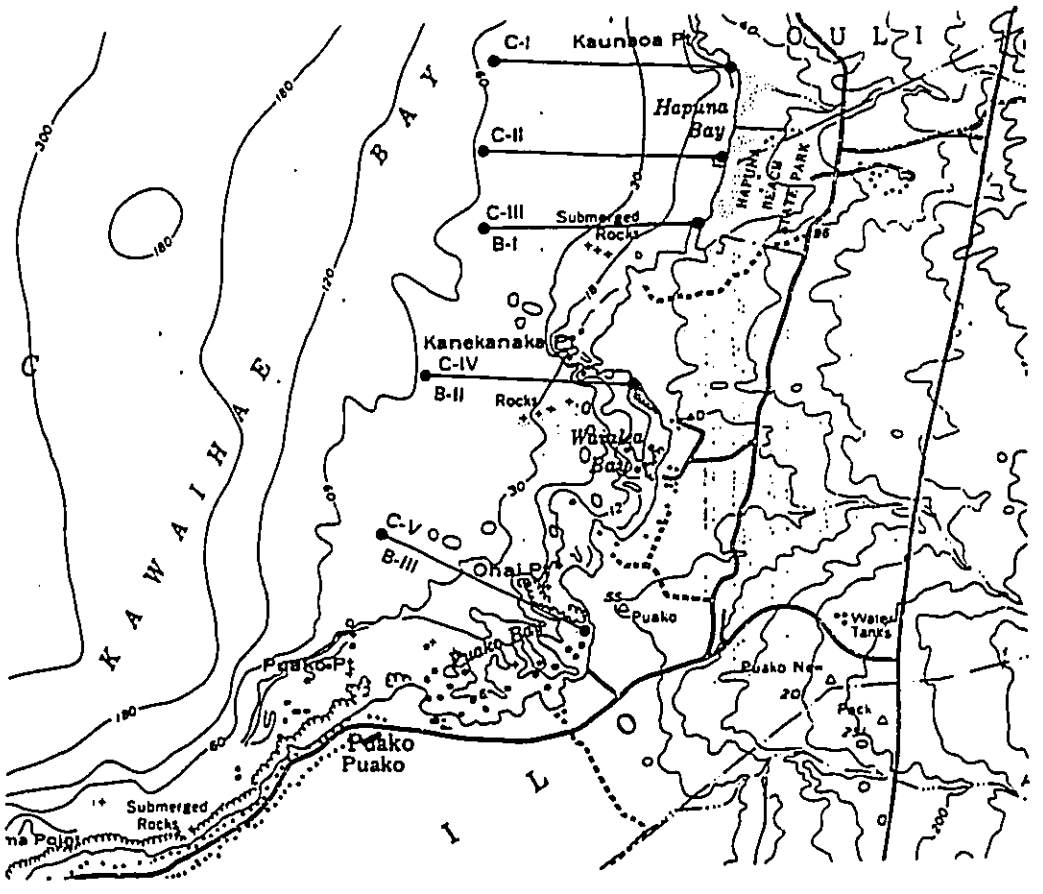


FIGURE 1. Chart showing location of Hapuna Beach, and the shoreline fronting the proposed expanded Recreational Area between Hapuna Bay and Puako Bay. Also shown are locations of water chemistry sampling transects (C-I through C-V) and biological sampling transects (B-I through B-III). Note the considerable distance between depth contours off the subject area relative to the area south of Puako.

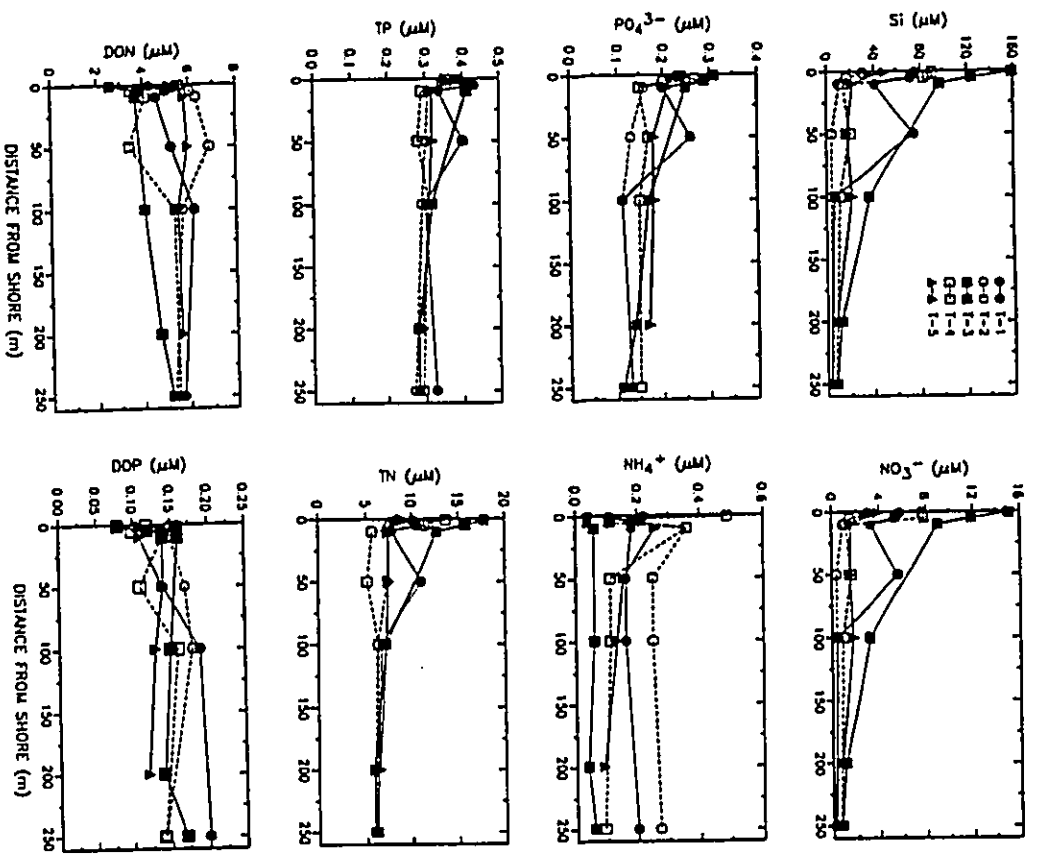


FIGURE 2. Plots of surface water dissolved nutrient concentrations as functions of distance from the shoreline off the Hapuna Beach Recreational site. Location of sampling transects T-1 through T-5 are shown in Figure 1.

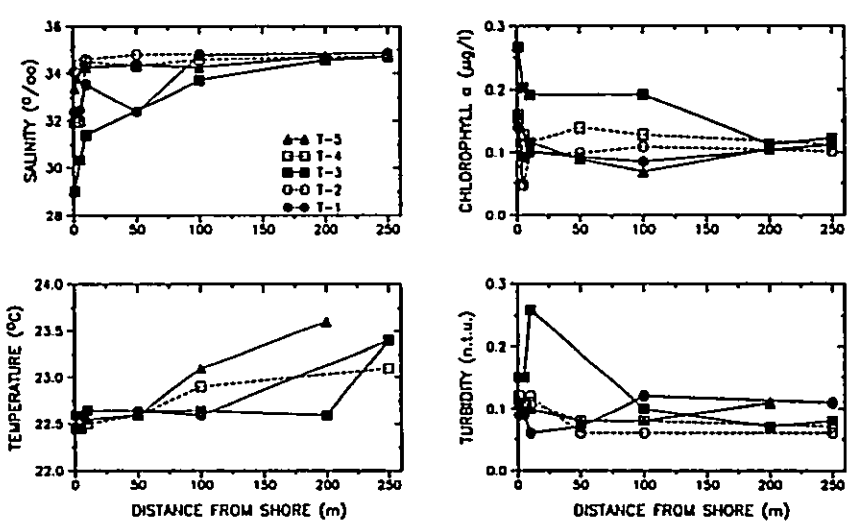


FIGURE 3. Plots of surface water chemistry constituents as functions of distance from the shoreline off the Hapuna Beach Recreational site. Location of sampling transects T-1 through T-5 are shown in Figure 1.

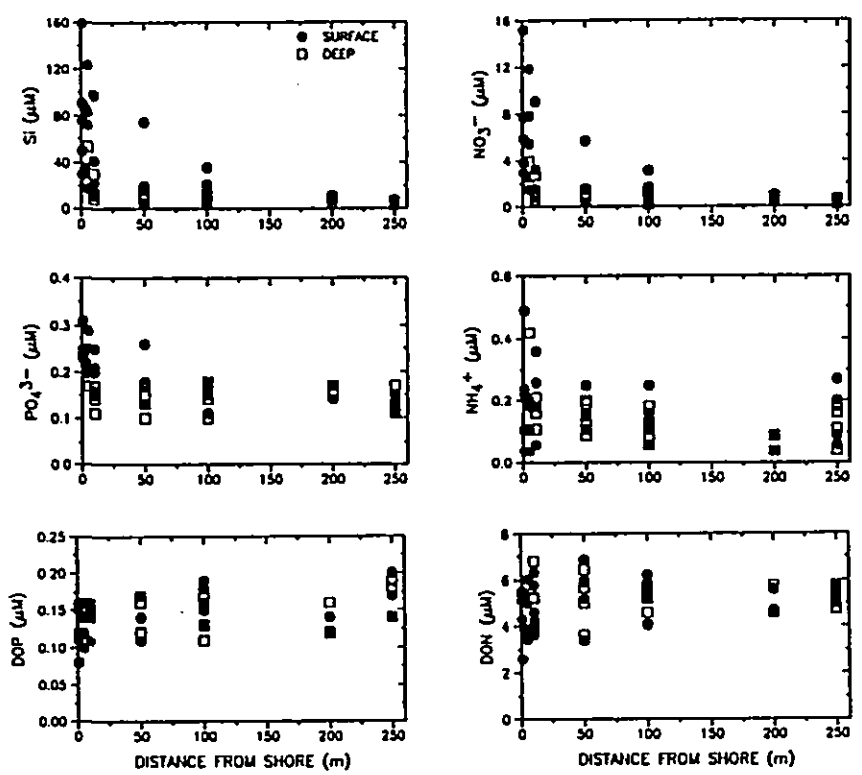


FIGURE 4. Plots of surface and deep dissolved nutrient concentrations of all samples as functions of distance from shore off the Hapuna Beach sampling sites shown in Figure 1.

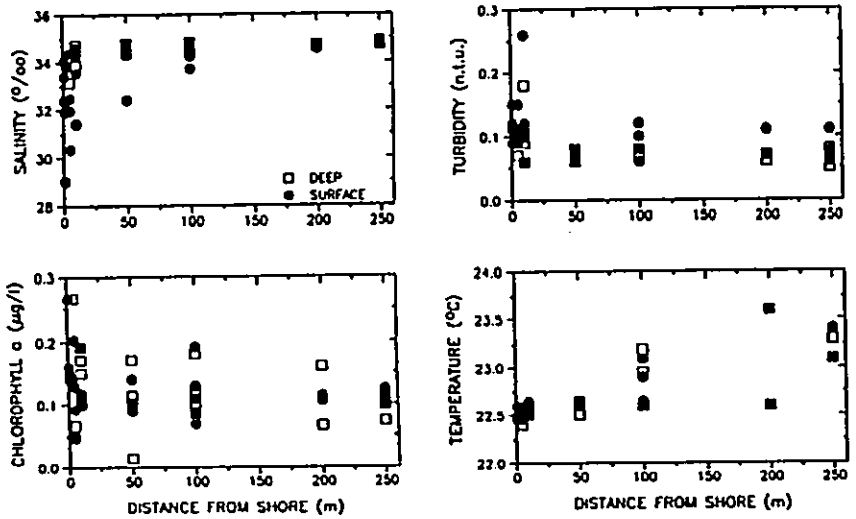


FIGURE 5. Plots of surface and deep water chemistry constituents of all samples as functions of distance from shore off the Hapuna Beach sampling sites shown in Figure 1.

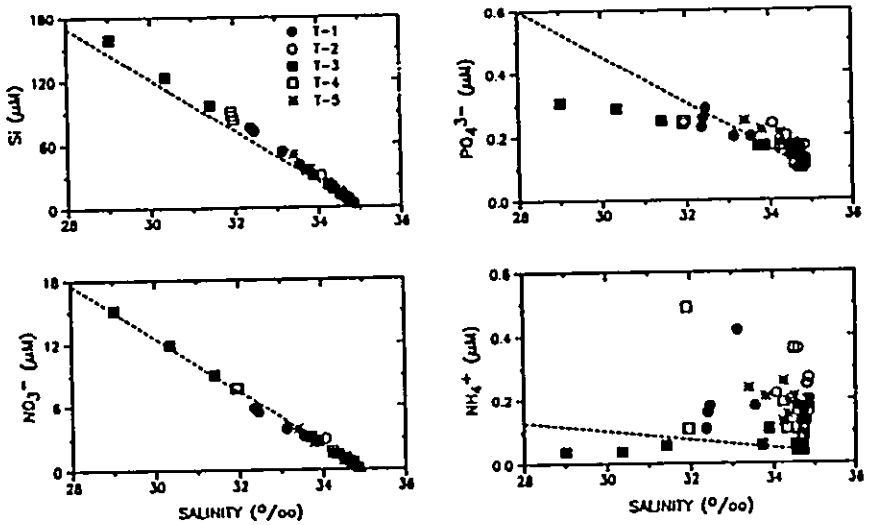


FIGURE 6. Plots of dissolved Si, PO_4^{3-}, NO_3^-, and NH_4^+ as functions of salinity. Dashed line is conservative mixing line constructed by connecting nutrient concentrations from groundwater (salinity = 0), and open ocean water (salinity = 35 ppt).

APPENDIX A

Coral Transect Data

REEF CORAL TRANSECT DATA SHEET
(PERCENT COVER)

TRANSECT SITE: HAPUNA
TRANSECT ID #: 1-8'
DATE: 04/08/91

MEAN CORA COVER 16.1 %
STD. DEV. 5.6
SPECIES COUNT 6
SPECIES DIVERSITY 1.131

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	12	12	4	8	12	22	4	8	2	16	100
Pocillopora meandrina	3	2	3	11	7		3	3	1	1	34
Montipora verrucosa	1		1								2
Montipora patula	1	1	1	1	1	1	1	1	2	1	11
Pavona varians	1	1		2	1		1	1	2		9
Leptastra purpurea		1	1		1	1		1			5
QUADRAT TOTAL	18	17	10	22	22	24	9	14	7	18	161

TRANSECT SITE: HAPUNA
TRANSECT ID #: 1-15'
DATE: 04/08/91

MEAN CORA COVER 43.9 %
STD. DEV. 22.2
SPECIES COUNT 9
SPECIES DIVERSITY 1.117

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	23	44	2	13	64	42	12	8	63	21	292
Porites compressa	2	13	6	8	11	2		8	9	11	70
Pocillopora meandrina	3	3	4	12	2	6	7	3	1		41
Montipora verrucosa	2				1		1	1			5
Montipora patula	1	1	2	1	1	3	2		2	1	14
Pavona duerdeni			1		1						2
Pavona varians	1	1		2	1		1	1	2		9
Leptastra purpurea		1	1	1				1			4
Palythoa tuberculosa		1					1				2
QUADRAT TOTAL	32	64	16	37	81	53	24	22	77	33	439

TRANSECT SITE: HAPUNA
TRANSECT ID #: 1-50'
DATE: 04/08/91

MEAN CORA COVER 74.8 %
STD. DEV. 15.4
SPECIES COUNT 4
SPECIES DIVERSITY 0.507

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	12	3	11	8	11	2	31	2	26	12	118
Porites compressa	36	67	64	56	82	59	29	81	74	73	621
Pocillopora meandrina	1			2						1	4
Pavona varians		1			1	1	1		1		5
QUADRAT TOTAL	49	71	75	66	94	62	61	83	101	86	748

REEF CORAL TRANSECT DATA SHEET
(PERCENT COVER)

TRANSECT SITE: HAPUNA
TRANSECT ID #: 2-10'
DATE: 04/08/91

MEAN CORA COVER 16.5 %
STD. DEV. 5.0
SPECIES COUNT 8
SPECIES DIVERSITY 1.417

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	12	3	14	7	9	11	10	3	5	11	85
Pocillopora meandrina	2	4	5	1	3	10	3	3	1	5	37
Montipora verrucosa		1	2	1	4		1	1	3	1	14
Montipora patula	3	1	1	1	1	3	2	1	2	1	16
Pavona duerdeni		1			1						2
Pavona varians	1		1		1		1	1			5
Leptastra purpurea		1	1					1			3
Palythoa tuberculosa		1		1			1				3
QUADRAT TOTAL	18	12	24	11	19	24	18	10	11	18	165

TRANSECT SITE: HAPUNA
TRANSECT ID #: 2-20'
DATE: 04/08/91

MEAN CORA COVER 52.7 %
STD. DEV. 18.7
SPECIES COUNT 9
SPECIES DIVERSITY 1.264

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	44	21	19	13	54	45	24	9	47	31	307
Porites compressa	34	12	8	9	12	5	7	12	4	17	120
Pocillopora meandrina	3	4	2	8			3	5	1	4	30
Montipora verrucosa	2	4	3		7		5	1	3		25
Montipora patula	5	3	1	2	7	3	4	1	2	1	29
Pavona duerdeni	1		1		1						3
Pavona varians	1	1	1		1		1	1			6
Leptastra purpurea		1	1	2				1			5
Palythoa tuberculosa			1				1				2
QUADRAT TOTAL	90	46	37	34	82	53	45	30	57	53	527

TRANSECT SITE: HAPUNA
TRANSECT ID #: 2-60'
DATE: 04/08/91

MEAN CORA COVER 70.9 %
STD. DEV. 15.3
SPECIES COUNT 3
SPECIES DIVERSITY 0.306

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	6	4	9	1		11	3		5	12	51
Porites compressa	65	45	76	38	86	75	59	67	69	72	652
Pavona varians	1	1		1	1		1		1		6
QUADRAT TOTAL	72	50	85	40	87	86	63	67	75	84	709

REEF CORAL TRANSECT DATA SHEET
(PERCENT COVER)

TRANSECT SITE: HAPUNA
TRANSECT ID #: 3-5'
DATE: 04/08/91

MEAN CORA COVER 22.4 %
STD. DEV. 10.1
SPECIES COUNT 8
SPECIES DIVERSITY 1.561

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	3	5	6	12	9	11	2	10	16	9	83
Porites compressa	2	13	5	6	2	9		1	22	9	69
Pocillopora meandrina	3	3				6		8	2	6	28
Montipora verrucosa			1				1				2
Montipora patula	1	2	1		1		1	2		1	9
Pavona varians	3	2	1	4	3	2	1	1	2	4	23
Leptastra purpurea		1		1				1			3
Palythoa tuberculosa	1	1			1	1	1		1	1	7
QUADRAT TOTAL	13	27	14	23	16	29	6	23	43	30	224

TRANSECT SITE: HAPUNA
TRANSECT ID #: 3-30'
DATE: 04/08/91

MEAN CORA COVER 67.3 %
STD. DEV. 20.2
SPECIES COUNT 8
SPECIES DIVERSITY 1.255

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	22	34	14	34	52	13	33	27	29	21	279
Porites compressa	17	53	22	12	45	43	9	14	43	32	290
Pocillopora meandrina	1	3	3	6	8	2		10	1	6	40
Montipora verrucosa	2	1	1	2	1	1	1	1			10
Montipora patula	3	1	1	1	2	2	4	7	3	2	26
Pavona varians	1	1	1	1	1	2	1	3	2	3	16
Leptastra purpurea		1	1	1				1			4
Palythoa tuberculosa	1	1		2		1	1		1	1	8
QUADRAT TOTAL	47	95	43	59	109	64	49	63	79	65	673

TRANSECT SITE: HAPUNA
TRANSECT ID #: 3-55'
DATE: 04/08/91

MEAN CORA COVER 83.8 %
STD. DEV. 6.5
SPECIES COUNT 3
SPECIES DIVERSITY 0.245

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	2	3	1	8	5	2	4	5	2	11	43
Porites compressa	68	67	87	80	81	81	79	80	87	73	783
Pavona variana	1	1			1	1	1		1		6
Montipora verrucosa	1		1	1			1		1	1	
QUADRAT TOTAL	72	71	89	89	87	84	85	85	91	85	832

APPENDIX E

Assessment of the Environmental Impact of Fertilizers and Pesticides on the Proposed Golf Course of the Hapuna Beach State Recreation Area Expansion, South Kohala, Hawaii

ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF FERTILIZERS AND PESTICIDES

ON THE PROPOSED

GOLF COURSE OF THE HAPUNA BEACH STATE RECREATION AREA EXPANSION, SOUTH KOHALA, HAWAII

A REPORT TO

Harrison Associates

May 28, 1991

PREPARED BY

Charles L. Murdoch, Ph. D

Richard E. Green, Ph. D.

I. INTRODUCTION

The proposed Hapuna Beach State Recreation Area Expansion, South Kohala, will include an 18-hole golf course to the east (mauka) of Queen Kaahumanu Highway. The proposed golf course area is presently undeveloped and is covered with a variety of grass, brush, and tree species. Thus the land is not presently treated with pesticides or fertilizer. The 18-hole golf course will require application of fertilizers to supply essential nutrients to turfgrasses and ornamental plants, and pesticides to control their associated weed, disease and insect pests. The term pesticide, used in its generic sense in this report, includes herbicides, fungicides and insecticides. The assessment provided in the report focuses principally on the potential for applied chemicals to move in surface runoff to streams and subsequently to shoreline waters, and also will address movement of chemicals to groundwater. Additionally, the potential for pesticide transport in the air and potential for negative impact on birds in the area are addressed briefly in the appendices. The toxicity and environmental behavior of pesticides which are likely to be used are considered in the analysis, as are soil, topographic and climatic factors which may impact on fertilizer and pesticide movement.

II. APPROACH

Key elements of the analysis are (1) calculation of quantities of applied chemicals (pesticides and fertilizer nutrients) which are likely to be used throughout the year, (2) compilation of soil, geologic and climatic information which will aid in the assessment of chemical movement, (3) estimation of water balance from rainfall, irrigation and evapotranspiration, (4) compilation of pesticide properties which may be of environmental significance, and (5) computation of the Attenuation Factor for pesticides used on golf courses, using properties of the chemicals and soil properties, in order to estimate the likelihood of chemical movement to groundwater.

A preliminary recreational activity planning map with project boundaries and an aerial photograph copy were provided by Harrison Associates. We visited the site in April , 1991.

III. ANALYSIS OF FACTORS IMPACTING ON CHEMICAL MOVEMENT

A. Site Factors

1. Topography, geology and soils

The project site is located in the South Kohala District of the island of Hawaii, south and east of the present Hapuna Beach State Park. A variety of recreational activities are envisioned for various portions of the Park Extension. The golf course is planned to occupy an area 1900 feet wide east of Queen Kaahumanu Highway at the north end and the intersection of Puako Road and Queen Kaahumanu Highway at the south end. The area for the golf course will be about 200 acres; the entire Park Extension, including the golf course, will be about 800 acres. Thus the golf course constitutes about 25% of the development and is located in the mauka portion.

The mauka boundary of the golf course is at about 280 feet elevation, while the makai boundary (adjacent to Queen Kaahumanu Highway) ranges from about 200 feet at the north end to about 140 feet elevation near the stream channel about 2000 feet north of the south boundary of the property. The average slope toward the coast is about 5%. Two stream channels which originate in the watershed mauka of the planned golf course dissect the golf course area and extend to the coastline. The first, near the north end of the golf course, terminates in Hapuna Bay on Mauna Kea Properties land. The second, near the south end of the golf course, terminates near the center of Wailea Bay. Both of these streams (unnamed) are intermittent, carrying water mainly during the rainy season. A variety of other smaller intermittent streams also reach the coastline.

Only one soil is mapped on the site: Kawaihae extremely stony very fine sandy loam, with slopes of 6 to 12 percent (Sato, et al., 1973). The depth to pahoehoe bedrock ranges from 20 to 40 inches. This soil is classified in the subgroup Ustollic Camborthids, in the Order Aridisols, indicating the influence of the arid climate on development of this ash-derived soil. According to Sato et al. (1973), the permeability of the Kawaihae soil is moderate, runoff is medium, and the erosion hazard is moderate. The organic carbon content is relatively low, normally less than 1%, with about 0.5% throughout the soil profile. Thus erosion of the topsoil may not result in much change in the organic carbon content at the soil surface. The pH is near 7.0 (neutral) and the base saturation is high (75 to 100%). This soil can sustain excellent turf growth when adequate nutrients and water are supplied.

2. Rainfall, evapotranspiration and potential recharge

The Hapuna Beach Golf Course is located in the most arid area of the state of Hawaii. Total annual rainfall at the nearest rainfall station (Kawaihae) averages only approximately 9 inches. Mean monthly rainfall varies from approximately 2 inches in January to approximately 0.25 inch in July. Mean monthly rainfall amounts are given in Figure 1. There is no pan evaporation station in the area. Ekern and Chang (1985) gave estimated mean annual pan evaporation of 90 to 100 inches for the area. There is, therefore, an annual evaporation deficit of 80 to 90 inches. Evaporation greatly exceeds rainfall throughout the year. Thus, with careful irrigation, there will be little net recharge of groundwater.

It is of interest that rainfall mauka of the proposed Hapuna Beach Golf Course is much greater than that at the golf course site itself (Appendix Figure A-1). Pan evaporation drops rapidly mauka of the golf course site (Appendix Figure A-2). Since streams which drain the golf course have a much larger drainage area mauka of the golf course and rainfall is greater and evaporation less in this area, stream

flow to the shoreline comes primarily from undeveloped areas mauka of the golf course.

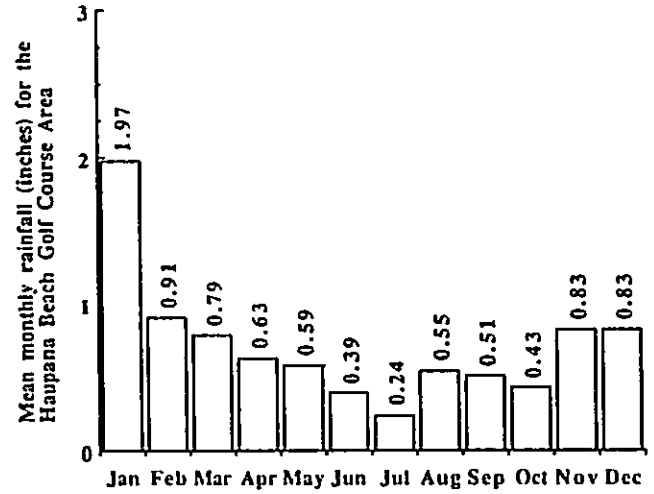


Figure 1. Mean monthly rainfall for the Hapuna Beach Golf Course area derived from Giambelluca et al., 1986.

3. Groundwater

The groundwater aquifer beneath the area has not been well characterized. The area is associated with the Waimea Aquifer System of the West Mauna Kea Aquifer Sector (Yuen et al., 1990). The basal aquifer in the Hamakua formation is thought to contain brackish groundwater over a distance of four to five miles inland from the coast. Two wells on the nearby Mauna Kea Resort pump brackish water (Belt Collins & Associates, 1987).

B. Management Factors

1. Fertilizers

Fertilizers are applied to golf courses to supply those essential nutrients which are used in large amounts and which are deficient in most soils. In typical soils, the elements which are normally applied in a turfgrass fertilization program are nitrogen (N), phosphorus (P), and potassium (K). Fertilizers are normally applied to only the greens, tees, fairways, and part of the roughs of a golf course. Typical areas in each of these types of turf for a 18-hole golf course are estimated in the discussion below.

Turfgrasses use much more N than other elements. Based on turfgrass clipping composition, it has been shown that the turfgrasses grown in Hawaii use about twice as much N as K and about 4 times as much N as P.

The primary fertilizer elements of concern for contamination of ground and surface waters are nitrogen and phosphorus. Phosphorus is attached very tightly to soil clays and moves little if any from the site of application. Phosphorus, therefore will not cause any problem with contamination of drainage water. Ammonium nitrogen (NH_4) likewise moves little in soils. Nitrogen applied in the ammonium form, however, is rapidly converted to the nitrate form (NO_3) which is not bound to the soil and moves readily with water. Because of high nitrogen use rates by turfgrasses, however, nitrogen will be used rapidly after application. Only under conditions where rainfall occurs soon after application of a soluble nitrogen source would there be excessive loss by surface runoff or by leaching below the root zone. Thus nitrogen movement can be mitigated by applying a slow-release nitrogen fertilizer in which the nitrogen is in an insoluble form when applied (Brown, et al., 1977) or by applying small amounts of soluble N through the irrigation system and irrigating only to replace soil moisture used by evapotranspiration (Snyder, et al., 1984).

Fertilizer use rates for the different golf course areas are shown in Table 1. Complete fertilizers (ones containing N, P, and K) are usually applied. Because nitrogen is applied in larger quantities and also because it is the only fertilizer element likely to cause contamination of ground or surface waters, only nitrogen application rates are given.

Table 1. Approximate fertilizer use for an 18-hole golf course in Hawaii.

Type of turf	Area (acres)	Fertilizer amount (lb N/1000 sq ft)	Application frequency	Total annual application (tons N)
Greens	3	0.5	2 weeks	0.85
Tees	3	1.0	3 weeks	1.15
Fairways	50	1.5	8 weeks	10.00
Roughs	30	1.0	3 months	2.60
Total	86			14.60

2. Pesticides

There are a number of weed, insect and disease pests of turfgrasses in Hawaii which sometimes require application of chemical pesticides. Pesticides are normally applied only in response to outbreaks of pests. There are few instances in which pesticides other than herbicides are applied in a regularly scheduled, preventative program. A typical pesticide program for golf courses in Hawaii is given in Table 2 below. There are several chemicals which may be substituted for certain ones in this suggested program. Properties of the chemicals listed in Table 2, as well as those of most chemicals used in turf in Hawaii, are given in Appendix A, Table A-1.

Table 2. Approximate pesticide use for an 18-hole golf course in Hawaii.

Turfgrass area	Area (acres)	Chemical	Frequency	Rate/application	Annual total
I. Herbicides					
A. Greens	3	MSMA	6 times/year	2 lb., ai/acre	36 lb. ai
		bensulide	2 times/year	12 lb ai/acre	72 lb. ai
B. Tees	3	MSMA	6 times/year	2 lb. ai./acre	36 lb. ai
		Trimec®	3 times/year	1 pint/acre	9 pints
		bensulide	2 times/year	12 lb. ai./acre	72 lb. ai
C. Fairways	50	MSMA	6 times/year	2 lb. ai./acre	600 lb. ai
		Trimec®	3 times/year	1 pint/acre	19 gallons
		metribuzin	2 times/year	0.75 lb. ai./acre	75 lb. ai.
D. Roughs	36	MSMA	2 times/year	2 lb. ai./acre	144 lb. ai
		metribuzin	1 time/year	0.5 lb. ai./acre	18 lb. ai.
II. Insecticides					
A. Greens	3	chlorpyrifos	As needed	1 lb. ai./acre	18 lb. ai.
B Tees	3	chlorpyrifos	As needed	1 lb. ai. acre	18 lb. ai.
C. Fairways	Spot treatments	chlorpyrifos	As needed	1 lb. ai./acre	50 lb. ai.
III. Fungicides					
A. Greens	3	metalaxyl	As needed	1.3 lb. ai./acre	25 lb. ai.
		chlorothalonil	As needed	8 lb. ai./acre	72 lb. ai.
B. Tees	3	metalaxyl	As needed	1.3 lb. ai./acre	25 lb. ai.
		chlorothalonil	As needed	8 lb. ai./acre	72 lb. ai.
C. Fairways	Spot treatments	chlorothalonil	As needed	8 lb. ai./acre	250 lb.ai.

3. Irrigation

Because rainfall is not uniformly distributed throughout the year, all golf courses are irrigated to supplement rainfall. Golf courses usually have permanent sprinkler irrigation systems with sophisticated control systems. Many are computer controlled, so that each sprinkler head on the golf course can be adjusted to apply a selected amount of water on each cycle.

Irrigation requirements of plants can be calculated from pan evaporation (PE) and rainfall (R) data if the water use requirement (transpiration plus evaporation) of the crop being grown is known. The water use requirement of warm-season turfgrasses is approximately 50% of pan evaporation (Handreck and Black, 1984). Irrigation systems are never completely efficient. If one assumes a 85% efficiency of water application, then irrigation requirement can be calculated as (0.59 PE) - R. Water use requirement for warm-season turfgrasses was calculated for the Haupana Beach Golf Course site from pan evaporation (Ekern and Chang, 1985) and rainfall (Giambelluca et al., 1986) data, assuming 86 acres of the golf course will be irrigated. Since brackish water will likely be used for irrigation at this site, calculated irrigation amounts were increased 20% for a leaching fraction to leach accumulated salts from irrigation water through the rootzone. Based on these data, the total annual irrigation requirement for the Hapuna Beach Golf Course area averages approximately 145 to 170 million gallons. Even in this extremely arid area, this is considerably less than the commonly cited one million gallons per day required for golf courses in Hawaii. Murabayashi (1989) reported that irrigation amounts for 11 golf courses in the State varied from 0.0023 million gallons per day per acre (mgd/acre) to 0.011 mgd/acre, a 478% difference. Average water use for the 11 golf courses was 0.006 mgd/acre. Based on Murabayashi's data, the average golf course with 86 acres of irrigated turf would require approximately 0.52 million gallons of water per day or 188 million gallons per year. The water budget method appears to be a more logical method of determining irrigation requirements, as it is apparent that there are differences in irrigation requirements between areas with different rainfall and evaporation amounts. Since the figures used here are long term averages, day to day (or year to year) irrigation needs may be much different, however, long term averages should predict the average irrigation needs. Daily irrigation scheduling will have to be done using current data.

Irrigation practices may have a large influence on the movement of soluble nitrogen fertilizers in soils. If excessive irrigation water is applied soon after application of soluble nitrogen sources, the likelihood of runoff or leaching of nitrogen below the root zone is increased. From the above it is apparent that basing irrigation amounts on calculated water use is a much more efficient method of water utilization than is currently being practiced. The data reported by Murabayashi (1989) was from golf courses in areas ranging from very arid (the Kona Coast, Keihi) to relatively wet (Princeville, Kauai). The Hapuna area is very arid, with an extremely high annual pan evaporation rate, yet the average annual irrigation requirement for turfgrasses at this location is less than the amount reported by Murabayashi. Basing irrigation scheduling on water use rates will not only result in large savings of water compared to present practices, but also reduce the likelihood of chemicals being leached from the rootzone.

IV. POTENTIAL FOR CHEMICAL MOVEMENT TO SURFACE WATERS AND GROUNDWATER

A. Surface Water Quality

The principal concern here is for water quality in Hapuna Bay and Waialea Bay, both of which receive stream flow from the two unnamed, intermittent streams which carry runoff from the golf course area. There is always a question of the extent to which land use practices impact on the quality of coastal waters which receive runoff from the land. However, there appears to be little cause for concern at this site. The USGS topographic map of the area (Puu Hinai, Hawaii Sheet, 1982) and the aerial photo indicate that the two principal stream channels drain large areas mauka of the golf course, so that runoff from the golf course into the stream channels during the rainy season would be diluted substantially by runoff from mauka areas outside the development. Thus, in major winter storms producing significant runoff, dilution of runoff from the golf course will likely diminish concentrations of applied chemicals in stream water so that no significant impact on coastal water is anticipated. An additional factor contributing to diminished impact is the relatively large buffer area between the golf course and the shoreline; the distance from the lower boundary of the golf course, east of Queen Kaahumanu Highway, and the coastline is over 3000 feet. Much of the runoff from the golf course in a major storm would not be carried by the two major stream channels, but would terminate in the buffer area above the coast. Thus it is highly unlikely that either fertilizer nutrients or pesticides used in golf course management would reach the bays in measurable quantities or at levels that would have any adverse effect on either marine organisms or people. Current requirements for monitoring shoreline waters receiving runoff from new developments on the island of Hawaii will provide data to document water quality before, during and after development.

B. Potential Impact on Groundwater Quality

1. Nitrogen from fertilizer

Monitoring results on the Mauna Kea Resort Golf Course, which is near Hapuna Beach State Park, have shown no apparent increase in nitrogen levels of near-shore waters in Kaunaoa Bay after 23 years of golf course fertilization (Green and Murdoch, 1987). This bay receives groundwater flow from an aquifer which lies immediately below the fertilized golf course; it would be a likely place to find nitrogen enrichment from leached nitrate if such enrichment were occurring. These results were consistent with the analysis and conclusions of Dollar and Smith (1988) who found no nitrate enrichment of shoreline waters under normal golf course fertilizer practices. Also, considering the nearly 3200-foot buffer area between the makai boundary of the proposed Hapuna public golf course and the nearest shoreline waters, it is very unlikely that nitrogen enrichment of shoreline waters will occur; the buffer area will cause additional dispersion and dilution of nitrate and other chemicals which may leach periodically during periods of high rainfall.

2. Pesticides

Because the area treated with pesticides on a golf course is small, the total amount of pesticide applied is relatively small also. Most pesticides used in golf course management in Hawaii (Table 2) are either rapidly degraded (half-life in soil of less than 60 days) or are tightly sorbed on soil organic matter (Koc exceeding 500), and move little from the site of application. The pesticides in Appendix Table A-1 which are most likely to move below the root zone are metribuzin, mecoprop, dicamba, simazine, and trichlorfon. The relative mobility of these chemicals can be quantified by computation of the Attenuation Factor (AF) of each chemical for an appropriate set of conditions. Attenuation of chemical movement by the soil includes both retardation of movement due to sorption on soil organic matter and degradation in the soil by both biological and chemical pathways. The AF numerical index (Rao et al., 1985) is presently being evaluated (Khan and Liang, 1989; Loague et al., 1989) for use in an assessment methodology which the State of Hawaii will use in pesticide regulation. The AF index can have numerical values from AF = 0 (total attenuation) to AF = 1 (no attenuation). By definition, AF is the fraction of chemical remaining in the soil after a single application when the recharge is sufficient to carry the chemical to the bottom of a soil layer of a given depth (for example, 50 cm). For soil and water recharge conditions of practical interest in Hawaii, AF values for the five chemicals which are most likely to move beyond a depth of 50 cm are shown in Table 3. AF values range from 2.1×10^{-6} for simazine (lowest contamination potential) to 7.1×10^{-3} for trichlorfon (highest contamination potential). For comparison, DBCP, which was used for 25 years in pineapple and has contaminated groundwater at many locations, has $AF = 4.6 \times 10^{-1}$, indicating a much higher likelihood for DBCP movement to groundwater than any of the chemicals listed in Table 3. Also, the total amounts of chemicals in Table 3 which are used on golf courses are relatively small. Trichlorfon is not used in Hawaii to our knowledge, although it is labeled. Mecoprop and dicamba are components of the herbicide Trimec®. Total annual mecoprop and dicamba application for the 18-hole golf course will be approximately 20 and 4 pounds, respectively. The total amount of metribuzin applied will be approximately 75 lb. annually. Simazine is used on few golf courses in Hawaii. If used, simazine application would not exceed 100 lb. annually.

Table 3. Attenuation factors (AF) for the most mobile pesticides labeled for use on golf courses.[†]

Pesticide	AF
Metribuzin	3.5×10^{-6}
Mecoprop	1.3×10^{-3}
Dicamba	7.1×10^{-5}
Simazine	2.1×10^{-6}
Trichlorfon	7.1×10^{-3}

[†]Based on the following conditions: soil organic carbon content = 1.5%; soil bulk density = 1.2 g/cm^3; soil water content = 35% by volume; water recharge = 0.1 cm/day; depth of penetration = 50 cm.

If a groundwater aquifer is to be used for a potable water supply, the potential for contamination by agricultural chemicals used in turfgrass management requires a more detailed analysis than when the water is likely to be used for irrigation or may not be used at all because of its salinity. A preliminary assessment has indicated that the aquifer beneath the project site is not suitable for human consumption. Hence, concern for groundwater quality is associated principally with the transport of leached chemicals to shoreline water by way of the groundwater. Lava areas with no soil mantle will require importation of soil to support turf growth and to retard movement of applied chemicals to groundwater. The imported soil should have an organic carbon content of about 1% or greater for adequate reduction of pesticide movement. Considering the negligible quantities of pesticides likely to move to groundwater and the potential for control of nitrate leaching by careful management of fertilizer and irrigation scheduling, there will be no significant contamination of shoreline water by chemicals in the groundwater.

The above assessment of the potential for pesticide contamination of groundwater at this site is necessarily qualitative. It is of some interest to note actual groundwater monitoring results for other locations considered vulnerable to groundwater contamination. A study of four golf courses on sandy soils in Cape Cod, Massachusetts by Cohen et al. (1990) revealed only a few occurrences (in sixteen sampling wells observed quarterly over a period of one and a half years) of detection of pesticides that are currently registered for turf. Of the pesticides listed in our Table 2, Cohen et al. found 2, 4-D, dicamba and chlorpyrifos in only one well (different wells for each compound), and chlorothalonil in two wells. In each case the concentrations in the water were less than 0.3 ppb, far below the specified health guidance levels for these chemicals. Thus the Cape Cod results suggest that under conditions where leaching of pesticides is most likely there is little danger of groundwater being contaminated to the extent that it would endanger human life if the water were used as a potable water source. On the other hand the results

demonstrate that pesticides applied to golf greens and tees can be leached to shallow groundwater in soils that are vulnerable to leaching.

V. Mitigation of Possible Negative Impacts on Water Quality

A. Irrigation

Irrigation practices may have a large influence on the movement of soluble nitrogen fertilizers in soils. If excessive irrigation water is applied soon after application of soluble nitrogen sources, the likelihood of runoff or leaching of nitrogen below the root zone is increased. Basing irrigation scheduling on water use rates and leaching requirements will result in large savings of water and also reduce the likelihood of chemicals being leached from the rootzone. Determination of water use rates for irrigation scheduling can be accomplished by any of several methods, including the following.

1). U. S. Weather Bureau Class A Evaporation pan data.

A standard Class A evaporation pan should be placed on the golf course in an area representative of environmental conditions and in accordance with instructions for correct placement provided by the U. S. Weather Bureau. Water use of warm season grasses can be calculated as approximately 50% of class A pan evaporation. Additional water will be required to account for inefficiencies in coverage by the irrigation system (no irrigation system provides perfect coverage) and for the required leaching fraction to leach salts from the rootzone. Irrigation should be scheduled when soil water content of the rootzone is approximately one-half the available water storage capacity of a particular soil. The amount of water to apply at a given irrigation is that required to replenish the soil water storage capacity plus additional amounts to compensate for inefficiency of sprinkler coverage and to provide additional water for leaching of salts. One can assume that the depth of the rootzone for turf is approximately one foot. An example of how Class A pan evaporation data are used to schedule irrigation is given below.

Fairways with a silt loam soil store approximately 2.5 inches of available water per foot of depth. Greens and tees composed of a mixture dominated by sand hold approximately 0.75 inch of water per foot of depth. The Coefficient of Uniformity (a measure of the uniformity of sprinkler coverage) of the irrigation system is 85%. Brackish irrigation water is being used with an electrical conductivity of 1.25 mmhos/cm. Bermudagrass turf is being used throughout the golf course. Bermudagrasses are quite salt tolerant, therefore the salinity of the soil solution will be maintained at a salinity level no greater than 12 mmhos/cm. Leaching fraction required to maintain a given salinity of soil solution = (Salinity of Irrigation water + Desired salinity of the soil solution). Water use rate of the bermudagrass turf is approximately 50% of Class A pan evaporation.

a. Fairways should be irrigated when 2.5 inches of water is evaporated from the Class A pan (one-half of the water storage capacity of fairway soils = 1.75 inches/ft. depth; water use rate = 50% of pan evaporation, 1.75 + 0.50 = 2.5 inches).

The amount of water applied to fairways at each irrigation should be 1.75 + [1.75 X (1.00 - 0.85)]+ [1.75 X (1.25+12.0)] = 1.75 + 0.26+ 0.18 = 2.19 inches.

b. Greens and tees should be irrigated when 0.75 inch of water has evaporated from the Class A pan (one-half the water storage capacity of greens and tees = 0.375 inches/foot; water use rate = 50% of pan evaporation, 0.375 +.50 = 0.75 inch).

The amount of water applied to greens and tees at each irrigation should be 0.75 + [(0.75 X (1.00 - 0.85)] + [(0.75 X (1.25 + 12.0)] = 0.75 + 0.11 + 0.08= 0.94 inch.

2). State-of-the-art irrigation systems provide the option of environmental sensing instruments which calculate the water use rate of turf from climatic elements such as solar irradiation, temperature, relative humidity and wind speed. This type of equipment therefore eliminates the need to manually determine water use rates. The turfgrass manager will still need to program in the amount of water to be used before water is applied and the amount to be applied at each irrigation.

B. Nitrogen Movement

Fertilizer applications should always be scheduled so that additional water (leaching fraction) is not applied soon after application of soluble nitrogen fertilizers. Application of soluble nitrogen sources should also be avoided when heavy rainfall is expected. Use of only slow release N sources will ensure minimum N leaching. Petrovic (1990) reviewed the literature on fate of nitrogen applied to turfgrasses. The amount of applied N leached from turfgrass areas ranged from over 50% for soluble N sources to less than 1% for slow release sources. The amount leached was greatest when soluble N sources were applied to coarse textured soils and excessive irrigation or rainfall applied. Nitrogen leached from slow release fertilizers has generally been less than 1% of applied N, even when applied to porous soils and excessive irrigation or rainfall applied. Cohen et al. (1990) reported that nitrate content of leachate beneath golf greens, tees and fairways of golf courses on Cape Cod, Mass. was usually less than the Health Advisory Level of 15 ppm. Nitrate content of leachate was shown to decrease greatly on a golf course which changed from a soluble N source to a slow release N fertilizer.

C. Pesticide Movement

1. Soil cover

Most of the proposed development area has some soil cover, although it is shallow in some places and relatively low in organic matter in most places (see soil description in Section III A.1). To maximize the benefit from the existing soil cover, wherever land levelling is required, the topsoil should be stockpiled and later replaced to maintain as much organic matter in the surface soil as possible. Areas which do not have at least 1 foot of soil above the underlying lava and which will be planted to turf and treated with pesticides will require importation of soil having at least 1% organic carbon. The likelihood of pesticide movement through a shallow layer of soil will diminish with the development of a high-organic layer as the turf becomes well established.

2. Pesticide selection

Numerous pesticides are available for use on turf, as indicated in Appendix Table A-1. Principal considerations in the choice of which pesticides to use are (1) the efficacy of the chemical in controlling the pest of concern, (2) the environmental impact of the chemical, and (3) cost, for chemicals applied in larger amounts. Included in environmental impact is worker safety. An example of a possible alternative which might lessen the likelihood of a negative impact would be the choice of carbaryl rather than chlorpyrifos if a pond containing fish on a golf course were subject to receiving runoff from turf which is treated with the insecticide; carbaryl is less toxic to fish than is chlorpyrifos. In the Hapuna Recreation Area situation, substantial runoff is not expected, and chlorpyrifos is selected for its superior efficacy and resistance to leaching. The chemicals in Table 2 should have no adverse environmental effects with proper management.

3. IPM approach

Integrated Pest Management is the use of all known pest control tactics in design of a program to manage, not eradicate, pest populations, so that aesthetic or economic damage to turfgrass and harmful side effects to the environment are avoided. The goal of an IPM program is to manage pest populations in such a manner that high quality turfgrass can be produced economically, and in an acceptable and ecologically sound manner.

In an IPM approach, pesticide applications are made only when populations of pests reach predetermined damaging levels. Pesticides with the least detrimental environmental impact are utilized.

VI. CONCLUSIONS

Development of an 18-hole golf course in the mauka portion of the Hapuna Beach State Recreation Area is not expected to result in any adverse impact on the quality of either groundwater or nearby shoreline waters. The groundwater aquifer which will receive recharge from the area to be developed is brackish and thus will not be used for human consumption. The low rainfall and high evapotranspiration from turf in this area will preclude recharge of groundwater under normal rainfall conditions. Careful irrigation management will reduce the likelihood of recharge from irrigation of the turf. In the unlikely event that agricultural chemicals (e. g. nitrate from fertilizer application) did leach to groundwater during winter rains, the dilution and dispersion that would occur during groundwater flow through the 3200-foot buffer area between the golf course and the coast would likely reduce nitrate enrichment below levels of detection. Data from the nearby Mauna Kea Beach Golf Course, which has been established over 25 years, has not shown nitrogen enrichment of shoreline water even though the golf course at this site extends to the shoreline. The large buffer area between the golf course and the coastline at Hapuna will also tend to mitigate any negative impact of chemicals in surface runoff to shoreline water. In addition, the two major intermittent stream channels which will carry runoff from the golf course to the coastline originate in undeveloped areas mauka of the golf course; when runoff occurs from the golf course it will be diluted by water originating outside the golf course, further reducing the likelihood of significant concentrations of nitrate or pesticides reaching the coast in runoff waters.

Additional mitigation of chemical impacts on water quality can be accomplished by insuring an adequate depth of surface soil in any areas planted to turf, use of slow-release nitrogen fertilizers, selection of pesticides which are effective against the pests but which are not likely to move from the site of application, and implementation of integrated pest management. Normal precautions in the use of pesticides registered for turf will also preclude negative impacts on wildlife (particularly birds) and air quality. The importance of good management requires the expertise of a well qualified Golf Course Superintendent.

VII. LITERATURE CITED

Belt Collins & Associates, 1987. Draft Environmental Impact Statement, South Kohala Resort, p. IV-25.

Brown, K. W., R. L. Duble, and J. C. Thomas. 1977. Influence of management and season on fate of N applied to golf greens. Agron. J. 69:667-671.

Ekern, P. C. and J. Chang. 1985. Pan evaporation: State of Hawaii, 1894-1983. Report R74. Department of Land and Natural Resources, Division of Water and Land Development, State of Hawaii. 171 pp.

Giambelluca, T. W., M. A. Nullet, and T. A. Schroeder. 1986. Rainfall Atlas of Hawaii. Report R76. Department of Land and Natural Resources, Division of Water and Land Development, State of Hawaii. 276 pp.

Green, R. E. and C. L. Murdoch, 1987. Evaluation of the impact of agricultural chemicals on shoreline waters by movement in groundwater. Kaunaoa Bay, Mauna Kea Resort. Appendix D in Draft Environmental Impact Statement for South Kohala Resort, Sept. 1987.

Hartley, Douglas and Hamish Kidd (Eds.). 1983. The Agrochemicals Handbook. Unwin Brothers, Ltd. Old Working, Surrey, England.

Handreck, K. A. and N. D. Brown. 1984. Growing Media For Ornamental Plants and Turf. New South Wales University Press. P. O. Box 1, Kensington NSW Australia 2033. p 252.

Hofman, Vern, Henry Kucera and Mark Berge. 1986. Spray Equipment and Calibration. Cooperative Extension Service, North Dakota State University, Fargo, North Dakota 58105. 13 AEng-5-3. 31 pp.

Jarrett, Albert. 1985. Golf Course and Grounds Irrigation and Drainage. Reston Publishing Co. Inc. Reston, VA 22090.

Khan, M. A. and Tung Liang. 1989. Mapping pesticide contamination potential. Environmental Management 13: 233-242.

Loague, K. M., R. S. Yost, R. E. Green and Tony C. Liang. 1989. Uncertainty in a pesticide leaching assessment for Hawaii. J. Contam. Hydrol. 4: 139-161.

Miles, J. R. W., C. M. Tu, and C. R. Harris. 1979. Persistence of eight organophosphorus insecticides in sterile and non-sterile organic and mineral soils. Bull. Environ. Contam. Toxicol. 22: 312-318.

Murabayashi, Edwin T. 1989. Wastewater reuse by irrigation in Hawai'i. Water Resource Research Center Special Report 09:00.88, University of Hawaii. 10 p.

Rao, P. S. C., A. G. Hornsby, and R. E. Jessup. 1989. Indices for ranking the potential for pesticide contamination of groundwater. Soil and Crop Sci. Soc. Fla. Proc. 44: 1-8.

Sato, H. H., W. Ikeda, R. Paeth, R. Smythe and M. Takehiro, Jr. 1973. Soil Survey of Island of Hawaii, State of Hawaii. United States Dept. of Agric., Soil Conservation Service.

Sears, M. K., and R. A. Chapman. 1980. Persistence and movement of four insecticides applied to turfgrasses. In: H. D. Niemcyzk and B. G. Joyner (eds.) Advances in Turfgrass Entomology. pp. 57-50.

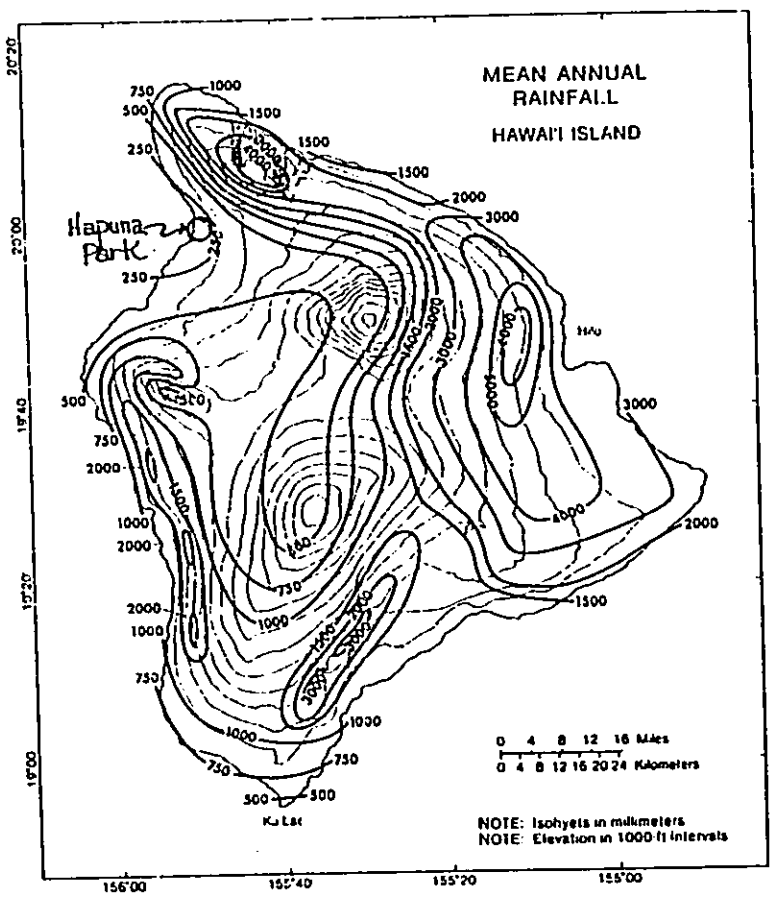
Snyder, G. H., B. J. Augustin, and J. M. Davidson. 1984. Moisture sensor-controlled irrigation for reducing N leaching in bermudagrass turf. Agron. J. 76:964-969.

Soil Conservation Service, U. S. D. A. 1976. Soil survey laboratory data and description for some soils of Hawaii. Rept. No. 29. 208 p.

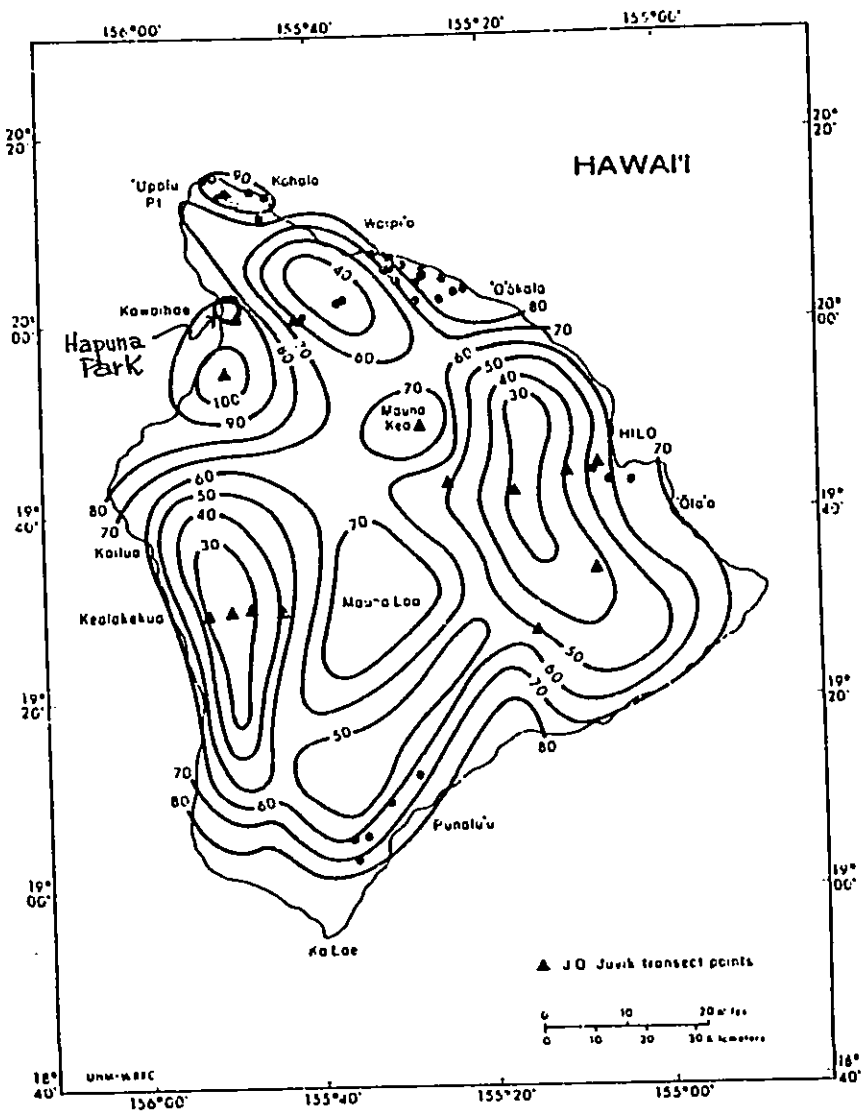
Tashiro, H. 1980. Distribution and persistence of chlorpyrifos and diazinon in soil when applied to turfgrass. In: H. D. Niemcyzk and B. G. Joyner (eds.) Advances in Turfgrass Entomology. pp. 53-56.

Yuen, G. A. L., et al., 1990. Water resources protection plan, Hawaii Water Plan. Commission on Water Resources Management, Department of Land and Natural Resources, State of Hawaii, p. V-27.

APPENDICES



Appendix Figure A-1. Mean annual rainfall for Hawaii Island, showing Hapuna Park location (adapted from Giambelluca et al., 1986).



Appendix Fig. A-2. Adjusted annual pan evaporation for Hawaii Island, showing Hapuna Park location (adapted from Ekern and Chang, 1985).

Appendix Table A-1. Properties of pesticides used on turf in Hawaii.

Pesticide common name	Trade name (s)	Oral LD-50 (mg/kg body wt)*	Toxicity to fish and wildlife*	Soil sorption index (Koc)**	Water solubility (mg/l)**	Half-life in soil (days)**	Leaching potential**
I. Herbicides							
MSMA	Weedhoe etc	1800	Low	10000	1000000	100	Small
glyphosate	Roundup, Kleenup	150	Mod. to birds, none to fish	10000	1000000	30	Small
metribuzin	Sencor	2200	Moderate	41	1220	30	Large
2,4-D	part of mixtures	370-700	High to fish	109	300000	10	Medium
mecoprop	ditto	700-1500	Low	3	660000	21	Large
dicamba	ditto	1000-2000	Non toxic to fish	2	800000	14	Large
oryzalin	Surflan	10000	Mod. to birds, toxic to fish	2700	2.5	60	Small
oxadiazon	Ronstar	8000	Toxic to fish		0.7		
propyzamide	Kerb	5620-8350	Low	990	15	30	Small
simazine	Princep	>5000	Low	138	3.5	75	Large
chlorthal-dimethyl	Dacthal	>3000	Low	5000	0.5	30	Small
bensulide	Betasan, Betamec	770	Mod. to fish	10000	25	60	Small
paraquat dichloride	Ortho Paraquat CL	150	Mod. to birds, none to fish	100000	1000000	3600	Small
benfluralin	Balan	10000	Low to birds, high to fish	11000	0.1	30	Small
II. Insecticides							
chloropyrifos	Dursban	135-163	High	6070	2	30	Small
bendiocarb	Ficam	40-156	High				
carbaryl	Sevin	400-850	Moderate	229	40	7	Small
trichlorfon	Dylox	450-630	Moderate	2	154000	27	Large
III. Fungicides							
anilazine	Dyrene	<5000	Low	3000	10	1	Small
benomyl	Benlate	9590	Low	2100	2	100	Small
chlorothalonil	Daconil 2787	>10000	Low to birds, mod. to fish	1380	0.6	20	Small
iprodione	Chipco 26019 RP	3500	Low	500	13	20	Small
mancozeb	Dithane M-45	>8000	Low	1000	0.5	35	Small
ouniozone	PCNB, Terrachlor	12000	Non-toxic	1000	0.44	21	Small
thiram	Tersan	7500	Low	383	30	20	Medium
triadmefon	Bayleton	568	Low	273	260	21	Medium
metalaryl	Subdue	669	Non-toxic	16	7100	7	Medium
thiophanate-methyl	Cleary 3336	7500	Low	1000	3.5	0	Small

*From: Hartley, Douglas and Hamish Kidd (Eds.) 1983. The Agrochemicals Handbook. Unwin Bros., Ltd. Old Working., Surrey, England.

**From: Wauchope, R. D. 1988. U. S. D. A.-ARS Interim Pesticide Properties Database. Version 1.0. Unpublished

Appendix Table A-2. Toxicity classes of pesticides.

Class	Description	Warning Statement	Oral LD50
1	Highly Toxic Skull & Crossbones	Poison,	1-50
2	Moderately Toxic	Danger	51-500
3	Low Toxicity	Warning	500-5,000
4	Very Low Toxicity	Caution	>5,000

APPENDIX B

IMPACT ON MIGRATORY BIRDS AND ENDANGERED HAWAIIAN WATERBIRDS.

The fertilizers, herbicides, and fungicides used in golf course maintenance pose little or no hazard to birds frequenting the grassed areas or ponds associated with golf courses. Fertilizers are relatively non-toxic unless ingested in large amounts. All herbicides and fungicides used in golf course maintenance in Hawaii are of low to moderate toxicity (Appendix A, Table A-1). The only chemicals used in golf course maintenance in Hawaii which are highly toxic to birds are the organic phosphate insecticides, especially chlorpyrifos.

Although chlorpyrifos is toxic to birds, it is strongly adsorbed on the thatch layer of turf and moves little from the site of application. One reason for its weakness in controlling soil infesting insects is the inability to get the insecticide through the thatch layer to the depth needed to contact these insects. Recent studies (Sears and Chapman, 1980; Tashiro, 1980) have shown that chlorpyrifos applied to turfgrasses does not penetrate more than 2 to 3 centimeters in the soil. In addition to resistance to movement in the soil, it has been shown that it is rapidly degraded in the soil, both by hydrolysis and microbial action (Miles et al. 1979).

Because of the adsorption of organic phosphate insecticides on organic layers in turf and their rapid break down, there is little chance of their movement from grassed areas into the ponds associated with the proposed golf course. Label instructions for application of these pesticides (which turfgrass managers are required by law to follow) specifically prohibit their direct application to streams and ponds.

The likelihood of bird injury by pesticides used in maintenance of the proposed golf course can be reduced by proper application of pesticides with reduced toxicity to birds. Appendix Table A-1 shows that carbaryl and trichlorfon are less toxic to birds than chlorpyrifos. In most cases these insecticides may be substituted for chlorpyrifos with little loss of effectiveness.

Golf courses are frequently visited by birds. As far as we are aware, there have been no reported incidents of bird kill in Hawaii from chemicals applied in golf course management. Waterfowl and fish appear to thrive in ponds and water hazards on golf courses in Hawaii. Many golf courses cultivate white amur fish in the ponds to control algae. Mosquito fish are generally stocked to prevent mosquito problems. We are aware of no incidents of fish or waterfowl injury from chemicals applied to golf courses.

The labeling of herbicides and pesticides by EPA for particular uses, enforced by the Hawaii Department of Agriculture, is perhaps the best assurance of protection of humans and wildlife from their hazards. All pesticides must be applied in compliance with federal and state laws regulating their use. Hazards to both humans and wildlife are included in the decision to label a pesticide for specific uses, including use on golf courses, and in developing regulations on allowable application procedures of the pesticide for various uses.

APPENDIX C

IMPACT ON AIR QUALITY

Most herbicides and pesticides used on golf courses are of relatively low mammalian toxicity, with LD_{50} values ranging from hundreds to several thousand mg/kg body weight (Appendix Table A-1). None of the chemicals listed in Table 2 in the report are highly volatile. A measure of volatility is the vapor pressure (VP). The compounds used in highest quantity, for which vapor pressure data is readily available, are chlorothalonil ($VP=1.3 \times 10^{-5}$ atm at 25° C) and chlorpyrifos ($VP=2.4 \times 10^{-8}$ atm at 25° C). In comparison, DBPC, which is known to be volatile, has a vapor pressure of 1.2×10^{-3} atm at 21° C, i.e. at least 100 times the vapor pressure of chlorothalonil and 100,000 times the vapor pressure of chlorpyrifos. In addition, pesticides are applied on golf courses in dilute sprays (50 to 100 gallons of spray solution per acre) to open areas. For these reasons there is little likelihood of volatility once the pesticides are applied.

If properly applied, there is also little potential for drift of spray particles from golf course spray equipment. The greatest danger of significant drift of pesticides is from aerial application. Golf course pesticides are applied with ground spray equipment. Boom height of spray equipment is less than one meter. Low spray pressures (20 to 40 psi) and coarse spray droplets further reduce the hazard of airborne fine droplets. Droplets larger than 100 micrometers diameter are not highly subject to drift.

Most of the spray volume from typical flat-fan nozzles used in agricultural spray equipment is from droplets larger than 100 micrometers. Appendix Table C-1 below shows a typical distribution of droplet sizes for a flat-fan nozzle (the type used in most golf course spray equipment). At the low concentrations used in pesticide application, this would not result in significant quantities of pesticides being carried downwind. High wind speed would increase the likelihood of drift of fine spray droplets, however, because high wind speed distorts spray patterns and results in poor coverage; spraying in periods of high wind is not common practice. Appendix Table C-2 below shows the percent of spray application volume deposited at 4 and 8 feet downwind and the distance downwind for the volume to drop to 1% or below for flat-fan nozzles under different conditions. Even under high wind conditions (almost 10 mph) and spraying at 40 psi, the distance downwind at which 1% or less of the total spray volume was deposited was only 17 feet.

Appendix Table C-1. Droplet size range for a typical flat-fan nozzle at 20 and 40 psi. (from Hofman et al., 1986)

Droplet size range (microns)	Percent of spray volume 20 psi	40 psi
0-21	0.1	0.4
21-63	3.0	10.4
63-105	10.7	20.1
105-147	16.2	25.4
147-210	36.7	35.3
210-294	27.5	7.7
>294	5.8	0.7

Appendix Table C-2. Percent of spray volume deposited at 4 and 8 feet downwind and the distance in feet for the volume of spray solution to drop to 1% of the total spray volume (from Hofman et al., 1986).

Nozzle ht.	Pressure (psi)	Wind speed (mph)	Percent deposited 4ft.	8ft.	Distance to drop to 1% of volume
14	40	3.5	3.1	0.6	7.0
27	40	3.5	5.9	1.5	13.0
18	30	5.3	9.3	2.2	14.0
18	25	9.9	10.3	3.1	15.5
18	40	9.9	9.1	3.6	17.0

To facilitate spray operations and to comply with label instructions of some pesticides, spray applications are only made in late afternoon or early morning hours when golfers are not on the golf course. This reduces the risk of exposure of people to airborne spray particles. Sufficient buffer space with tall vegetation between the golf course and housing sites and facilities (such as the clubhouse) which will be used by people will further reduce the chance of exposure to airborne pesticide particles.

The greatest danger of airborne pesticides is to the applicators of pesticides themselves. Mixing of wettable powder formulations and being in close proximity to airborne spray particles, particularly when operating spray equipment in a downwind position, places spray operators in particularly vulnerable positions. EPA and OSHA have strict standards which specify

that spray operators wear appropriate protective clothing and breathing apparatuses.

APPENDIX F

Botanical Survey
Hapuna Beach State Recreation Area Expansion

BOTANICAL SURVEY
HAPUNA BEACH STATE RECREATION AREA EXPANSION
SOUTH KOHALA DISTRICT, ISLAND OF HAWAI'

by

Winona P. Char

CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: HARRISON ASSOCIATES

February 1994

Table of Contents

	page
INTRODUCTION	1
SURVEY METHODS	2
DESCRIPTION OF THE VEGETATION	3
Coastal Kiawe Forest	4
Grassland	5
Gulch Vegetation	6
DISCUSSION AND RECOMMENDATIONS	7
PLANT SPECIES LIST	10
LITERATURE CITED	16

BOTANICAL SURVEY
HAPUNA BEACH STATE RECREATION AREA EXPANSION
SOUTH KOHALA DISTRICT, ISLAND OF HAWAI'I

INTRODUCTION

The project site consists of approximately 800 acres of State-owned land located within the ahupua'a of Lalamilo, South Kohala, Hawai'i island. Elevation ranges from sea-level to about 270 ft. above mean sea-level along its mauka boundary, with a small portion along the northeast corner somewhat higher at about 380 ft. elevation. The project site is divided into two parcels by the Queen Ka'ahumanu Highway. The mauka parcel consists of about 200 acres; an 18-hole golf course and ancillary facilities (driving range, golf clubhouse, maintenance area) are planned for this parcel. It is bounded by the Queen Ka'ahumanu Highway to the west, the Hapuna Golf Course to the north, undeveloped lands to the east, and the Lalamilo Windfarm Road to the south. The makai parcel covers about 600 acres. It already supports the popular and well-used Hapuna Beach Park and an existing lodging (A-frames). In the Master Plan, more public facilities are planned for the makai parcel; these include an organized group camp area, car/family campground, group picnic rentals, restrooms, parking, hiking trails, and picnic areas. The makai parcel is bounded by the ocean to the west, the recently completed Hapuna Resort area to the north, the Queen Ka'ahumanu Highway to the east, and Puako to the south.

The vegetation throughout most of the 800-acre project site is dominated by two introduced species, buffel grass and kiawe trees. The topography is generally moderately sloping, but somewhat steeper and rolling on the upper, mauka parcel. The dark reddish-brown, extremely stony soils form a thin layer over very weathered and decomposed pahoehoe bedrock; stones cover 50% or more of the surface. Annual rainfall is less than 20 inches.

Field studies to assess the botanical resources found on the Hapuna Beach State Recreation Area Expansion project site were conducted on 27 to 30 December 1993. A team of four botanists was used to gather the technical data contained in this report. The primary objectives of the survey were to: 1) describe the major vegetation types; 2) inventory the flora; 3) search for threatened and endangered species as well as rare and vulnerable plants; and 4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps, the preliminary Master Plan map, and a black and white aerial photograph were examined to determine vegetation cover patterns, terrain characteristics, access, boundaries, and reference points. The mauka parcel was accessed from Lalamilo Windfarm Road to the south, and to the north from the "water-tank road" located directly across from the Hapuna Beach Road entrance along Queen Ka'ahumanu Highway. On the makai parcel, a paved but rutted and well-traveled road, the Puako Road, crosses the length of the parcel. A large number of dirt roads are also found on the makai parcel.

The less disturbed mauka parcel, which was more likely to harbor native plant communities and, perhaps, rare plants, was more

intensively surveyed. No detailed survey was made of the improved and landscaped areas on the beach park, lodging area, and around the homes by Waialea Bay.

A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, topography, exposure, drainage, etc. Plants which could not be positively identified in the field were collected for later determination by comparison with known specimens in the herbarium, and reference with the most recent taxonomic literature. The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the field survey. A survey taken at a different time of the year and under varying environmental conditions would no doubt yield slight variations in the species checklist, especially of the weedy, annual plants.

DESCRIPTION OF THE VEGETATION

Except for the sandy beach areas at Hapuna and Waialea Bay, the substrate throughout the project site has been mapped as "KNC", Kawaihae extremely stony very fine sandy loam, 6 to 12% slopes, on the soil maps (Sato et al. 1973). The thin dark reddish-brown colored soil has numerous stones and rocky outcroppings which cover anywhere from 50 to 60% of the soil surface. This soil type overlays pahoehoe bedrock, although in places there are areas with fragmental 'a'a lava. This substrate supports open, rolling grasslands, primarily of buffel grass with scattered trees of kiawe. Along the coastal section of the property, especially in low lying areas, the soils become deeper and less stony. The fine sandy loam is more yellow-brown in color, resembling Pahala ash somewhat. These coastal areas support a dense kiawe forest. There are several small gulches which cross the property. These support grassland vegetation, except for the somewhat larger gulch

located on the southern boundary of the mauka parcel, near the Lalamilo Windfarm Road. There are several seeps within this gulch and this moister environment provides a microhabitat for a number of species not found elsewhere on the project site.

The coastal kiawe forest, grassland, and gulch vegetation are described in more detail below. A list of all the plants inventoried on the project site during the field survey is presented at the end of the report.

Coastal Kiawe Forest

Coastal kiawe forest is found behind the sandy beaches at Hapuna and Waialea Bay, on rocky headlands, and behind a few cobble beaches - these beaches are composed of sun-bleached, white coral fragments and water-worn basalt stones, about 1 to 3 inches in diameter. The kiawe trees (Prosopis pallida) form a closed-canopy forest, that is, the branches of the trees interlock and the canopy cover is greater than 60%. The trees are about 18 to 20 ft. tall.

Under the kiawe trees, the ground cover is primarily buffel grass, although in some places hairy merremia vines (Merremia aegyptia), bristly foxtail grass (Setaria verticillata), and West Indian beggar's tick (Bidens cynapifolia) are locally common during the wetter months. 'Aheahea or 'aweoweo shrubs (Chenopodium oahuense), an endemic member of the goosefoot family, is locally common in the kiawe forest just north of the Puako boat ramp.

Along the seaward facing portions of the forest, a number of more salt-tolerant species are found. These include alena (Boerhavia repens), Australian saltbush (Atriplex semibaccata), 'ilima (Sida fallax), 'ihi (Portulaca pilosa), kipukai or nena (Heliotropium curassavicum), and the silvery-leaved pa'u o Hi'iaka (Jacquemontia

ovalifolia). A few tree species occur in this vegetation type; these are ironwood (Casuarina equisetifolia), tree heliotrope (Tourneforthia argentea), kou (Cordia subcordata), and milo (Thespesia populnea).

Grassland

This vegetation type covers the majority of the project site. Its general physiognomy is of wide, open, low clumps of grass with very scattered, small trees. Buffel grass (Cenchrus ciliaris) is the dominant grass species on the makai parcel and on the lower half of the mauka parcel. Buffel grass, native to Africa and tropical Asia, is a perennial, mat to tussock-forming species. In Hawai'i, it is naturalized and common in dry areas, from sea-level to about 360 ft. elevation, in a wide variety of disturbed habitats on all of the main islands except Ni'ihau (Wagner et al. 1990).

On the project site, buffel grass cover is about 50 to 60%, with the rest of the ground barren, stony soil. Buffel grass forms wiry clumps 1 to 2 ft. tall. Widely scattered throughout the grassland are small trees of kiawe, 6 to 10 ft. tall; tree cover is about 3 to 5%. The trees form somewhat taller stands in low lying, swale areas. Common associates of the grassland are 'uhaloa (Waltheria indica), 'ilima, hairy spurge (Chamaesyce hirta), pa'u o Hi'iaka, and hairy merremia. Disturbed areas bordering roads support a few clumps of fountain grass (Pennisetum setaceum), and a number of weedy, mostly annual species such as swollen fingergrass (Chloris barbata), threadstem carpetweed (Molluga cerviana), graceful spurge (Chamaesyce hypericifolia), Cuba jute (Sida rhombifolia), and Chamaesyce hyssopifolia.

On the upper half of the mauka parcel, two native grasses, pili grass (Heteropogon contortus) and Eragrostis atropioides, are

codominant with buffel grass, that is, they occur in equal numbers. Eragrostis forms stiff, erect tussocks, 2 to 3 ft. tall, while pili grass forms loose, bluish-green colored tufts, up to 2 ft. tall. The native species -- Eragrostis, pili grass, 'ilima, 'uhaloa, and pa'u o Hi'iaka, tend to dominate the stonier knolls, while the swale areas with somewhat deeper soil are covered primarily by buffel grass. Eragrostis is locally common on relatively flat areas with a pebbly soil texture.

Gulch Vegetation

On the upper half of the mauka parcel, just north of the Lalamilo Windfarm Road, is a gulch which contains several seeps and small pools of water, which amazingly contain a few guppies in them. The gulch continues downslope where it quickly dries out and, like other gulches on the project site, is covered by buffel grass grassland.

In the area of the seeps and small pools, the gulch bottom is damp with moss-covered boulders. Woodfern (Christella parasitica), pteris (Pteris vittata), hairy sword fern (Nephrolepis multiflora), maiden-hair fern (Adiantum raddianum), and the native kumu-niu or 'iwa'iwa (Doryopteris decipiens) are found among the boulders and moist soil along the gulch walls. A number of species were only recorded from this area; they include kili'o'opu (Kyllinga brevifolia), Galinsoga parviflora, guava (Psidium guajava), pualele (Emilia fosbergii), cocklebur (Xanthium strumarium), peppergrass (Lepidium virginicum), and all the ferns.

This small section of the gulch is quite a contrast when compared to the other parts of the project site. The lush plant growth and cooler, moister conditions attract cattle to the area and much of the vegetation is browsed.

DISCUSSION AND RECOMMENDATIONS

The vegetation on the majority of the project site consists of grassland with scattered kiawe trees: buffel grass-dominated grassland on the makai parcel and the lower half of the mauka prcel, and a buffel grass-Eragrostis-pili grass association on the upper half of the mauka parcel. Coastal kiawe forest occurs as a somewhat narrow band just behind the shoreline. Gulch vegetation is a minor vegetation type found only in the upper section of the gulch located north of the Lalamilo Windfarm Road; seeps and small pools of water provide a wetter microhabitat.

A Federal and State listed endangered species, the ko'oloa'ula (Abutilon menziesii), is known from the nearby Nansay Hawai'i Puako property which is being developed for residential use (U.S. Fish and Wildlife Service 1993). The ko'oloa'ula is a highly ornamental, diffusely branched shrub with heart-shaped, silvery-green leaves, and dark red to maroon flowers which resemble miniature hibiscus blossoms. Several populations of the pololei fern (formerly Ophioglossum concinnum, now O. polyphyllum), a Category 1 candidate endangered species, are known to occur on nearby lands at Pu'u o Kohola and the Hauna Lani Resort (Char 1989, 1991). The fern has small, paddle-shaped leaves, 1 to 3 inches long, and becomes dormant during the dry season. Recent studies, however, indicate that the species is no longer an endemic Hawaiian species, but part of the more widely distributed and common Ophioglossum polyphyllum complex. The U.S. Fish and Wildlife Service has therefore removed the fern from its listing proposal.

An intensive search was made for the ko'oloa'ula, but no plants were found on the ±800-acre project site. The ko'oloa'ula on Hawai'i island is usually associated with 'a'a lava flows.

Of a total of 73 species inventoried on the project site, 61 (84%) are introduced or alien species, 1 (1%) is originally of Polynesian introduction, and 11 (15%) are native. Of the natives, 7 are indigenous, that is, they are native to the Hawaiian Islands and elsewhere, and 4 are endemic, that is, they are native only to the Hawaiian Islands. The endemic species are: the kumuniu or 'iwa'iwa fern (Doryopteris decipiens), the 'aheahea or 'aweoweo shrub (Chenopodium oahuense), Eragrostis atropioides, and the silver-leaved pa'u o Hi'iaka (Jacquemontia ovalifolia ssp. sandwicensis). None of the plants found on the property are listed threatened or endangered species, nor are any proposed or candidate for such status (U.S. Fish and Wildlife Service 1989, 1990, 1992). None of the plants are considered rare or vulnerable (Wagner et al. 1990).

Given the findings above, the development of the site as proposed in the Master Plan should not have a significant negative impact on the botanical resources of the site, or the general South Kohala region.

As for recommendations, it is recommended that native plants be used for landscaping. The Hawai'i legislature recently passed "Act 73" which mandates that any new or renovated landscapes for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants wherever and whenever possible.

Native plants found in the area are already adapted to the local environmental conditions and require less water and maintenance, as well as very little soil. The Hapuna Beach Park already uses several native species, as well as Polynesian introduced or Polynesian heritage plants in its landscaping. These include pa'u o Hi'iaka, milo, kou, 'ulei (Osteomeles anthyllidifolia), coconut or niu (Cocos nucifera), hau (Hibiscus tiliaceus), beach

Scientific name	Common name	Status	Vegetation type C	GR	B
FERNS					
ADIANTACEAE (Maiden-hair Fern Family)					
Adiantum raddianum Presl	maiden-hair fern	X	-	-	+
NEPHROLEPIDACEAE (Sword Fern Family)					
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	hairy sword fern	X	-	-	+
POLYPODIACEAE (Common Fern Family)					
Phymatosorus scolopendria (Burm.) Pic.-Ser.	laua'e, lauwa'e	X	-	-	+
PTERIDACEAE (Pteris Family)					
Pteris vittata L.	pteris	X	-	-	+
SINOPTERIDACEAE (Cliffbrake Fern Family)					
Doryopteris decipiens (Hook.) J. Sm.	kumu-niu, manawahua, 'iwa'iwa	E	-	-	+
THELYPTERIDACEAE (Woodfern Family)					
Christella parasitica (L.) Levl.	woodfern, oakfern	X	-	-	+
Macrothelypteris torresiana (Gaud.) Ching		X	-	-	+
FLOWERING PLANTS					
MONOCOTS					
AGAVACEAE (Sisal Family)					
Furcraea foetida (L.) Haw.	Mauritius hemp	X	+	-	-
CYPERACEAE (Sedge Family)					
Kyllinga brevifolia Rottb.	kili'o'opu, kaluha	X	-	-	+

Scientific name	Common name	Status	Vegetation type C	GR	B
LILIACEAE (Lily Family)					
Aloe vera L.	aloe	X	+	-	-
POACEAE (Grass Family)					
Aristida adscensionis L.	six weeks threeawn	X	-	+	-
Cenchrus ciliaris L.	buffel grass	X	+	+	+
Cenchrus echinatus L.	common sandbur, 'ume'alu	X	+	-	-
Chloris barbata (L.) Sw.	swollen fingergrass, mau-'ulei	X	+	+	+
Digitaria adscendens (Kunth) Henr.	crabgrass	X	-	-	+
Eleusine indica (L.) Gaertn.	wiregrass, goosegrass	X	+	-	+
Eragrostis atropioides Hillebr.	hard-stemmed lovegrass	E	-	+	-
Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.	pili, pili grass	I	-	+	-
Pennisetum setaceum (Forssk.) Stapf	fountain grass	X	+	+	+
Setaria verticillata (L.) P. Beauv.	bristly foxtail	X	+	-	+
Sporobolus virginicus (L.) Kunth	seashore rushgrass, 'aki-'aki	I	+	-	-
Sporobolus sp.		X	+	-	-
DICOTS					
AMARANTHACEAE (Amaranth Family)					
Alternanthera pungens Kunth	khaki weed	X	+	-	-
Amaranthus spinosus L.	spiny amaranth, pakai kuku	X	+	-	-
ASCLEPIADACEAE (Milkweed Family)					
Calotropis procera (Ait.) Ait. f.	small crown flower	X	+	-	-
ASTERACEAE (Sunflower Family)					
Ageratina riparia (Regel) R. King & H. Robinson	pamakani	X	-	-	+
Ageratum conyzoides L.	maile hohono	X	-	-	+
Bidens cynapifolia Kunth	West Indian beggar's tick	X	+	-	+
Conyza bonariensis (L.) CRonq.	hairy horseweed, 'ilioha	X	-	-	+

Scientific name	Common name	Status	Vegetation type C	Br	B
Conyza canadensis var. pusilla (Nutt.) Cronq.	horseweed, lani wela	X	-	-	+
Emilia fosbergii Nicolson	pualele	X	-	-	+
Erechtites valerianifolia (Wolf.) DC.	fireweed	X	-	-	+
Galinsoga parviflora Cav.	galinsoga	X	-	-	+
Pluchea symphytifolia (Mill.) Gillis	pluchea, sourbush	X	+	+	+
Sonchus oleraceus L.	sow thistle	X	+	-	-
Tridax procumbens L.	coat buttons	X	-	-	+
Xanthium strumarium var. canadense (Mill.) Torr. & A. Gray	cocklebur, kikania	X	-	-	+
BORAGINACEAE (Borage Family)					
Cordia subcordata Lam.	kou	P	+	-	-
Heliotropium curassavicum L.	kipukai, nena	I	+	-	-
Tournefortia argentea L.f.	tree heliotrope	X	+	-	-
BRASSICACEAE (Mustard Family)					
Lepidium virginicum L.	peppergrass	X	-	-	+
CAPPARACEAE (Caper Family)					
Cleome gynandra L.	wild spider flower, honohina	X	-	+	-
CASUARINACEAE (Ironwood Family)					
Casuarina equisetifolia L.	common ironwood, paina	X	+	-	-
CHENOPODIACEAE (Goosefoot Family)					
Atriplex semibaccata R. BR.	Australian saltbush	X	+	-	-
Atriplex suberecta Verd.	saltbush	X	+	-	-
Chenopodium murale L.	nettle-leaved goosefoot, 'aheahea	X	+	-	+
Chenopodium oahuense (Meyen) Aellen	'aheahea, 'aweoweo	E	+	+	-

Scientific name	Common name	Status	Vegetation type C	Br	B
CONVOLVULACEAE (Morning-glory Family)					
Jacquemontia ovalifolia ssp. sandwicensis (A. Gray) K. Robertson	pa'u o Hi'iaka, kakua o Hi'iaka	E	+	+	-
Merremia aegyptia (L.) Urb.	hairy merremia, koali kua hulu	X?	+	+	+
EUPHORBIACEAE (Spurge Family)					
Chamaesyce hirta (L.) Millsp.	hairy spurge	X	+	+	+
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	X	-	+	-
Chamaesyce hyssopifolia (L.) Small		X	-	+	-
Chamaesyce prostrata (Aiton) Small	prostrate spurge	X	-	+	-
FABACEAE (Pea Family)					
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	-	-	+
Desmodium incanum DC.	Spanish clover, ka'imi	X	-	+	-
Leucaena leucocephala (Lam.) de Wit	koa-haole, ekoa	X	+	+	+
Mimosa pudica var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant, puahila-hila, sleeping grass	X	-	-	+
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe	X	+	+	+
MALVACEAE (Mallow Family)					
Malvastrum coromandelianum (L.) Garcke	false mallow, hauuoi	X	-	-	+
Sida fallax Walp.	'ilima	I	+	+	+
Sida rhombifolia L.	Cuba jute	X	-	+	-
Thespesia populnea (L.) Sol. ex Correa	milo	I?	+	-	-
NOLLUGINACEAE (Carpetweed Family)					
Mollugo cerviana (L.) Ser.	threadstem carpetweed	X	+	+	+

Scientific name	Common name	Status	Vegetation type c	gr	g
Conyza canadensis var. pusilla (Nutt.) Cronq.	horseweed, lani wela	X	-	-	+
Emilia fosbergii Nicolson	pualele	X	-	-	+
Erechtites valerianifolia (Wolf.) DC.	fireweed	X	-	-	+
Galinsoga parviflora Cav.	galinsoga	X	-	-	+
Pluchea symphytifolia (Mill.) Gillis	pluchea, sourbush	X	+	+	+
Sonchus oleraceus L.	sow thistle	X	+	-	-
Tridax procumbens L.	coat buttons	X	-	-	+
Xanthium strumarium var. canadense (Mill.) Torr. & A. Gray	cocklebur, kikania	X	-	-	+
BORAGINACEAE (Borage Family)					
Cordia subcordata Lam.	kou	P	+	-	-
Heliotropium curassavicum L.	kipukai, nena	I	+	-	-
Tournefortia argentea L.f.	tree heliotrope	X	+	-	-
BRASSICACEAE (Mustard Family)					
Lepidium virginicum L.	peppergrass	X	-	-	+
CAPPARACEAE (Caper Family)					
Cleome gynandra L.	wild spider flower, honohina	X	-	+	-
CASUARINACEAE (Ironwood Family)					
Casuarina equisetifolia L.	common ironwood, paina	X	+	-	-
CHENOPODIACEAE (Goosefoot Family)					
Atriplex semibaccata R. BR.	Australian saltbush	X	+	-	-
Atriplex suberecta Verd.	saltbush	X	+	-	-
Chenopodium murale L.	nettle-leaved goosefoot, 'aheahea	X	+	-	+
Chenopodium oahuense (Meyen) Aellen	*'aheahea, 'aweoweo*	E	+	+	-

Scientific name	Common name	Status	Vegetation type c	gr	g
CONVOLVULACEAE (Morning-glory Family)					
Jacquemontia ovalifolia ssp. sandwicensis (A. Gray) K. Robertson	pa'u o Hi'iaka, kakua o Hi'iaka	E	+	+	-
Merremia aegyptia (L.) Urb.	hairy merremia, koali kua hulu	X?	+	+	+
EUPHORBIACEAE (Spurge Family)					
Chamaesyce hirta (L.) Millsp.	hairy spurge	X	+	+	+
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	X	-	+	-
Chamaesyce hyssopifolia (L.) Small		X	-	+	-
Chamaesyce prostrata (Aiton) Small	prostrate spurge	X	-	+	-
FABACEAE (Pea Family)					
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	-	-	+
Desmodium incanum DC.	Spanish clover, ka'imi	X	-	+	-
Leucaena leucocephala (Lam.) de Wit	koa-haole, ekoa	X	+	+	+
Mimosa pudica var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant, puahila-hila, sleeping grass	X	-	-	+
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe	X	+	+	+
MALVACEAE (Mallow Family)					
Malvastrum coromandelianum (L.) Garcke	false mallow, hauuoi	X	-	-	+
Sida fallax Walp.	'ilima	I	+	+	+
Sida rhombifolia L.	Cuba jute	X	-	+	-
Thespesia populnea (L.) Sol. ex Correa	milo	I?	+	-	-
MOLLUGINACEAE (Carpetweed Family)					
Mollugo cerviana (L.) Ser.	threadstem carpetweed	X	+	+	+

Scientific name	Common name	Status	Vegetation type		
			C	EF	S
MYRTACEAE (Myrtle Family)					
Psidium guajava L.	guava, kuawa	X	-	-	+
NYCTAGINACEAE (Four-o'clock Family)					
Boerhavia coccinea Mill.	red-flowered boerhavia	X	+ +	+ +	- +
Boerhavia repens L.	alena	I	+ +	+ +	+
PORTULACACEAE (Purslane Family)					
Portulaca oleracea L.	pigweed, common purslane	X	+	-	+
Portulaca pilosa L.	'ihi	X	+	-	-
RUBIACEAE (Coffee Family)					
Spermacoce assurgens Ruiz & Pav.	buttonweed	X	+	-	+
SOLANACEAE (Nightshade Family)					
Nicotiana glauca R.C. Graham	tree tobacco	X	+	+	+
Solanum linnaeanum Hepper & P. Jaeger	apple-of-Sodom, kikania	X	+	+	-
STERCULIACEAE (Cacao Family)					
Waltheria indica L.	'uhaloa, hi'aloa, kanakaloa I?		+	+	-
ZYGOPHYLLACEAE (Caltrop Family)					
Tribulus terrestris L.	puncture vine	X	+	-	-

LITERATURE CITED

Char, W.P. 1989. Botanical survey, Mauna Lani Marina, Mauna Lani Resort, Island of Hawai'i. Prepared for Belt Collins & Associates. April 1989.

_____ . 1991. Botanical assessment survey, Mauna Kea Properties: The Queen's Land, South Kohala, Island of Hawai'i. Prepared for Belt Collins & Associates. April 1991.

Lamoureux, C.H. 1988. Checklist of the Hawaiian pteridophytes. "Kupukupu O Hawai'i Ne'i". Draft manuscript. University of Hawai'i, Manoa.

Sato, H.H., W. Ikeda, R. Paeth, R. Smythe, and T. Takehiro, Jr. 1973. Soil survey of the Island of Hawaii, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service, Washington,D.C.

U.S. Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants. 50 CFR 17.11 & 17.12.

_____ . 1990. Endangered and threatened wildlife and plants; Review of plant taxa for listing as Endangered and Threatened Species; Notice of review. Federal Register 55(35): 6184-6229.

_____ . 1992. Endangered ane threatened wildlife and plants; Proposed endangered status for 22 plants from the island of Hawaii, State of Hawaii. Federal Register 57(243): 59951-59970.

_____ . 1993. Lana'i plant cluster recovery plan: Abutilon eremitopetalum, Abutilon menziesii, Cyanea macrostegia spp. gibsonii, Cyrtandra munroi, Gahnia lanaiensis, Phyllostegia glabra var. lanaiensis, Santalum freycinetianum var.

lanaiensis, Tetramolopium remyi, and Viola lanaiensis. U.S. Fish and Wildlife Service, Portland, OR.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and B.P. Bishop Museum Press, Honolulu. B.P. Bishop Museum Special Publication No. 83.

APPENDIX G

Phased Archaeological Inventory Survey
Hapuna Beach State Recreation Area Expansion Project
Phase III - Data Analyses and Final Report

Report 1246-011594

Phased Archaeological Inventory Survey
Hapuna Beach State Recreation Area
Expansion Project
Phase III - Data Analyses and Final Report

Land of Lalamilo
South Kohala District, Island of Hawaii

BY

Peter M. Jensen, Ph.D. • Associate Senior Archaeologist

PREPARED FOR

Harrison Associates
711 Kapiolani Blvd., Suite 1442
Honolulu, Hawaii 96813

FEBRUARY 1994

©1994 Paul H. Rosendahl, Ph.D., Inc.

PHRI Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services
HAWAII 365 Makaala Street • Hilo, Hawaii 96720 • (808) 969-1763 • GUAM P.O. Box 23585 • G.M.F., Guam 96921 • (671) 472-3117

SUMMARY

At the request of Mr. Warren Harrison, of Harrison Associates, on behalf of their client, the State of Hawaii, Paul H. Rosendahl, Ph.D., Inc. (PHRI) recently conducted an archaeological inventory survey of the c. 750-acre Hapuna Beach State Recreation Area Expansion project area, located in the Land of Lalamilo, South Kohala District, Island of Hawaii. Phase I of the inventory survey was undertaken in 1990 and involved initial site identification field work (Burgett and Rosendahl 1990). The primary goal of the Phase I work was to attempt to identify all archaeological sites within the overall project area, and to determine whether any of the identified complexes might be of sufficient significance as to seriously constrain or prevent proposed park expansion and development. The Phase I work identified 259 sites and site complexes containing an estimated 627 component features. None of the sites/features were considered extraordinarily significant, and it was concluded that a mitigated negative declaration could be rendered in the EIS. The Phase I findings justified continuing with Phase II of the archaeological inventory survey program.

Phase II of the inventory survey was undertaken in 1992 and involved completion of inventory-level field work at those sites which required additional evaluation and documentation. Phase II field work reduced the total number of project area sites to 164 sites from the original figure of 259. Completion of Phase II field work was followed by preparation of an Interim Report (Dunn 1992), which explained the basis for reducing the number of project area sites.

The present project represents Phase III of the archaeological inventory survey. This phase has involved analysis of all recovered cultural materials, including site and feature distributions, as well as description and analysis of recovered portable cultural material and ecofactual remains. As noted, the overall objective of the three-phased program was to provide information appropriate to and sufficient for the preparation of an environmental impact statement (EIS) which is being prepared in conjunction with the State's proposal to expand existing park facilities.

One hundred sixty-four sites containing approximately 425 component features have been identified and recorded within the current project area. This total includes 121 of the 259 sites that had originally been identified during the Phase I survey work (Burgett and Rosendahl 1990. Of the remaining 138 previously identified sites, 13 were determined to be located outside the project area, and 30 were determined to be either wholly contemporary hunting blinds or other recreational-related features. The remaining 95 previously identified sites were either not relocated, were reinvestigated and determined not to be cultural features, or they had been destroyed during the interval between Phase I and Phase II field survey work. In addition to the 121 previously identified sites, 43 sites were newly identified and recorded during the Phase II field work.

The sites included the following feature types: adjoining C-shapes, alignment, cairn, cairn with adjoining wall, cleared area, circular alignment, circular enclosure, circular wall, C-shape, C-shape wall, C-shape with adjoining wall, depression, enclosure, enclosure with adjoining C-shape, foundation, hearth, D-shaped alignment, L-shaped wall, L-shaped alignment, midden scatter, modified outcrop, mound, overhang, parallel walls, paved area, paved terrace remnant, pylons, ramp, remnant enclosure, remnant terrace, remnant U-shape, rubble concentration, semi-circular alignment, terrace, terrace with adjoining wall, trail, trail segment, U-shape, upright stones, wall, wall remnant, and wall segment. A range of functional interpretations have been made for these formal feature types, including agriculture, fence line, habitation, hunting blind, indeterminate, marker, military, park maintenance, possible agriculture, possible ceremonial, possible marker, possible military, possible post support, possible temporary habitation, recreation, temporary habitation, trail marker, transportation, and water transportation. In some cases more than one functional interpretation was assigned to a single feature. As inferred from inventory-level data, the predominant functional activities represented appear to include temporary habitation, agriculture, habitation, and transportation (evidenced by markers, cairns and trails).

Of the 164 sites identified and recorded within or immediately adjacent to the project area, 156 are assessed as being significant or potentially significant solely for information content. However, for 138 of these sites, the present level of documentation (detailed recording of sites and features, surface collections, and limited test excavations) is considered sufficient to have recovered all of the significant information values represented by these sites, and no further archaeological data collection is warranted or recommended. Of the remaining 18 sites considered significant solely for information content, further data collection/recovery work is recommended. The remaining eight project area sites are considered significant under multiple criteria. Sites 19367 and 19368 represent two of four large coastal complex sites believed to contain permanent or semi-permanent habitation features. Both retain potentially significant information value, and both may possess feature configurations which warrant some level of preservation and interpretive development. For both of these sites, further data recovery work, followed by some level of preservation with interpretive development, has been recommended. Site 19366, as with Sites 19367 and 19368, represents a large coastal complex habitation site which retains significant information value and value as a site type. As well, this site contains two trail segments and two possible ceremonial features (Features F and J), rendering the site significant for cultural value as well. Additional data recovery work, followed by some level of preservation with interpretive development, is therefore recommended for this site.

Site 19365, as with Sites 19366, 19367 and 19368, represents a large coastal complex habitation site which retains significant information value and value as a site type. This site also contains a trail segment, rendering the site significant for cultural value. As well, this site contains two possible burial features (Features E and M). Additional data recovery work, followed by some level of preservation with interpretive development and possible preservation "as is" for any identified human remains, has been recommended for this site. Three single-component sites consisting of trails or trail segments are assessed as being significant for information value as well as culturally significant (19406, 19410, 19413). For these three sites, the present level of recording is considered sufficient to have recovered all of the significant information values represented by these sites, and no further data collection is warranted or recommended. Site 19305 consists of a modified outcrop and has been assessed as significant for residual information value as well as potentially cultural significant because the feature present may be ceremonial in nature. For this site, further data recovery work is recommended, with a provisional recommendation of preservation with interpretive development, pending the results of additional data recovery work.

Contents

INTRODUCTION • 1
Background • 1
Scope of Work • 1
Project Area Description • 3
Previous Archaeological Research • 5
Culture-Historical Summary and Settlement Patterns • 10
Field Methods and Procedures • 14

FINDINGS • 20
Surface Findings • 22
Subsurface Evaluations • 57

DATA ANALYSES by Susan T. Goodfellow, Ph.D. • 65
Age Determinations • 65
Portable Artifacts • 67
Ecofactual Remains • 81

CONCLUSION • 88
General Summary of Findings • 88
General Significance Assessments and Recommended General Treatments • 91

REFERENCES CITED • 99

APPENDIX A: Site Descriptions • A-1

APPENDIX B: Summary of Identified Sites and Features • B-1

APPENDIX C: Stratigraphic Descriptions for Excavated Test Units • C-1

APPENDIX D: Historical Documentary Research by Kepa Maly • D-1

Illustrations

Figure 1. Project Location • 4

Figure 2. Project Area Location and Site Locations • 21

Figure 3. Distribution of Habitation Sites • 47

Figure 4. Feature A Enclosure at Site 19366 • 48

Figure 5. Feature O Enclosure at Site 19366 • 49

Figure 6. Cleared Areas and Habitation Features in Relation to Trail System, Site 19366 • 50

Figure 7. Distribution of Temporary Habitation Sites • 52

Figure 8. Site 19342, Features A and G, Multi-Component Site Exhibiting a Temporary Habitation Function • 53

Figure 9. Distribution of Agricultural Sites • 55

Figure 10. Feature F Mound at Site 19366, Possible Ceremonial Function • 56

Figure 11. Features E and M at Site 19365, Possible Burial Features • 58

Figure 12. Octopus Lures • 69

Figure 13. Basalt Cores • 71

Figure 14. Perforated Nerita picea • 73

Figure 15. Coral Abraders • 74

Figure 16. Echinoid Abraders • 75

Figure 17. Basalt Whetstones • 77

Figure 18. Modified Basalt Artifact • 78

Figure 19. Modified Gourd Artifact • 79

Figure 20. Modified Shell Artifacts • 80

Figure 21. Graphic Portrayal of Percentage Distribution of Functional Feature Types Related to Indigenous Use and Occupation of the Project Area • 90

Tables

Table 1. Previous Archaeological Work in Nearby Portions of South Kohala and North Kona • 11

Table 2. Correlation of Site Numbers • 16

Table 3. Summary of Non-Indigenous Components, Grouped by Inferred Feature Function • 24

Table 4. Frequencies of Formal Feature Types—Non-Indigenous Components • 29

Table 5. Frequences of Functional Feature Types—Non-Indigenous Components • 31

Table 6. Summary of Indigenous Components, Grouped by Inferred Feature Function • 34

Table 7. Frequencies of Formal Feature Types—Indigenous Components • 41

Table 8. Frequences of Functional Feature Types—Indigenous Components • 44

Table 9. Summary of Excavations • 60

Table 10. Summary of Radiocarbon Age Determinations • 66

Table 11. Detailed Distribution of Portable Remains • 68

Table 12. Detailed Distribution of Ecofactual Remains • 83

Table 13. Ubiquity Values for Ecofactual Remains • 85

Table 14. Summary of General Significance Assessments and Recommended General Treatments • 92

INTRODUCTION

BACKGROUND

At the request of Mr. Warren Harrison, of Harrison Associates, on behalf of their client, the State of Hawaii, Paul H. Rosendahl, Ph.D., Inc. (PHRI) recently conducted an archaeological inventory survey of the c. 750-acre Hapuna Beach State Recreation Area Expansion project area, located in the Land of Lalamilo, South Kohala District, Island of Hawaii. The present document represents the final phase of a three-phased archaeological inventory survey program.

Phase I of the inventory survey was undertaken in 1990 and involved initial site identification field work (Burgett and Rosendahl 1990). The primary goal of the Phase I work was to attempt to identify all archaeological sites within the overall project area, and to determine whether any of the identified complexes might be of sufficient significance as to seriously constrain or prevent proposed park expansion and development. The Phase I work identified 259 sites and site complexes containing an estimated 627 component features. None of the sites/features were considered extraordinarily significant, and it was concluded that a mitigated negative declaration could be rendered in the EIS. The Phase I findings justified continuing with Phase II of the archaeological inventory survey program.

Phase II of the inventory survey was undertaken in 1992 and involved completion of inventory-level field work at those sites which required additional evaluation and documentation. Phase II field work reduced the total number of project area sites to 164 sites from the original figure of 259. Completion of Phase II field work was followed by preparation of an Interim Report (Dunn 1992), which explained the basis for reducing the number of project area sites (this issue is also addressed in the Findings section of the present document).

The present project represents Phase III of the archaeological inventory survey. This Phase has involved analysis of all recovered cultural materials, including site and feature distributions, as well as description and analysis of recovered portable cultural material and ecofactual remains.

As noted, the overall objective of the three-phased program is to provide information appropriate to and sufficient for the preparation of an environmental impact statement (EIS) which is being prepared in conjunction with the State's proposal to expand existing park facilities.

SCOPE OF WORK

The basic purpose of an inventory survey is to identify — to discover and locate on available maps — all sites and features of potential archaeological significance present within a specified project area. An inventory survey is an initial level of archaeological investigation, and as such is extensive rather than intensive in scope. The primary aim of an inventory survey is to determine the presence or absence of archaeological resources within a specified project

area. A survey of this type indicates both the general nature and variety of archaeological remains present, and the general distribution and density of such remains. An inventory survey also permits a general significance assessment of identified archaeological resources and facilitates the formulation of recommendations and estimates for any *mitigation* work that might be necessary or appropriate. Such mitigation work typically includes further data collection (i.e., detailed recording of sites and features), and selected test excavations. In addition, mitigation often involves data recovery research excavations, as well as construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

In keeping with the primary goals of inventory surveys generally, the basic objectives of the present three-phased inventory survey program were fourfold: (a) to identify (find and locate) all sites and site complexes present within the project area; (b) to evaluate the potential general significance of all identified archaeological remains; (c) to determine the possible impacts of proposed park expansion upon the identified remains; and (d) to define the general scope of any subsequent further data collection and/or other mitigation work that might be necessary or appropriate.

Based on a review of available background literature, on PHRI's familiarity with the general and specific project area, and the requirements of State and County review authorities, coupled with discussions with Mr. Harrison of Harrison Associates, the following specific tasks were determined to constitute an adequate and appropriate scope of work for the present inventory survey program:

1. Review archaeological and historical literature relevant to the project area, and conduct limited historical documentary research, with emphasis on readily available literature and documentary sources. As well, conduct limited interviews with any appropriate and available local informants;

2. Conduct 100% coverage, low-level (30-50 ft) aerial survey (helicopter) of the entire project area, with special emphasis on (a) following out any foot trails present and plotting them on aerial photographs and/or maps, (b) identifying all sites observed, and (c) identifying areas devoid of sites (e.g., any relatively recent lava flows and/or mechanically altered lands);

3. Conduct variable coverage (partial to 100%), variable intensity pedestrian survey of the project area in order to identify and record to inventory-level standards (a) any previously identified sites and features, and (b) any previously unidentified sites and features. Survey coverage would be based, in part, on the findings of the aerial survey;

4. Conduct limited subsurface testing (manual excavation) at selected sites and features in order to (a) determine the presence or absence of potentially significant buried cultural features or deposits, and (b) obtain suitable samples for age determination analyses;

5. Analyze background research and field data; and

6. Prepare Interim and Final Reports.

In order to ensure compliance with the rules and regulations of governmental review agencies, all aspects of the inventory survey were conducted in accordance with the standards for inventory-level survey recommended by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD). The significance of all archaeological remains identified within the project area were therefore assessed in terms of (a) the National Register of Historic Places eligibility criteria contained in the Code of Federal Regulations (36 CFR Part 60), and (b) the criteria for evaluation of traditional cultural values prepared by the national Advisory Council on Historic Preservation. DLNR-SHPD and the Hawaii County Planning Department (HCPD) use these criteria to evaluate eligibility for both the Hawaii State as well as the National Registers of Historic Places.

To further facilitate client management decisions regarding the subsequent treatment of identified resources, the general significance of all archaeological remains identified during the survey was also evaluated in terms of three PHRI Cultural Resource Management (CRM) value modes, which are derived from the above federal evaluation criteria. Sites were thus evaluated in terms of potential scientific research, interpretive, and/or cultural values. Scientific research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and cultural processes at the local, regional, and interregional levels of organization. Interpretive value refers to the potential of archaeological resources for public education and recreation. Cultural value refers to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and values.

PROJECT AREA DESCRIPTION

The Hapuna State Park Expansion Area consists of approximately 750 acres of land situated along the leeward (*kona*) shore of the district of South Kohala. The project area is in the coastal zone and a portion of the intermediate zone of the land unit now identified as Lālāmilo (*milo [Thespesia populnea]* branch). The project area includes portions of Hāpuna, Waiale'a, and Puako Bays, three prominent bays of South Kohala, and their immediate coastal flat lands (*ko kula kai*). Although identified as Lālāmilo today, early traditional accounts and mid-1800s land records generally identify the land as *Pua-kō* (Cane tassels or blossoms), rather than Lālāmilo. It appears that the name change had occurred by c. 1928, when territorial survey maps began identifying Lālāmilo as the land unit rather than Puakō. The circumstances surrounding this change are presently unknown.

The Phase I survey work involved a project area of approximately 700 acres. By the time the Phase II field survey work was undertaken, however, three additional areas, contiguous to the original project area and totaling approximately 50 acres, had been added. One of these areas involved an extension to the southwest portion of the original project area, involving lands adjacent to the boat ramp at Puako. The second area was located in the far northeast corner of the original project area, inland of Queen Kaahumanu Highway. The third area was in the far southeast portion of the original project area, also inland of Queen Kaahumanu Highway. These three areas had not been previously subjected to helicopter survey, but were evaluated during the Phase II field work by walking a series of pedestrian sweeps oriented north-south and east-west.

Figure 1 identifies all of the Phase I and Phase II project area lands. As finally configured, the project area is bounded along the west by the Pacific Ocean, along the north by the northern

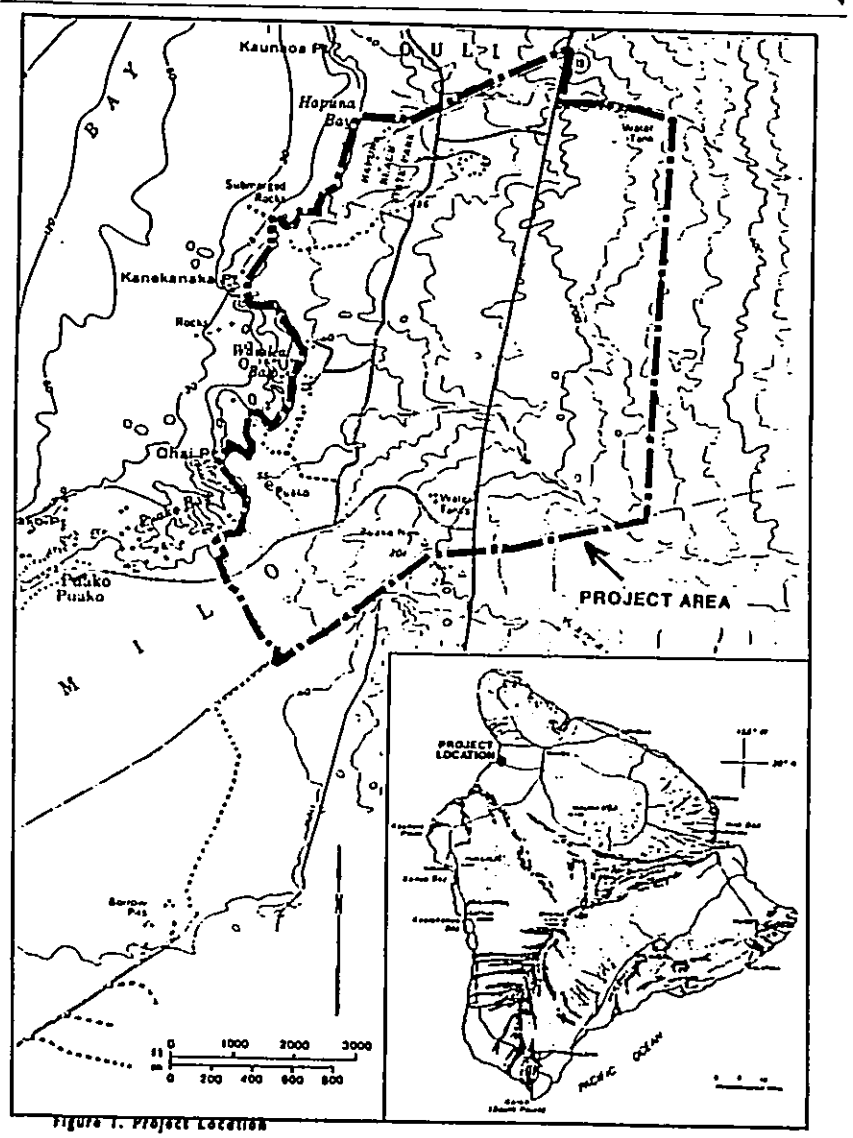


Figure 1. Project Location

portion of Hapuna Bay and the South Kohala Resort Complex, and along the south by the boundary between Lalamilo and Waikoloa. The eastern boundary roughly parallels Queen Kaahumanu Highway at a point c. 2,200 feet east of the highway.

The hot, dry climate of the project area is directly related to physiographic and orographic phenomena associated with the proximity and relative position of Kohala Mountain, Mauna Kea, and Mauna Loa. These land masses interrupt the moisture-laden northeast tradewinds that predominate much of the year, creating a "rain shadow" to the west and southwest. Mean annual rainfall is less than about ten inches, with approximately 75% occurring during the six-month winter season which typically starts in October-November and continues through March-April. Mean annual temperature is about 77 degrees F., with a maximum seasonal variation ranging from ca. 64 degrees to about 89 degrees F.

The geologic base of the project area consists of Pleistocene Mauna Kea flows of the upper member of the Hamakua volcanic series. These chiefly basaltic lava flows are capped by Pahala ash deposits in many areas. Extensive areas of beach sand are found along the coast, and exposures of the underlying pahoehoe lava bedrock are common throughout the project area. The limited surface water has skewed the erosion of the most prominent land forms in this area, which occur within moderately to gently sloping pahoehoe flows and are represented by collapsed blisters, small overhangs, caves, and upthrusts. As well, several ephemeral drainage channels proceed roughly east-west through the project area.

The soil within the coastal zone consists primarily of a sparse aeolian-deposited silt loam which is present on exposed pahoehoe bedrock and in some of the caves. A few of the coastal caves also contain pools of water, with strand lines revealing the maximum extent of tidal intrusion. More significant soil development has occurred within the inland portions of the project area, although even here large expanses of exposed pahoehoe are present. Generally, the principal soil is Kawaihae extremely stony very fine sandy loam (6-12% slopes).

Currently, vegetation throughout the project area, including both coastal and inland zones, is dominated by light to moderate stands of *kiawe* bushes and trees (*Prosopis pallida* Humb. and Bonpl. ex Willd.). Also present is the native shrub, *'ilima* (*Sida fallax* Walp.). Another introduced tree species, *koa-haole* (*Leucaena glauca* [L.] Benth.), is represented in the wetter gully bottoms, where it commingles with a variety of grasses.

Little specific information is available concerning the local marine environment. Generally, however, this section of coastline reflects only moderate development of littoral and marine habitats. Along Hapuna Bay, for example, sandy bottoms and beach segments dominate the shore. However, these features are intervened by rocky shores, sea cliffs, and boulder beaches separating Hapuna from Kaunaoa Bay to the north, and even more extensive reef development at Puako Bay to the south. These habitats generally support a variety of species of molluscs, sea urchins, seaweeds, and crustaceans that were important to the prehistoric inhabitants of the region, particularly around Puako. While the inshore waters support a diverse community of fish, echinoderms, crustaceans, and bottom-dwelling molluscs, the deeper offshore waters contain larger pelagic and bottom fishes, as they do elsewhere in West Hawaii.

PREVIOUS ARCHAEOLOGICAL RESEARCH

Extensive archaeological research has been undertaken within West Hawaii generally, including coastal and upland portions of several land units within South Kohala, principally

Anaehoomalu, Waikoloa, Kalahuipuaa, Lalamilo, and Ouli. Some of this work is very recent and ongoing, while other studies date to the 1950's and early 1960's, and earlier. Particularly relevant to the present project area are those studies at and around Puako and adjacent lands to the south, as well as studies involving lands immediately north of the project area and north of Hapuna Bay. Also relevant are some of the studies involving inland portions of these *ahupua'a*.

Kenneth Emory in 1955 briefly investigated a number of sites at Kalahuipuaa and conducted excavations at a large shelter cave (HA-E1-342). During the same period he also excavated a cave shelter (Site H101) at Puako. Although the results of these excavations were not published, Emory's findings are summarized in Kirch's "Notes On the Excavation of Site H101, Paniau Shelter" (Kirch 1979:198). Kirch also summarizes other early investigations at Puako, including excavations conducted by Colin Smart in 1962-63 at the Puako Bay coastal midden site (HA-E3-2), as well as a 1964 Bishop Museum study of the Puako Petroglyph Fields (E3-1). Excavations at HA-E3-2 yielded portable artifacts and faunal remains but no absolute age estimates. During the study of the petroglyph field, the Bishop Museum team mapped and photographed c. 3,000 petroglyphs (ibid.).

During the survey of the Kailua-Kawaihae Road Corridor (Ching 1971), which proceeds through the eastern portion of the present project area, 665 features were recorded, several of which are believed to have been re-located during the present project. Features types encountered during this survey include dwelling caves, house platforms, rock and cave shelters, walled shelters, enclosures, burials, trails, cairns, refuge cave, *holua* slide, possible *holua* slide, adzer manufacturing areas, petroglyph areas, stone mounds, terraces, walls, unassociated firepits, storage vault, and unknown function. A total of 28 features and three complexes were encountered within the Lalamilo section of the road corridor.

Subsequently, Rosendahl (1972a) conducted salvage excavations at the three site complexes within the Lalamilo section of the road corridor, including one complex on the border of Waikoloa and Lalamilo *ahupua'a*. Rosendahl's work focused primarily on defining the nature of aboriginal residential occupation and the interrelationships among resource zones. Rosendahl's findings confirmed that the primary focus of occupation within the barren inland zone involved (a) the use of temporary shelters by people traveling between the coastal and upland zones, (b) temporary and extended residential occupation by people engaged in marine and other exploitation activities along the coast, and (c) storage facilities for marine-exploitation gear and other recurrently used possessions. The results of limited dating suggested primary use from c. AD 1500 through the post-1778 contact period (Rosendahl 1972a:iv).

In 1972, the Bishop Museum conducted a brief survey of the proposed and alternate alignments of the Puako Beach Lots Spur Road located south of the present project area (Rosendahl 1972b). Six sites were identified, briefly described, and plotted on maps. The formal feature types encountered included cairns, pavements, and walled shelters.

In 1973 and 1975, the Bishop Museum conducted an extensive two-phase archaeological survey in the *ahupua'a* of Kalahuipuaa, Waikoloa, and Lalamilo, on lands owned or leased by Mauna Lani Resorts. With the exception of privately owned lands south of Puako Bay, the survey included most of the coastal lands between the shore and the Kailua-Kawaihae Highway, from Puako in the north to Honokaope Bay near Anaehoomalu. One hundred seventy-nine sites containing approximately 449 features were recorded during the survey

(Kirch 1979:3). Fifteen of the 149 sites were located in Lalamilo. With the exception of Site E3-21, an historic cemetery, the sites appeared to be dominated by temporary habitation areas. Six of the sites were C-shape shelters, four were sites composed of more than one C-shape shelter, one was an oval structure, two were enclosures, and one was a shelter cave. All the sites were more than 300 m inland from the shoreline (Kirch 1979:3,21,22,27).

In 1975 Kirch conducted excavations at Kalahuipuaa at ten shelter cave sites containing midden deposits. The sites represented both coastal and inland environments, and the excavation sample is believed to represent approximately 70% of all midden-bearing caves within the entire 3,800 acre project area. The results of the survey and excavations later formed the basis for Kirch's (1985) synthesis of areal prehistory. The sites at Kalahuipuaa yielded age ranges indicating that occupation occurred between AD 1110-1800, with the most intensive period of occupation occurring between about AD 1500-1800 (Kirch 1979). The earliest period of occupation (AD 1100-1300) appears to have been marked by the nearly exclusive use of shelter caves. The later period saw a wider range of habitation features being utilized, including surface structures.

In 1988 Welch conducted archaeological research at the site of the Ritz-Carlton Hotel, located south of the present project area (Welch 1988a, 1988b, 1989) and within a portion of the lands prviously examined by the Bishop Museum. This work provided little new information concerning site types and densities, but did provide new precautions regarding hydration rates for volcanic glass. Specifically, Welch concluded that careful consideration must be given to the source of the volcanic glass, as well as relevant temperature data, since both significantly affect rates of hydration and hence the age estimates derived from volcanic glass.

At Anaehoomalu, a number of archaeological surveys have been completed over the last two decades. By 1989, 46 sites containing 97 component features had been identified within the Waikoloa Beach Resort parcels (Jensen 1989). Jensen subsequently completed archaeological data recovery at 18 of these 46 sites, concluding that the project area was utilized as early as AD 600-700 and continued through a series of semi-discrete episodes of use which eventually ended shortly after AD 1800. Additional, intensive survey work combined with testing programs and mitigative-level data recovery excavation has been undertaken within western-most Waikoloa, adjacent to Anaehoomalu (Jensen 1988). These studies have augmented and supplemented some of the earlier findings for this area (e.g., Barrera 1971; Kirch 1975).

Closer to the present project area; a reconnaissance survey involving lands located adjacent to the Puako petroglyph fields was conducted in 1982 by Tomonari-Tuggle (1982). The survey, which involved two parcels totaling c. 15,000 sq ft, was undertaken in conjunction with a proposal by Mauni Lani Resorts to improve access to the two large Puako petroglyph fields. Two sites were identified during the survey, one being an isolated petroglyph and the second a discontinuous, low rubble wall believed to represent an historic fence foundation.

In 1984 the B.P. Bishop Museum undertook reconnaissance survey in Lalamilo, examining c. 60 acres immediately south of the Puako petroglyph fields and north of Pauoa Bay (Welch 1984). The entire area had been included in the 3,800 acres previously examined by Kirch (1975), although reexamination was required in order to ensure compliance with new state and county regulations. Welch's field work identified one modern site and six sites of possible prehistoric origin, all on pahoehoe flows. The features included cairns, stone alignments (surface shelters), and a possible burial cave. Welch's findings illustrated the restricted range of site and feature types within inland contexts.

Paniau, located at the southwestern tip of Lalamilo, has been investigated by several researchers. Kennedy (1980) reports that Emory surveyed Paniau in 1956 and mapped 34 sites. During Kennedy's 1980 survey, 24 sites were identified within the Ruddle Property boundaries. In 1990, PHRI conducted an inventory survey (Burgett and Rosendahl 1992) identifing 26 sites containing at least 47 component features. All but one of the sites were surface structures representing four permanent/semi-permanent and 15 temporary habitations. Numerous petroglyphs, several modified sinkholes, and mounds were also identified. Few features were interpreted as agricultural, supporting the notion that there was trade of subsistence products between resource areas. Adjacent to Paniau, PHRI has also undertaken inventory survey work along a proposed extension of Puako road into the Paniau development parcel. Findings similar to those encountered during the Paniau survey were described in the road extension inventory survey report (Boudreau and Graves 1993).

To the east and northeast of the project area, investigations along the Kawaihae-Mudlane Road Corridor were undertaken in the early 1970's (Barrera and Kelly 1973). This important study identified 4,561 archaeological features. The majority of these features were situated either along the coastal margin in the vicinity of Kawaihae, or in upland zones of Lalamilo. A portion of the road corridor was re-routed to preserve a unique configuration and representative examples of features known as the Lalamilo agricultural area, the core of which was subsequently designated as an historic district (Waimea Archaeological District). Subsequent investigations along the highway corridor (Clark 1981, Clark and Kirch 1983) involved excavation of selected features and further historic documentary studies. These multidisciplinary studies were designed to further evaluate aboriginal use of different environmental zones, and to establish a chronological framework for activities occurring within the various zones. Accomplishments of the research project were numerous, including description of a previously unrecognized form of aboriginal Hawaiian intensive agriculture, referred to as "supplemental irrigation".

Immediately north of the present project area and involving portions of the north end of Hapuna Beach, a number of important studies have been undertaken. Of particular relevance are the studies involving Ouli coastal lands, from the boundary separating Lalamilo from Ouli which is located at Hapuna Bay, northward along the coast to Kaunaoa Bay.

Early surveys in this area, as elsewhere within West Hawaii, were undertaken by J.E. Reinecke, who inspected the coast from Kalahuipuaa near Puako, to Kawaihae. However, Reinecke did not record any archaeological sites along this segment of shoreline. Subsequently, research by L.J. Soehren of the Bishop Museum resulted in identifying two sites in the vicinity of the bluffs north of Hapuna Beach and along Maunaoa Point. These sites later figured importantly in more extensive evaluations of these areas.

Between December 1968 and January 1969, Rosendahl conducted a more extended surface survey of this section of coastline. A total of nineteen sites and site complexes were recorded for the coastal land between Kaunaoa Bay and Hapuna Bay, and portions of Site E4-14 at Kaunaoa Point (HRHP 50-10-11-5629) were extensively tested (Rosendahl 1969).

In January 1980, Archaeological Research Center, Hawaii (ARCH) conducted an archaeological reconnaissance survey of lands under consideration for golf course expansion by Mauna Kea Land Corporation (Ching and Hammatt 1980). Approximately 18 archaeological sites were identified between Kaunaoa Bay and Kaunaoa Point. Based on previous archaeological

work and on their own reconnaissance survey, ARCH recommended "archaeological testing combined with selective excavation of sites (15 total) in the coastal portion" (Ching and Hammatt 1980:3). This work, along with additional reconnaissance survey, was conducted by ARCH early in 1980, and involved test excavations of varying extent at 16 sites (Hammatt and Folk 1980:42-45).

In December of 1981, PHRI conducted additional intensive survey and test excavations in the coastal portion of the Land of Ouli, between Hapuna Bay and Kaunaoa Bay (Rosendahl and Kaschko 1983). Of the 37 sites which had been identified in this area, subsequent testing was recommended for 15 of them. The Kaunaoa Point Complex (Site 5629) had been tested previously (Rosendahl 1969) and had already indicated potential for more extensive work.

Following the Rosendahl and Kaschko's survey and testing work along Ouli coastal lands, Walker and Rosendahl completed additional intensive survey work within the southernmost portion of the ahupua'a of Ouli (Walker and Rosendahl 1987). This work involved a 100% survey coverage of two land parcels totaling c. 95.2 acres and comprising the South Kohala Resort Complex development project lands. This work is particularly relevant to the present project area as the two properties adjoin one another. Twenty-five sites containing at least 28 component features were identified within the overall project area. Of these, six sites had been previously recorded, and 19 sites were newly identified. The range of formal feature types included platform/enclosure, L-shaped wall segment, wall segment, surface artifact/midden concentration, trail, road, terrace wall, double C-shape, C-shape, rectangular mound, cairn, boulder alignment, recent historic refuse, and historic wooden structure.

Following submission of the report on the South Kohala Resort project area (Walker and Rosendahl 1987), PHRI undertook additional inventory survey work. This involved testing potential burial features at several of the sites that had been previously located within the Mauna Kea development lands adjacent to the north side of the South Kohala Resort parcel (Rosendahl and Graves 1990). The previous inventory survey work had identified 16 features representing possible human burials. Formal types among the possible burial features included 11 platforms, three mounds, a terrace complex, and an oval rock alignment. Archaeological testing was conducted at each of the 16 features, three of which were found to contain human skeletal remains. Eighteen of the excavated test units did not yield human skeletal remains, although in several instances unsuspected cultural deposits and/or unsuspected depth of cultural deposits were documented (Rosendahl and Graves 1990:6).

Finally, limited previous research has been undertaken within the boundaries of the present project area. This work includes Reinecke's 1930 coastal survey for the Bishop Museum (Reinecke n.d.), and Yent and Griffin's (1978) survey of an earlier proposal to expand and further develop the Hapuna Beach State Park property.

During his 1930 survey for the Bishop Museum, J.E. Reinecke inspected the coast from Kalahuipuaa, near Puako, to Kawaihae, passing through the present project area. Reinecke did not, however, record any archaeological sites within the present project area, except that coastal and several branching trails are noted on his map near Puako.

In June of 1978, staff archaeologists of the Department of Land and Natural Resources conducted archaeological reconnaissance survey at Hapuna Beach State Park (Yent and Griffin 1978). The 1978 project area was considerably smaller than the present project, comprising c. 175 acres (less than 1/3 the present project's c. 750 acres) and being bounded along the east

by the old Puako Road. A total of 76 sites were identified during the survey, all of which were assigned temporary field designations (HAP #1 through #76). Extensive military-related impacts to prehistoric features was noted, and the authors commented that many of the small surface features were likely constructed during military drills and manuevers. However, the surveyors also identified native Hawaii artifact types at several of the features, including cowry shell fragments (octopus lures), echinoid scrapers, and additional items. Clearly, temporary as opposed to permanent occupation characterized most if not all of this area during prehistoric times, although no formal archaeological testing was undertaken to evaluate this assumption. Many of the sites originally identified by Yent and Griffen were relocated during the present survey work, and an appropriate correlation table is presented in the Findings section of this report.

Table 1, provides a summary of some of the research efforts reviewed above in terms of their relevance to the current project.

CULTURE-HISTORICAL SUMMARY AND SETTLEMENT PATTERNS

As noted in the discussion above, several of the previous archaeological studies of coastal, intermediate, and upland zones have established base-line data for more thorough evaluations of settlement and land use patterns in this portion of West Hawaii. The following synthesis has been generated on the basis of archaeological data from Anaehoomalu, Kalahuipuaa, Lalamilo, Ouli, Kawaihae, and Waimea. As well, the synthesis has drawn from historic documentary research for the present project area undertaken by Kepa Maly and included in the present report as Appendix D.

For the earliest time periods, it is possible to envision sporadic exploitation of the coastal and upland resources of West Hawaii by small groups who resided elsewhere most of the year, probably along the windward coast (Jensen 1989a). Indeed, the early sites in this region of West Hawaii appear to be restricted to small coastal settlements at select areas. Based on radiocarbon and volcanic glass dates, initial occupation of the region probably occurred c. AD 600 at Anaehoomalu and was restricted to temporary habitation features. Jensen (1989a), following Kirch (1975), Cordy (1971), and others, has suggested that early habitation likely emphasized use of natural caves and overhangs, as well as construction of small, simple surface features (i.e., C-shapes, small terraces, etc.).

In addition to early use of the coastal environments at Anaehoomalu (Jensen 1989a), settlements were also being established at other coastal locales. Further north in the ahupua'a of Kawaihae 2nd (Queen's Lands at Mauna Kea), radiocarbon age determinations suggest initial occupation c. AD 800-900 (Carlson and Rosendahl 1990), and in the area between Pauoa Bay and Makaiwa Bay (Mauna Lani Cove), a radiocarbon date suggesting initial settlement by c. AD 960 was reported by Jensen (Jensen 1991).

The early inhabitants of the area exploited the shorelines, shallow water areas, solution beaches, and fringing reefs of the coastal zone, although it has also been documented that terrestrial resources (i.e., birds, pigs, and dog) also supplemented their diets. There is little evidence for agricultural activity directly associated with the initial period of occupation, although areal residents may have secured vegetative nutrients from the sea (sea weed), practiced limited agriculture at select locales (if present), and/or imported vegetative items from inland zones.

Table 1. Previous Archaeological Work in Nearby Portions of South Kohala and North Kona

Year	Author	District	Ahupua'a	*Type	Institution
1930	Reinecke	General	General	R	Bishop Museum
1955	Emory	South Kohala	Lalamilo	E	Bishop Museum
1962	Smart	South Kohala	Lalamilo	E	Bishop Museum
1971	Ching	General	General	I	
1972	Rosendahl	South Kohala	Waikoloa Lalamilo	E	Bishop Museum
1972	Rosendahl	South Kohala	Lalamilo	R	Bishop Museum
1973	Barrera	South Kohala	General	I	Bishop Museum
1975	Kirch	South Kohala	Waikoloa	I,E	Bishop Museum
1979	Kirch	South Kohala	Lalamilo	E	Bishop Museum
1980	Kennedy	South Kohala	Lalamilo	I	Archaeological Consultants of Hawaii
1982	Kaschko & Rosendahl	South Kohala	Kawaihae 2 Ouli	R,H	PHRI
1982	Tomonari-Tuggle	South Kohala	Lalamilo	R	IPHRI
1983	Rosendahl	South Kohala	Ouli		
1983	Clark & Kirch	General	General	I	Bishop Museum
1984	Welch	South Kohala	Lalamilo	I	Bishop Museum
1985	Rosendahl	North Kona	Kukio 1st	R	PHRI
1988	Welch	South Kohala	Lalamilo	I,E	International Archaeological Research Institute (IARI)
1989	Welch	South Kohala	Lalamilo	I,E	IARI
1989	Jensen	South Kohala	Waikoloa	I	PHRI
1989	Jensen	South Kohala	Anaehoomalu	E	PHRI
1989	Jensen	South Kohala	Waikoloa	I	PHRI
1990	Carlson & Rosendahl	South Kohala	Kawaihae 2	I	PHRI
1990	Graves	South Kohala	Ouli	E	PHRI
1991	Jensen	South Kohala	Waikoloa	E	PHRI
1991	Dunn & Rosendahl	South Kohala	Lalamilo	I,E	PHRI
1992	Burgett, Rosendahl, & Goodfellow	South Kohala	Lalamilo	I,E	PHRI

* R = reconnaissance survey
I = intensive survey
H = historic documentation
E = excavation

Kirch proposed that the overall population of West Hawaii was relatively low and remained fairly stable until c. AD 1200, at which point a significant, steady increase began to occur (Kirch 1985:288). Prior to this time period, primary settlements may have been limited to coastal zones, as at Anaehoomalu, Queen's Land at Mauna Kea, Mauna Lani Cove, Puako/Paniau, Puako Bay, Kawaihae, etc. However, due to insufficient data, initial occupation dates for Kawaihae and Puako Bay are presently lacking.

Coeval with the beginning of population increase at c. AD 1200 may have been a shift toward increasing reliance on surface habitation structures, at least at Anaehoomalu and Kalahuipua'a (Kirch 1979), Puako/Paniau (Boudreau and Graves 1993), and within the present project area at Hapuna Beach. Cordy (1975) has proposed that this trend — increased use of surface habitation structures such as enclosures, platforms, C-shapes, terraces, and walled shelters — may reflect of increased sedentism within these coastal environments. Despite these suggested trends, subsistence was probably still largely based on marine resources, although still supplemented with collected and gathered terrestrial items. Significantly, aquacultural features (fish ponds) have been documented as present at numerous coastal locales — e.g., Anaehoomalu (Jensen 1989a) and Kalahuipua'a (Kirch 1979).

The scarcity of agricultural features at coastal sites suggests that area residents obtained agricultural products from elsewhere. It is possible that the upland agricultural complexes of Waimea, or the legendary agricultural complex at Pu'upo'o near Keamuku may have been developed during this time period, perhaps in response to or a result of the growing population proposed by Kirch (1985) and others (see Barrera 1971). This is supported by the presence of dispersed temporary habitations in the Waimea uplands, several of which have been radiocarbon dated to AD 1200 - 1500 (Clark and Kirch 1983).

This pattern of exploiting coastal resources and importing agricultural products from more upland zones may account for the temporary nature of most of the recorded sites attributed to this time period. Rosendahl (1972c) has described the behavioral consequences of this residential pattern in the form of a "shifting residence" settlement model, predicated upon mobile population units systematically moving between key environmental zones.

Through c. AD 1500, populations continued to increase and expand. Accompanying this expanding population was an increased incidence of permanent habitation structures across several environmental zones. Investigations within the Kailua-Kawaihae road corridor between Hapuna and Anaehoomalu resulted in the identification of temporary habitations, storage features, and several water diversion features, apparently used for seasonal flood-water farming (Rosendahl 1972a). Rosendahl's findings suggest that the primary focus of occupation within this otherwise "barren" zone involved (a) the use of temporary shelters by people travelling between the coastal and upland zones, (b) temporary and extended residential occupation by people engaged in marine and other exploitation activities, and (c) storage facilities for marine-exploitation gear and other recurrently used possessions. The results of dating analysis suggest initial construction of these features around AD 1500 (Rosendahl 1972a:iv).

In contrast to Rosendahl's hypothesis that populations moved between resource zones, Hommon suggests that the period of inland expansion saw concurrent occupation of coastal residences and inland sites, with the separate populations of these two areas exchanging their specialized commodities and thus creating a social trading network (Hommon 1976:258). Hommon's hypothesis may be supported by the presence of several coastal/inland trail systems

in this region (i.e., the coastal-inland Trail #8 at Mauna Kea, the Puako-Waimea and the Puako-Keamuku trails), as well as numerous coastal trails (including the Kawaihae-Puako and the Kiholo-Puako systems). Additional evidence for product exchange during this period exists at Anaehoomalu, where specialized abrader tools were manufactured in abundance. Numerous abrader basins, associated with temporary habitations, have been identified at coastal Waikoloa, Anaehoomalu, Kalahuipua'a, and the Mauna Lani Cove area (Jensen 1989a, 1991; Dunham 1987; Kirch 1979). The temporary habitation shelters associated with the abrader basins have been dated to c. AD 1400-1800 (Jensen 1991). However, it should be emphasized that both sets of data are also compatible with Rosendahl's model of population movement between resource zones.

In any case, it is clear that while shifting residence may have characterized the initial phase of population increase and population expansion, a more sedentary existence was emerging within both coastal and upland zones during the later stages of this period. Thus, between about AD 1500-1650, many of the surface habitation structures identified at Kalahuipua'a document more permanent occupation of this section of coast line (Kirch 1979). Long term/permanent occupation in the Waimea uplands is also clearly evident by c. AD 1700 (Clark and Kirch 1983). These findings clearly suggest that a major settlement pattern shift had occurred in West Hawaii by about AD 1650. As Rosendahl had earlier suggested (Rosendahl 1972c), at some point it apparently became more efficient to transport resources between the environmental zones, rather than acquiring the resources from these various zones through periodic migration of people.

This new settlement pattern is likely to have required concomitant changes in the social system. Kirch (1985) and Hommon (1976) have suggested that by AD 1700-1800 there was an elaboration of social stratification, and intensified food production and resource exploitation. The new settlement pattern may have resembled the *'ili ohana* model described by Handy and Pukui (1958).

Concurrent permanent occupation of upland and coastal environments may not have continued into the historic period. According to Kirch (1985) the population of West Hawaii began declining c. AD 1700, although Welch has identified and discussed a number of potential errors in dating and other data sources (Welch 1989:100). The issue may actually be much more complex than problems associated with dating. As Kirch notes, the growth of major economic and political centers such as Kawaihae, Waimea, and Kailua may have contributed to the population decline within more marginal zones, such as the Ouli/South Kohala region (Kirch 1985:288). Additionally, development of major prehistoric transportation routes (by sea and land) linking the major population centers may have contributed to reduced contact with coastal areas between Kailua and Kawaihae. Thus, the population decline proposed by Kirch (1985) may have actually been a population realignment, at least in the North Kona/South Kohala region.

Clearly, numerous additional questions have arisen from attempts to determine whether early historic-era populations were actually declining or increasing. Ancillary issues have included, for example, observations by Reeves (IN Clark and Kirch 1983:236) as to whether or not the drive by Kamehameha I to finance his territorial expansion may have led to the increased use of marginal lands in the Waimea area, and may have precipitated the use of supplemental irrigation systems there. Further, around AD 1791, Kamehameha I constructed the large Pu'ukohala *heiau* south of Kawaihae, an undertaking which obviously required the labor of "thousands of people encamped on the neighboring hillsides", according to Fornander (1969:2,238). The implications of these events and circumstances re. population fluctuations within the project area must also be considered.

Finally, there is no question that aboriginal Hawaiian settlement and subsistence were radically altered by the influx of Europeas following Cook's arrival (AD 1779). The Europeans introduced numerous plants and animals that not only changed the Hawaiian life style but altered the native vegetation (Newman 1970). Several introduced plants and animals were listed by Newman, including squash, melons, pumpkins, cattle, sheep, and goats. Newman also reports that overgrazing by livestock affected to some degree all of the vegetation on the island of Hawaii. Some portions, particularly the drier areas, underwent complete alteration. One of the most obvious consequences of introducing exotic plants and animals was architectural innature. The Hawaiian farmer now had to build protective walls (enclosures) around their lands to exclude animals. Evidence for this is found throughout West Hawaii (e.g., Carlson and Rosendahl 1990).

The final period of use of the project area dates from about 1941. WWII resulted in intensive activitites along this section of shoreline, including construction of many small defensive outposts along ridges and elsewhere. As well, some of these features were subsequently utilized and modified, and new ones constructed, by campers and others engaged in essentially recreational activities during the past 20-30 years. Many of these features were incorporated as component features within recorded archaeological sites, both by Yent and Griffin in 1978, and during the present survey project. As discussed below, these features are evaluated and discussed separately within the Findings section, below.

FIELD METHODS AND PROCEDURES

As noted under "Scope of Work", above, field work was undertaken in two primary phases. Phase I involved a 100% coverage, low-level aerial survey of the entire project area, followed by limited pedestrian survey (Burgett and Rosendahl 1990). The purpose of Phase I was to identify and record areas of site concentration, areas which might be devoid of sites, and the general density and characteristics of sites present. This work resulted in identifying a total of 259 sites containing approximately 627 component features within or close to the project area boundaries.

The Phase I survey work was followed by Phase II inventory survey work, which involved a complete coverage, variable intensity pedestrian survey of the entire project area in order to accurately identify, further assess, and record to inventory-level standards all significant and potentially significant cultural resources located within or immediately adjacent to the project area. The findings of this second phase of field work is the subject of the present final inventory survey report.

During Phase II, the temporary site numbers assigned during Phase I were retained (i.e., site numbers prefixed with PHRI project number "855"). Sites newly identified during Phase II were assigned temporary numbers prefixed by "1245". As discussed below, the Phase I finding of 259 sites was reduced to 164 sites during Phase II. This total includes 121 of the previously identified sites ("855" sites), and 43 newly identified sites (prefixed by "1245").

During the Phase II survey work, all project area sites were plotted onto topographic and more detailed project area maps (1"= 200 ft). The sites were located using a tape, hand-held compass, and topographic landmarks within and near the project area. Sites were then recorded on standard PHRI site-record forms, scaled sketch maps were drawn, and the sites were

photographed with 35mm black-and-white film. To aid in reidentification, all features were tagged with an aluminum strip bearing the temporary site number, feature letter, PHRI project number (i.e., "92-1245"), the letters "PHRI," and the date.

As part of the inventory survey, test excavation units were placed at various features/sites in the project area. The purpose of the units was to gather information on the nature and extent of cultural deposits and to collect carbon samples for radiocarbon dating. The test units were excavated by natural layers unless cultural deposits were uncovered, in which case arbitrary levels were excavated within layers. All fill was processed through 1/8-inch mesh screens to facilitate recovery of portable artifacts and midden. Portions of structural features were dismantled as part of the test excavation work, and cross-sections were documented graphically. All soil layers encountered were described following the format used in the Soil Survey Manual (Soil Survey Staff 1962).

Table 2 provides a correlation of all known site numbers for the 164 sites which have now been formally recorded within the project area.

Table 2. Correlation of Site Numbers

*SIHP	PHRI
19250	855-003
19251	855-004
19252	855-005
19253	855-006
19254	855-007
19255	855-008
19256	855-009
19257	855-010
19258	855-011
19259	855-012
19260	855-013
19261	855-014
19262	855-016
19263	855-017
19264	855-022
19265	855-027
19266	855-028
19267	855-029
19268	855-030
19269	855-031
19270	855-034
19271	855-035
19272	855-036
19273	855-037
19274	855-038
19275	855-039
19276	855-041
19277	855-042
19278	855-043
19279	855-044
19280	855-045
19281	855-047
19282	855-049
19283	855-051
19284	855-052
19285	855-053
19286	855-054
19287	855-055
19288	855-056
19289	855-057

* *State Inventory of Historic Places (SIHP) numbers. SIHP numbers are five-digit numbers prefixed by 50-10-11 (50=State of Hawaii; 10=Island of Hawaii; 11=USGS 7.5' series quad map ["Puu Hinai, Hawaii"]).*

Numbers preceded by 855 or 1245 are PHRI temporary site numbers.

Table 2. (cont.)

SIHP	PHRI
19290	855-058
19291	855-059
19292	855-064
19293	855-069
19294	855-070
19295	855-073
19296	855-074
19297	855-075
19298	855-077
19299	855-078
19300	855-080
19301	855-081
19302	855-082
19303	855-088
19304	855-089
19305	855-092
19306	855-093
19307	855-096
19308	855-098
19309	855-100
19310	855-101
19311	855-102
19312	855-103
19313	855-106
19314	855-107
19315	855-109
19316	855-113
19317	855-115
19318	855-117
19319	855-119
19320	855-121
19321	855-122
19322	855-123
19323	855-125
19324	855-126
19325	855-127
19326	855-136
19327	855-140
19328	855-144
19329	855-149
19330	855-154
19331	855-155
19332	855-158
19333	855-160
19334	855-161
19335	855-165
19336	855-168

Table 2. (cont.)

SIHP	PHRI
19337	855-174
19338	855-175
19339	855-176
19340	855-178
19341	855-179
19342	855-185
19343	855-193
19344	855-209
19345	855-212
19346	855-213
19347	855-214
19348	855-215
19349	855-217
19350	855-221
19351	855-222
19352	855-223
19353	855-224
19354	855-226
19355	855-234
19356	855-236
19357	855-237
19358	855-241
19359	855-242
19360	855-248
19361	855-250
19362	855-251
19363	855-253
19364	855-254
19365	855-255
19366	855-256
19367	855-257
19368	855-258
19369	855-259
19370	855-260
19371	1245-261
19372	1245-262
19373	1245-263
19374	1245-264
19375	1245-265
19376	1245-266
19377	1245-267
19378	1245-268
19379	1245-269
19380	1245-270
19381	1245-271
19382	1245-274
19383	1245-275

Table 2. (cont.)

SIHP	PHRI
19384	1245-276
19385	1245-277
19386	1245-278
19387	1245-279
19388	1245-280
19389	1245-281
19390	1245-282
19391	1245-283
19392	1245-284
19393	1245-285
19394	1245-286
19395	1245-287
19396	1245-301
19397	1245-303
19398	1245-304
19399	1245-305
19400	1245-306
19401	1245-307
19402	1245-308
19403	1245-309
19404	1245-310
19405	1245-311
19406	1245-312
19407	1245-313
19408	1245-315
19409	1245-316
19410	1245-318
19411	1245-325
19412	1245-326
19413	1245-327

FINDINGS

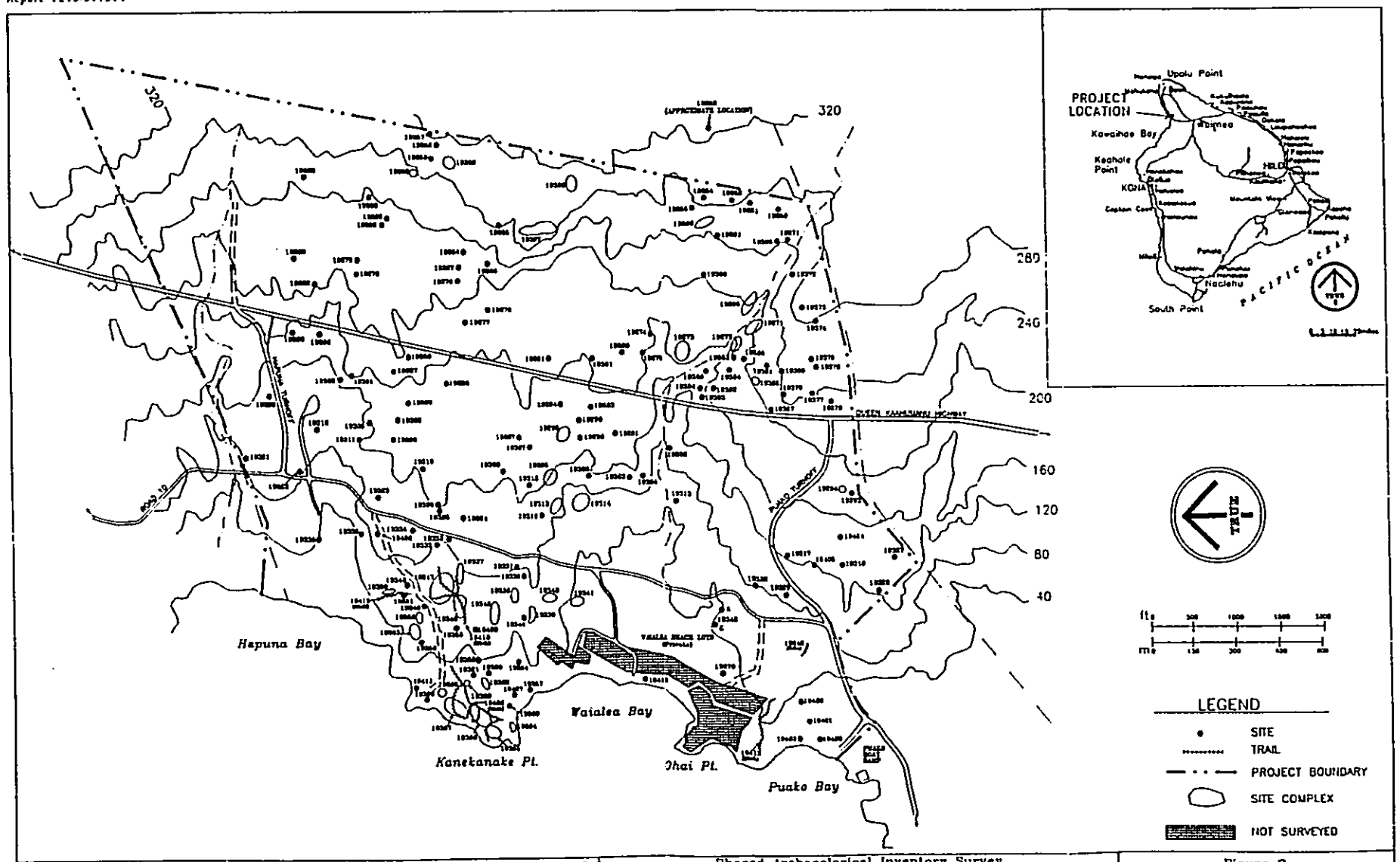
One hundred sixty-four sites containing approximately 425 component features have been identified and recorded within the current project area. This total includes 121 of the 259 sites which had originally been identified during the Phase I survey work (Burgett and Rosendahl 1990, sites prefixed with temporary number designations of "-855"). Of the remaining 138 previously identified sites, 13 were determined to be located outside the project area, and 30 were determined to be either wholly contemporary hunting blinds or other recreational-related features. The remaining 95 previously identified sites were either not relocated, were reinvestigated and determined not to be cultural features, or they had been destroyed during the interval between Phase I and Phase II field survey work. In addition to the 121 previously identified sites, 43 sites were newly identified and recorded during the Phase II field work (Dunn 1992, sites prefixed with temporary number designations of "-1245").

As part of the inventory survey, 75 shovel tests were excavated within Sites 19365, 19366, 19367, and 19368. In addition, 30 test units involving a total of 20.7 square meters of surface area were excavated at 24 features distributed among 17 separate sites. Indigenous portable artifacts collected from the excavations and surface collections include ground basalt tools, octopus lures, gourd fragments, worked marine shell, coral abraders, *puka* beads, volcanic glass flakes, and *opihi* shell scrapers, discussed below under "Data Analyses."

As will be noted in discussions below, many of the sites have been affected by bulldozing and/or "chain dragging" operations in the area. Included among the extensively impacted sites are the major coastal complexes which include most of the features believed to represent permanent as opposed to temporary habitation within the project area. Nevertheless, substantial detailed descriptive information was recovered during the inventory survey work. This information is presented in detail for the 164 sites and their 425 component features recorded to inventory-level standards in Appendix A, and is summarized in the Summary of Identified Sites and Features table (Appendix B). Site locations are shown below in Figure 2.

The descriptions in Appendix A include the following information:

1. Site number - State Inventory of Historic Places (SIHP) numbers. SIHP numbers are four-digit numbers prefixed by 50-80-06 or 10 (50=State of Hawaii; 80=Island of Oahu; 06=USGS quad map [Kahana], or 10=USGS quad map [Kaneohe]);
2. A site type designation - provides formal feature type for sites consisting of a single feature, or designates the site as a complex if the site is comprised of more than one feature. Also lists the total number of features present;
3. A description of site topography - a brief description of the terrain in the immediate vicinity of the site;
4. A listing of site vegetation - lists principal components of the vegetation at and within the vicinity of the site;
5. A statement of site condition - overall state of preservation of the site (poor, fair, good, or excellent);



PHRI PAUL H. ROSENDAHL, Ph.D., INC.
ARCHAEOLOGICAL • HISTORICAL • CULTURAL
RESOURCE MANAGEMENT STUDIES & SERVICES

305 MOHOULI STREET
HILO, HAWAII 96720
(808) 969-1763, 981-6998(FAX)

Phased Archaeological Inventory Survey
Hapuna Beach State Recreation Area Expansion Project
Phased III – Data Analyses and Final Report
PHRI Project 92-1246

Figure 2.
PROJECT AREA LOCATION
AND SITE LOCATIONS

6. An assessment of the site integrity - degree of post abandonment modification by human agencies (unaltered, partially altered, and completely altered) and the nature of modifications, if any;

7. A probable age indicates probable/possible (?) age of the site (i.e. historic or prehistoric);

8. A functional interpretation - probable or possible function(s) for each site; or, if a function cannot be determined, assigns an indeterminate function. For sites with multiple possible functions, the functions are separated by "/";

9. A site description - a brief overall description of the site listing types of constituent features, portable remains present, if any, and other site data; and

10. Feature dimensions - maximum length, width, and height or depth. Dimensions are immediately followed by a description of feature construction, associated portable remains, and other descriptive information.

SURFACE FINDINGS

A total of 164 sites have been identified in the project area (see Figure 2). Of this total, 104 (63.4%) consist of single structural features, with the remaining 60 (36.6%) representing complexes of two or more features. Several of the coastal complexes contain accumulated cultural deposits at and around fairly substantial habitation features and feature remnants, all of which appear to represent permanent habitation dating to prehistoric through early historic time periods. The largest of this group of permanently occupied coastal sites (Site 13366) contains a total of 28 separately identified features and feature remnants.

Despite the extensive impacts which have occurred to many of the sites/features, a fairly wide range of formal feature types could be defined on the basis of surface observations of feature architecture and construction techniques. These formal types include adjoining C-shapes, alignment, cairn, cairn with adjoining wall, cleared area, circular alignment, circular enclosure, circular wall, C-shape, C-shape wall, C-shape with adjoining wall, depression, enclosure, enclosure with adjoining C-shape, foundation, hearth, D-shaped alignment, L-shaped wall, L-shaped alignment, midden scatter, modified outcrop, mound, overhang, parallel walls, paved area, paved terrace remnant, pylons, ramp, remnant enclosure, remnant terrace, remnant U-shape, rubble concentration, semi-circular alignment, terrace, terrace with adjoining wall, trail, trail segment, U-shape, upright stones, wall, wall remnant, and wall segment.

A range of functional interpretations have been made for these formal feature types, including agriculture, fence line, habitation, hunting blind, indeterminate, marker, military, park maintenance, possible agriculture, possible ceremonial, possible marker, possible military, possible post support, possible temporary habitation, recreation, temporary habitation, trail marker, transportation, and water transportation. In some cases more than one functional interpretation was assigned to a single feature.

As inferred from inventory-level data, the predominant functional activities represented appear to include temporary habitation, agriculture, habitation, and transportation (evidenced by markers, cairns and trails). Clearly, exploitation of the area's marine resources, coupled with agricultural activity within gulch areas, while operating from both permanently occupied feature complexes as well as temporarily occupied sites, represent important activities for Native Hawaiian occupants of the region. Equally clearly, however, is the fact that a variety of non-subsistence-related, non-indigenous, post-1940's activities are also represented among the project area's cultural resource base.

Indeed, extensive "noise" was introduced into the data by the fact that the exigencies of site recording required that both indigenous as well as non-indigenous features were grouped together at many of the individually recorded sites. This intermixing of components rendered many of the resultant site complexes behaviorally meaningless. In order to neutralize this effect — i.e., in order to be able to evaluate prehistoric and early historic patterns of land use and settlement — it was necessary to *segregate* Native Hawaiian from non-Native Hawaiian components, and, once segregated, to treat each group of features as an independent data base. This task was accomplished simply by creating two separate feature summary tables based upon inferred feature function.

Table 3 provides a listing of 188 of the project area's 425 recorded features distributed among 111 recorded sites. These features represent post-1940's activities, including features constructed during episodes of military training at Hapuna, and fully modern activities such as hunting, State Park maintenance, and recreation. A variety of formal feature types are represented in this group of 188 components, including especially mounds, C-shapes, cairns, walls, modified outcrops, and enclosures. The frequencies of occurrence of these various formal types are summarized in Table 4. As noted above, the functional assignments made on the basis of associated artifacts and/or architectural details suggest that these features represent 1940's and more recent activities. Approximately 24 features are believed to represent modern hunting blinds or probable hunting blinds, while an additional 110 features have been assigned a "military" function, or probable military function. Additional feature types include cairns believed to represent fence post supports, or ground supports for posts which stabilized military tarps or covers, as well as 17 small surface habitation features lacking typical indigenous midden remains but containing modern artifacts. These latter features have been assigned a temporary habitation function, although cultural affiliation is considered to be military. Also represented are modern water transportation features ("pylons"), as well as flattened "staging" areas which are believed related to Hapuna Beach State Park maintenance activities. An additional 15 features (primarily mounds and modified outcrops) could not be assigned a function with any degree of certainty, but the absence of typical indigenous midden debris suggests likely military or contemporary affiliation. The frequencies of occurrence of the various functional types are summarized in Table 5.

Many, but not all, of these features were mapped to inventory-level standards, during which representative dimensional data was obtained for each of the sub-types identified. Available metric information is summarized in Table 3, while additional descriptive detail is provided in Appendix A.

Lastly, during the process of evaluating feature function, one of these features was subjected to subsurface archaeological testing. A single shovel test pit (ST-D8) was excavated within Feature A mound at Site 19367. No cultural materials were identified or recovered, and architectural details of the feature led to the conclusion that it probably represents post-indigenous activities.

Table 3. Summary of Non-Indigenous Components, Grouped by Inferred Feature Function

Inferred Feature Function	SHIP	PIRTY	Feat	Formal Feature Type	Feat. Length	Feat. Width	Feat. Hi-Depth
Hunting Blind	19250	855:001	A	C-shape	2.1	1.05	0.41
Hunting Blind	19250	855:003	B	C-shape	1.9	1.25	0.35
Hunting Blind	19251	855:004		C-shape			
Hunting Blind	19252	855:005		C-shape			
Hunting Blind	19254	855:007		C-shape			
Hunting Blind	19392	1245:284		C-shape			
Hunting Blind	19270	855:031		Wall			
Hunting Blind	19272	855:034	A	Wall	1.33	0.3	0.38
Hunting Blind	19272	855:036	B	Wall	1.5	0.3	0.35
Hunting Blind	19348	855:215	C	Wall	2.3	1.25	0.42
Hunting Blind	19381	1245:271		Wall			
Hunting Blind	19384	1245:276		Wall			
Hunting Blind	19386	1245:278		Wall			
Hunting Blind	19387	1245:280		Wall			
Hunting Blind	19393	1245:285		Wall			
Hunting Blind	19394	1245:286		Wall			
Subtotal n 18							
Hunting Blind/military	19253	855:006	A	C-shape	1.9	1.3	0.7
Hunting Blind/military	19255	855:006	B	C-shape	1.85	1.45	0.43
Hunting Blind/military	19257	855:008		C-shape			
Hunting Blind/military	19337	855:040		Modified concrete			
Hunting Blind/military	19350	855:257	A	U-shape	1.75	1.3	0.68
Hunting Blind/military	19368	855:030		Wall			
Hunting Blind/military	19385	855:051		Wall			
Hunting Blind/military	19325	855:137		Wall			
Subtotal n 8							
Military	19230	855:041		Alignment			
Military	19323	855:125		Alignment			
Military	19345	855:215		Alignment	10.7	0.75	0.41
Military	19247	855:055		C-shape			
Military	19295	855:021	D	C-shape	2.9	2.65	0.45
Military	19299	855:024		C-shape			
Military	19330	855:121	A	C-shape	2.3	1.8	0.5
Military	19331	855:122		C-shape			
Military	19332	855:158		C-shape			
Military	19326	855:213	B	C-shape	2.2	1.3	0.43
Military	19326	855:213		C-shape	2.3	1.6	0.4
Military	19352	855:253	A	C-shape			
Military	19352	855:253	B	C-shape			
Military	19352	855:253	C	C-shape			
Military	19352	855:253	D	C-shape			
Military	19352	855:253	E	C-shape			
Military	19353	855:254	A	C-shape			

Table 3. (cont.)

Military	19353	855:254	B	C-shape			
Military	19353	855:254	C	C-shape			
Military	19353	855:254	D	C-shape			
Military	19353	855:254	E	C-shape			
Military	19355	855:254	F	C-shape			
Military	19326	855:246	G	C-shape	1.9	1	0.33
Military	19384	855:065		C-shape	4	1.4	0.35
Military	19256	855:009		C-shape wall			
Military	19257	855:010		Cairn			
Military	19260	855:013		Cairn			
Military	19260	855:013	A	Cairn	0.6	0.5	0.3
Military	19260	855:013	B	Cairn	1	0.8	0.3
Military	19260	855:013	A	Cairn	1.2	1	0.2
Military	19260	855:013	C	Cairn	0.96	0.95	0.3
Military	19264	855:032	A	Cairn	1.3	0.8	0.3
Military	19264	855:035	B	Cairn	0.6	0.45	0.2
Military	19335	855:217		Cairn	0.6		0.33
Military	19283	855:035		Cairn			
Military	19260	855:058		Cairn			
Military	19306	855:093		Cairn	0.8	0.8	0.3
Military	19307	855:100		Cairn			
Military	19311	855:105		Cairn			
Military	19346	855:213	C	Cairn	1.4	1.3	0.33
Military	19335	855:258	A	Cairn	1	1	0.42
Military	19395	1245:287		Cairn	0.65	0.6	0.41
Military	19395	1245:287		Cairn	0.67	0.58	0.18
Military	19301	855:081		Circular enclosure			
Military	19285	855:046		Depression			
Military	19304	1245:301		Depression			
Military	19258	855:027	A	Enclosure	1	1	0.3
Military	19346	855:213	C	Enclosure	4.1	2.9	0.33
Military	19348	855:213	N	Enclosure			
Military	19397	1245:303	N	Enclosure	3.5	3.1	0.38
Military	19298	855:077	N	L-shape wall	1.9	1.6	0.4
Military	19278	855:061		Modified concrete			
Military	19320	855:125	A	Modified concrete	2.8	1.3	0.35
Military	19397	1245:303	B	Modified concrete	2.6	2.3	0.3
Military	19397	1245:301	C	Modified concrete	2.2	1.7	0.35
Military	19397	1245:303	D	Modified concrete	2.5	2.3	0.3
Military	19398	1245:304	B	Modified concrete	1.8	1.1	1.1
Military	19255	855:008		Mound			
Military	19258	855:011	A	Mound	2	2	0.5
Military	19258	855:011	D	Mound	1	0.9	0.2
Military	19260	855:013	B	Mound	1.6	1	0.43
Military	19267	855:029		Mound			
Military	19303	855:085		Mound			
Military	19341	855:199		Mound	1	1	0.15
Military	19346	855:213	N	Mound	1	1.35	0.16

Table 3. (cont.)

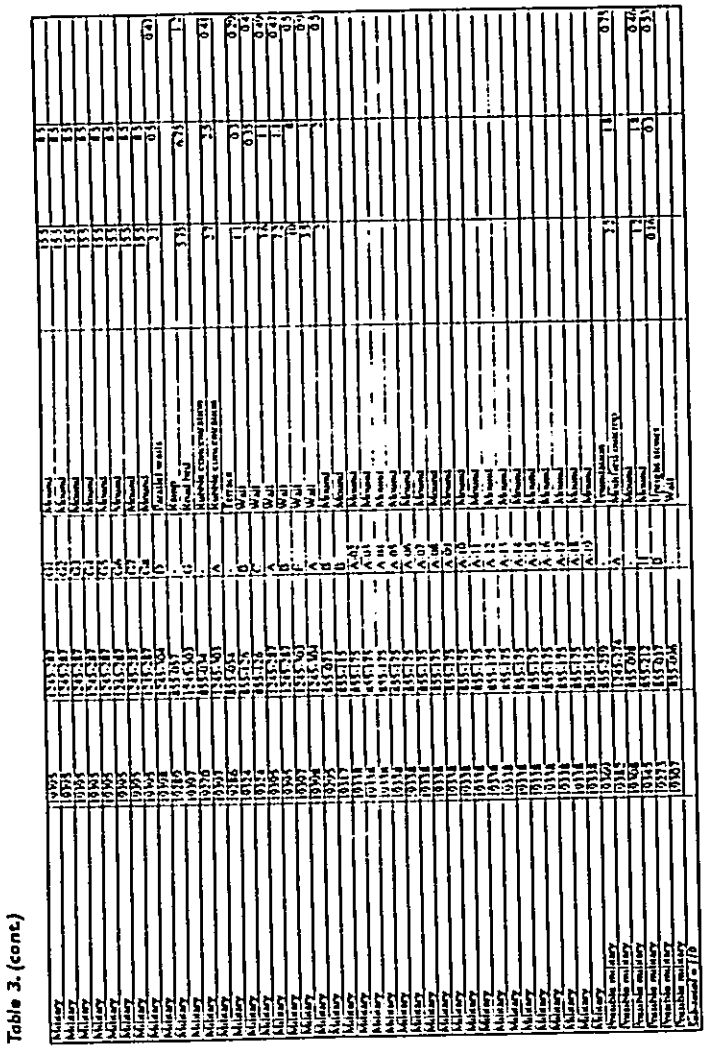
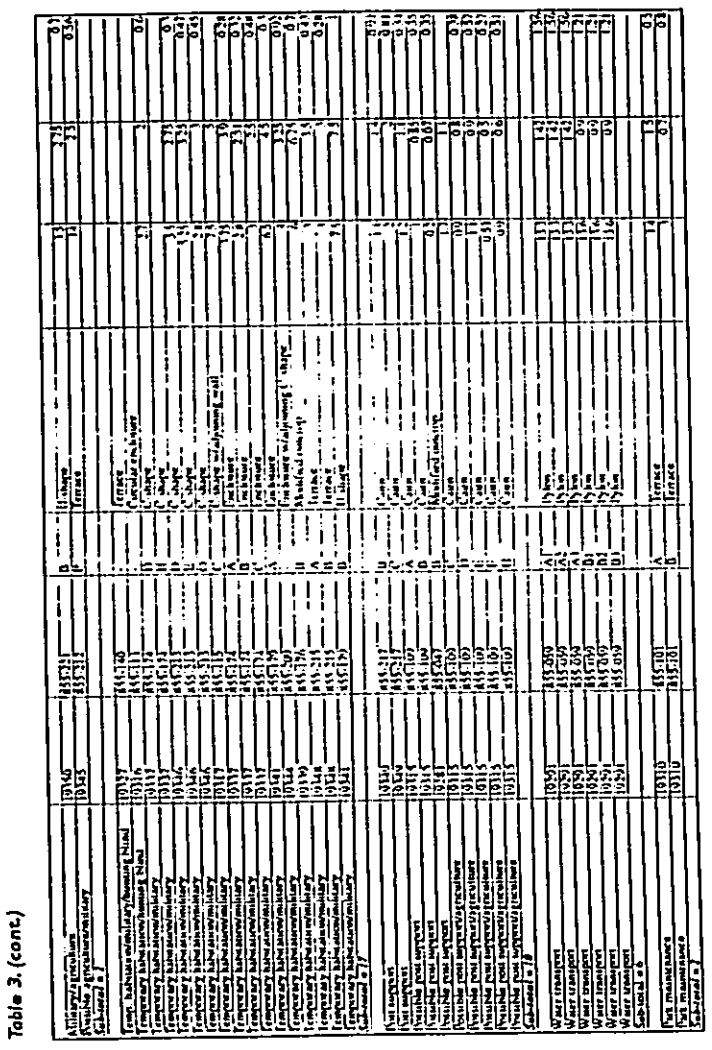


Table 3. (cont.)



DOCUMENT CAPTURED AS RECEIVED

DOCUMENT CAPTURED AS RECEIVED

Table 3. (cont.)

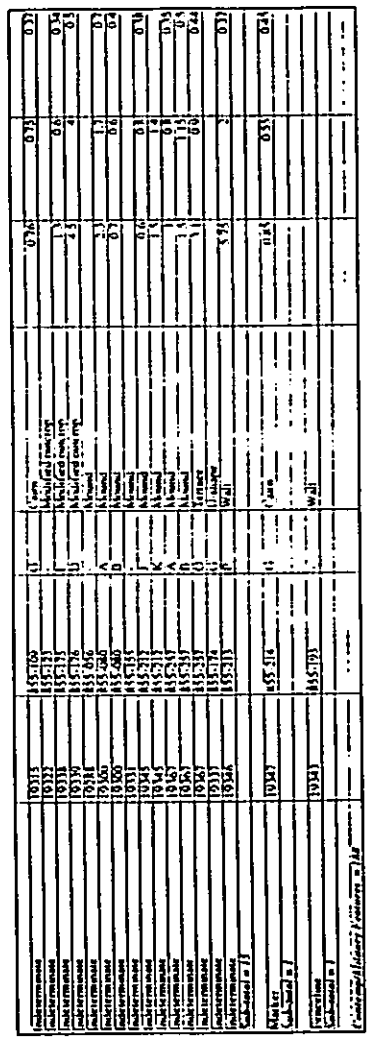


Table 4. Frequencies of Formal Feature Types—Non-Indigenous Components

Formal Type	Number	%	SIHP
Mound	46	24.5	19255,19258(A,B), 19260(B),19267,19288, 19295(B),19300(A,B), 19302,19308,19317(B), 19331,19338(A2-A19), 19341(C),19345(H,J,K), 19346(M),19367(A,B), 19395(G1-G8)
C-shape	34	18.1	19250(A,B),19251,19252, 19253(A,B),19254,19287, 19292,19295(D),19299 19320(A),19321,19332, 19337(D,H),19346(B,D,E, L,O,Q),19352(A-E), 19353(A-E),19355(B), 19366(V),19392
Cairn	28	14.9	19256,19257,19259(A,B), 19260(A,C),19264(A,B), 19273(C),19283,19290, 19306(C),19309,19311, 19315(A-H),19346(C), 19349(B,C),19355(A), 19395(E,F)
Wall	21	11.2	19268,19269,19272(A,B), 19285,19307,19324(B,C), 19343,19346(P),19348(C), 19381,19384,19386,19387, 19393,19394,19395(A,B), 19397(F),19398(A)
Modified outcrop	13	7.0	19277,19278,19281(B), 19320(B),19322,19338(F), 19339(B,D),19382(A), 19397(B,C,D),19398(B)
Enclosure	8	4.3	19298(A),19337(A,B,C), 19341(A),19346(G,N), 19397(E)
Terrace	8	4.3	19286,19310(A,B),19327, 19345(P),19348(A,B), 19367(O)
Pylon	6	3.2	19291(A1-A3,B1-B3)

Table 4. (cont.)

Formal Type	Number	%	SIHP
U-shape	4	2.1	19337(G),19341(B), 19350(A,B)
Alignment	3	1.6	19276,19323,19345(L)
Circular enclosure	3	1.6	19301,19316,19330
Depression	2	1.1	19262,19396
Rubble concentration	2	1.1	19270,19397(A)
Wall segment	1	0.5	19325
C-shape w/adjoining wall	1	0.5	19317(C)
Enclosure w/adjoining C-shape	1	0.5	19344
C-shape wall	1	0.5	19284
Foundation	1	0.5	19369
L-shape wall	1	0.5	19298(B)
Parallel walls	1	0.5	19398(D)
Ramp	1	0.5	19289
Roadbed	1	0.5	19397(G)
Upright stones	1	0.5	19273(B)
Total	188	100.0	

Table 5. Frequencies of Functional Feature Types—Non-Indigenous Components

Function Type	No.	%	SIHP
Military	83	44.1	19255,19256,19257, 19258(A,B),19259(A,B), 19260(A-C),19262, 19264(A,B),19267,19270, 19273(C),19276,19278, 19283,19284,19286,19287, 19289,19290,19295(D), 19298(A,B),19299,19301, 19302,19306(C),19309, 19311,19320(A,B),19321, 19323,19324(B,C),19341(C), 19345(L),19346(B,C,G,L-N), 19352(A-E),19353(A-E), 19355(A,B),19366(V), 19395(A,B,E,F,G1-G8), 19396,19397(A-G), 19398(A,B,D)
Military clearing piles	20	10.6	19295(B),19319(B), 19338(A2-A19)
Hunting blind	16	8.5	19250(A,B),19251,19252 19254,19269,19272(A,B), 19348(C),19381,19384, 19386,19387,19392 19393,19394
Indeterminate	15	8.0	19288,19300(A,B), 19315(G),19322,19331, 19337(G),19338(F), 19339(D),19345(J,K), 19346(P),19367(A,B,O)
Temporary habitation/military	15	8.0	19317(C),19337(A-D,H), 19339(B),19341(A,B), 19344,19346(D,E,O), 19348(A,B)
Hunting blind/military	8	4.3	19253(A,B),19268,19277, 19285,19292,19325, 19350(A)
Possible military	7	3.7	19273(B),19307,19308, 19332,19345(H),19369, 19382(A)

Table 5. (cont.)

Function Type	No.	%	SIHP
Water transport	6	3.2	19291(A1-A3,B1-B3)
Possible post support/ agriculture	5	2.7	19315(C-F,H)
Possible post support	3	1.6	19281(B),19315(A,B)
Park maintenance	2	1.1	19310(A,B)
Post support	2	1.1	19349(B,C)
Agriculture/military	1	0.5	19330
Fenceline	1	0.5	19343
Military/agriculture	1	0.5	19350(B)
Possible agriculture/military	1	0.5	19345(P)
Temporary habitation/ hunting blind	1	0.5	19316
Temp. habitation/military/ hunting blind	1	0.5	19327
Total	188	99.9	

The modern/contemporary features represented in the 188 features summarized above are clearly not significant for information value, per eligibility criteria of the National Register of Historic Places. The features dating to about 1940 and which are believed to be related to WWII training and maneuvers represent features of potential information value. However, in all cases these military features exhibit limited to no residual information value — i.e., significant quantities of portable cultural material have simply not accumulated at them. Further, none of these features exhibit unique architectural attributes or unusual construction detail. In view of the absence of significant information values, these features are not further discussed or evaluated in this report, except that relevant treatment options have been entered in Appendix B (Summary of Identified Sites and Features), and Table 14 (Summary of General Significance Assessments and Recommended General Treatments).

Table 6 summarizes the second primary grouping of cultural features within the project area, in this case representing Native Hawaiian use and occupation. As further summarized in Table 7, a range of formal feature types is represented among the 237 features in this group, dominated by terraces (49, 20.7%), C-shapes (36, 15.2%), modified outcrops (27, 11.4%), enclosures (20, 8.4%), cairns (15, 6.3%), and walls (11, 4.6%). The remaining 79 (33.4%) project area features attributed to indigenous activities include a few examples each of 29 additional formal types (see Table 7).

Tentative functional assignments have been made for all but four of the 237 indigenous features (see Table 8). The predominant functional categories are temporary habitation (104, 43.9%), agriculture (39, 16.5%), and habitation (29, 12.2%). Combined, these three functions encompass 172 (c. 72.6%) of the 237 features representing Native Hawaiian presence and occupation within the project area. The remaining 65 functional categories identified in Tables 6 and 8 represent 27.4% of the total, and include possible agriculture (23, 9.7%), marker (17, 7.2%), transportation (8, 3.4%), hearth (or possible recreational features) (7, 2.9%), possible ceremonial (3, 1.3%), possible burial (2, 0.8%), and indeterminate (4, 1.7%).

Habitation Features

As noted above, 37 features are believed to represent habitation, possible habitation, or habitation in direct association with agriculture (see Table 6). Terraces, enclosures, and paved areas represent the most frequently occurring associated formal feature types, although also present are a number of slight variations on these forms, as well as midden and artifact scatters.

This functional assignment was based on the presence or absence of a number of attributes, including (a) accumulated cultural deposits (consisting of food remains [midden], surface-occurring artifacts, or both), and (b) an evaluation of the structural complexity of the feature and details of construction. It should be noted, however, that existing data allow only a preliminary evaluation of function, and it is possible that some assignments could change given additional data from one or more of the features.

While habitation was not the most common function represented within the project area, it is in fact represented in a significant percentage of the features (37, or about 15.6%, of the 237 indigenous features). Significantly, the distribution of habitation features was generally predictable on the basis of existing models of prehistoric and historic patterns of land use and settlement. Throughout much of the dry, leeward coastal zone of West Hawaii, habitation features are frequently concentrated in the vicinity of brackish water ponds or fresh-water seeps near areas which also exhibit good coastal or off-shore fishing. The present project area is no

Table 6. Summary of Indigenous Components, Grouped by Inferred Feature Function

Inferred Feature Function	SHIP	PRINT ID	Key	Site Function	Formal Feature Type	Length	Width	Thickness
Agriculture	19363	855-255	D	Complex (13)	Mound	15	1	0.35
Agriculture	19345	855-212	O	Complex (14)	C shape	1.9	2.7	0.53
Agriculture	19359	855-242	-	C shape	C shape			
Agriculture	19366	855-256	Y	Complex (28)	Cleared area	4.5	3.5	0.41
Agriculture	19366	855-256	Z	Complex (28)	Cleared area	3.5	3	0.33
Agriculture	19366	855-256	AA	Complex (28)	Cleared area	6.8	6.4	0.3
Agriculture	19366	855-256	BB	Complex (28)	Cleared area	3.7	3.5	0.24
Agriculture	19328	855-144	C	Complex (2)	Modified outcrop	6.5	1.6	1.8
Agriculture	19349	855-217	D	Complex (4)	Modified outcrop	2	0.7	0.46
Agriculture	19354	855-226	C	Complex (3)	Modified outcrop	6.8	2	0.35
Agriculture	19376	1245-266	D	Complex (4)	Modified outcrop	0.9	0.75	0.6
Agriculture	19380	1245-270	-	Modified outcrop	Modified outcrop			
Agriculture	19382	1245-274	B	Complex (3)	Modified outcrop	1.2	1.25	0.4
Agriculture	19383	1245-275	-	Modified outcrop	Modified outcrop			
Agriculture	19340	855-248	C	Complex (5)	Mound	5.5	4.5	0.65
Agriculture	19293	855 069	-	Terrace	Terrace	3.5	2.5	0.32
Agriculture	19306	855 093	F	Complex (7)	Terrace	1.25	1.25	0.14
Agriculture	19306	855 093	G	Complex (7)	Terrace	1.65	1.5	0.6
Agriculture	19328	855-144	A	Complex (2)	Terrace	5.5	5.5	0.86
Agriculture	19340	855-178	C	Complex (5)	Terrace	7	4.5	1.28
Agriculture	19340	855-178	E	Complex (5)	Terrace	4	4	0.15
Agriculture	19341	855-179	E	Complex (4)	Terrace	4	3.5	0.37
Agriculture	19345	855-212	P	Complex (14)	Terrace	4.3	3.3	0.3
Agriculture	19345	855-212	M	Complex (14)	Terrace	4.5	4.4	0.38
Agriculture	19345	855-212	N	Complex (14)	Terrace	1.8	1	0.3
Agriculture	19354	855-226	B	Complex (3)	Terrace	2.6	0.5	
Agriculture	19362	855-251	C	Complex (4)	Terrace	2.5	1.75	0.41
Agriculture	19362	855-251	B	Complex (4)	Terrace			
Agriculture	19363	855-253	-	Terrace	Terrace	17.5	10.5	0.35
Agriculture	19366	855-256	W	Complex (28)	Terrace	2.5	1.4	0.46
Agriculture	19367	855-257	H	Complex (12)	Terrace	6.5	6.5	0.45
Agriculture	19368	855-258	C1	Complex (9)	Terrace			
Agriculture	19368	855-258	C2	Complex (9)	Terrace			
Agriculture	19368	855-258	C3	Complex (9)	Terrace	3.75	2	0.36
Agriculture	19398	1245-304	C	Complex (4)	Terrace			
Agriculture	19400	1245-306	-	Terrace	Terrace			

Table 6. (cont.)

Agriculture	19313	855-106	F	Complex (5)	Wall	1.2	1	0.4
Agriculture	19362	855-251	D	Complex (4)	Wall	2.3	0.7	0.5
Agriculture	19367	855-257	G	Complex (12)	Wall	5.4	1.1	0.26
Agriculture	19377	1245-267	A	Complex (2)	Wall	5.1	1	
Possible agriculture	19338	855-175	D	Complex (25)	Alignment	1.2	0.8	0.22
Possible agriculture	19338	855-175	H	Complex (25)	C shape	0.75	0.5	0.15
Possible agriculture	19295	855 073	G	Complex (5)	Circular alignment	0.85	0.8	0.2
Possible agriculture	19345	855-212	G	Complex (14)	Modified outcrop	4.7	1	0.6
Possible agriculture	19377	1245-267	D	Complex (2)	Modified outcrop	0.6	0.5	0.46
Possible agriculture	19385	1245-277	-	Modified outcrop	Modified outcrop			
Possible agriculture	19388	1245-280	A	Complex (3)	Modified outcrop	1.1	0.4	1.18
Possible agriculture	19388	1245-280	C	Complex (3)	Modified outcrop	0.7	0.4	0.56
Possible agriculture	19390	1245-282	-	Modified outcrop	Modified outcrop			
Possible agriculture	19395	1245-287	C	Complex (14)	Modified outcrop	12.9	1.4	0.35
Possible agriculture	19271	855-017	D1	Complex (2)	Terrace			
Possible agriculture	19271	855-017	D2	Complex (2)	Terrace			
Possible agriculture	19271	855-017	D3	Complex (2)	Terrace	1	1	0.1
Possible agriculture	19271	855-017	D4	Complex (2)	Terrace	4.7	3.9	0.4
Possible agriculture	19281	855-047	D	Complex (4)	Terrace	10.5	1.2	0.68
Possible agriculture	19306	855-093	F	Complex (7)	Terrace	2	0.75	0.34
Possible agriculture	19347	855-214	F	Complex (13)	Terrace	1	2.5	0.8
Possible agriculture	19360	855-248	E	Complex (5)	Terrace			
Possible agriculture	19374	1245-264	-	Terrace	Terrace	5.61	3.2	0.5
Possible agriculture	19382	1245-274	C	Complex (3)	Terrace	2.2	0.65	0.4
Possible agriculture	19388	1245-280	B	Complex (3)	Terrace			
Possible agriculture	19400	1245-306	-	Terrace	Terrace			
Subtotal = 62								
					Adjoining C shapes	6.5	5	0.85
Temporary habitation	19295	855 073	C	Complex (5)	Adjoining C shapes	6	3.1	0.2
Temporary habitation	19313	855-106	B	Complex (5)	Adjoining C shapes	7.25	2.5	
Temporary habitation	19317	855-115	A	Complex (4)	Adjoining C shapes	3	1	0.6
Temporary habitation	19360	855-248	B1	Complex (5)	Alignment			
Temporary habitation	19361	855-250	B2	Complex (2)	Alignment			
Temporary habitation	19361	855-250	B3	Complex (2)	Alignment			
Temporary habitation	19361	855-250	B4	Complex (2)	Alignment	1.8	0.9	0.35
Temporary habitation	19361	855-250	B1	Complex (2)	Alignment			0.35
Temporary habitation	19296	855-074	A	Complex (2)	C shape			
Temporary habitation	19304	855 089	-	C shape	C shape			

Table 6. (cont.)

| | | |

Table 6. (cont.)

| | | |

DOCUMENT CAPTURED AS RECEIVED

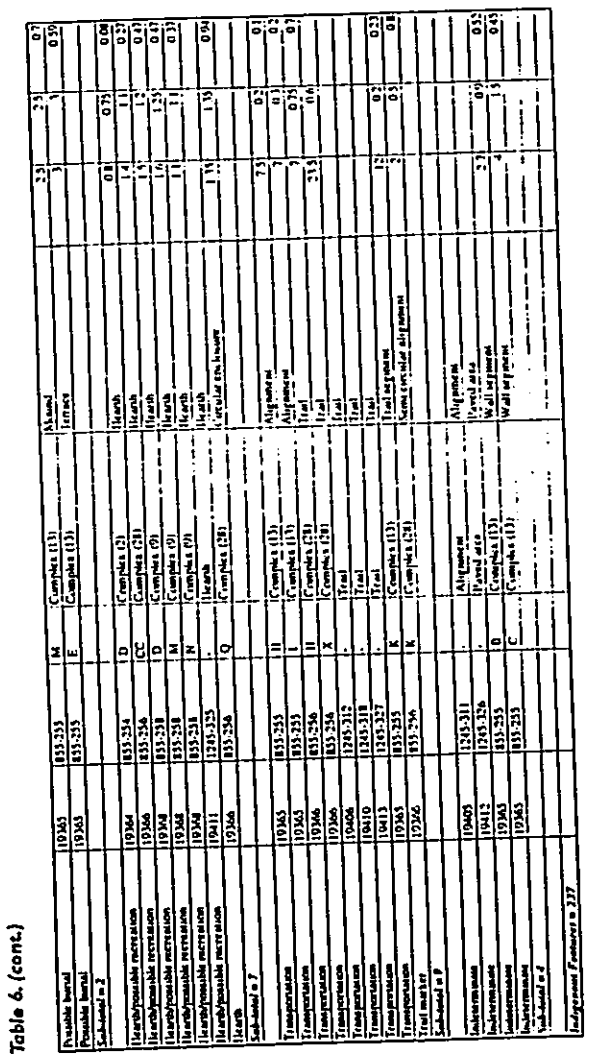


Table 6. (cont.)

| | | |

Table 7. (cont.)

Formal Type	Number	%	SIHP
Wall	11	4.6	19281(C),19306(B), 19313(F),19342(A), 19347(E),19362(D), 19366(B),19367(G,L), 19391(A),19402
Alignment	9	3.8	19360(B),19361(B1-B4), 19365(H,I),19377(A),19405
U-shape	8	3.4	19335,19346(A),19347(B), 19354(A),19367(D,E,F), 19376(B)
Hearth	6	2.5	19364(D),19366(CC), 19368(D,M,N),19411
Mound	5	2.1	19279,19360(C),19365(D,M), 19366(F)
Trail	5	2.1	19366(H,X),19406,19410, 19413
Circular enclosure	4	1.7	19294(D),19366(P,Q),19404
Cleared area	4	1.7	19366(Y,Z,AA,BB)
Paved area	4	1.7	19367(J),19368(G,L),19412
Adjoining C-shapes	3	1.3	19295(C),19313(B),19317(A)
Circular alignment	3	1.3	19338(E),19366(G),19391(B)
Midden scatter	3	1.3	19318,19351,19395(D)
Wall segment	3	1.3	19296(B),19365(B,C)
Circular wall	2	0.8	19345(B,D)
L-shape	2	0.8	19338(C),19347(P)
L-shape alignment	2	0.8	19314(B,G)
Rubble concentration	2	0.8	19303,19375
Terraces w/adjoining wall	2	0.8	19294(A,B)
Cairn w/adjoining wall	1	0.4	19407

Table 7. (cont.)

Formal Type	Number	%	SIHP
C-shape w/adjoining wall	1	0.4	19347(A)
D-shape alignment	1	0.4	19366(J)
Enclosure w/adjoining C-shape	1	0.4	19294(C)
Enclosure w/ modified outcrop	1	0.4	19338(A1)
Midden concentration	1	0.4	19366(T)
Overhang	1	0.4	19376(A)
Paved terrace	1	0.4	19364(C)
Rectangular alignment	1	0.4	19340(A)
Semi circular alignment	1	0.4	19366(K)
Trail segment	1	0.4	19365(K)
Wall remnant	1	0.4	19366(C)
TOTAL	237	99.6	

Table 8. Frequencies of Functional Feature Types—Indigenous Components

Function Type	Number	%	SIHP
Temporary habitation	104	43.9	19265,19266,19273(A), 19281(C),19294(A-D), 19295(A,C),19296(A,B), 19303,19304,19306(A,B,D), 19312,19313(A-D) 19314(B,D-H),19317(A,D), 19318,19319,19326(B), 19329(A,B),19333,19334, 19335,19336,19337(E,F), 19338(A1,B,C),19339(E), 19340(A,B,D),19342(A,G), 19345(B-E),19346(A,Q), 19347(A,B,D,E,I-Q), 19349(A),19354(A), 19356(B,F),19357,19358, 19360(A,B,D),19361(A,B1-B4), 19362(A),19364(C), 19370,19371,19375, 19376(A,B,C) 19378(A,B),19389, 19391(A,B),19395(D),19399 19401,19402,19403,19404,19408
Agriculture	39	16.5	19293,19306(F,G), 19313(F),19328(A,C), 19340(C,E),19341(E), 19345(F,M,N,O),19349(D), 19354(B,C),19359,19360(C) 19362(B,C,D),19363, 19365(D),19366(W,Y,Z, AA,BB),19367(G,H), 19368(C1-C3),19376(D), 19380,19382(B),19383, 19398(C),19400
Habitation	30	12.2	19351,19365(A,F,G,J,O), 19366(A-E,G,I,L,M,O,P, R,T,U),19367(D,E,F,J,K L,M),19368(E,G,L),
Possible agriculture	23	9.7	19273(D1-D4),19281(D), 19295(E),19306(E), 19338(D,E),19345(G), 19347(C),19360(E), 19374,19377(A,B),19382(C) 19385,19388(A,B,C),19390, 19395(C),19409

Table 8. (cont.)

Function Type	Number	%	SIHP
Marker	17	7.2	19261,19263,19271(A,B), 19274,19275,19279,19280, 19281(A),19282,19297, 19347(G),19366(N),19372, 19373,19379,19407
Transportation	8	3.4	19365(H,I,K),19366(H,X), 19406,19410,19413
Recreation	6	2.5	19364(D),19366(CC), 19368(D,M,N),19411
Indeterminate	4	1.7	19365(B,C),19405,19412
Possible ceremonial	3	1.3	19305,19366(F,J)
Possible burial	2	0.8	19365(E,M)
Hearth	1	0.4	19366(Q)
Trail marker	1	0.4	19366(K)
TOTAL	237	100.0	

exception. In Figure 3, the 12 sites containing all 37 habitation features have been plotted within the boundaries of the project area. These twelve sites (19349, 19351, 19364, 19365, 19366, 19367, 19368, 19399, 19401, 19402, 19403, and 19408) dominate the rocky points or headlands overlooking Waialea and Puako Bay, and all would have been easily accessed via the primary coastal trails. Indeed, it is this easy accessability, combined with the long history of modern recreational activities at and around Hapuna, which accounts for the extensive surface and subsurface disturbances to which all of these sites have been subjected.

Midden accumulations were present in moderate to dense amounts at most of the habitation features, as were a variety of portable artifact types. In order to recover specialized dating samples and to further evaluate midden constituents and artifact types present, many of the habitation features were subjected to a combination of shovel test pit or test unit excavation. The results of this research are presented below.

Site 19366 typifies the multi-functional feature complexes dominated by a habitation function and located along the coastal bluffs at Hapuna. This site happens also to contain the greatest number of individual features of any project area site, although three other coastal habitation complexes (19365, 19367, and 19368) exhibit generally similar feature associations.

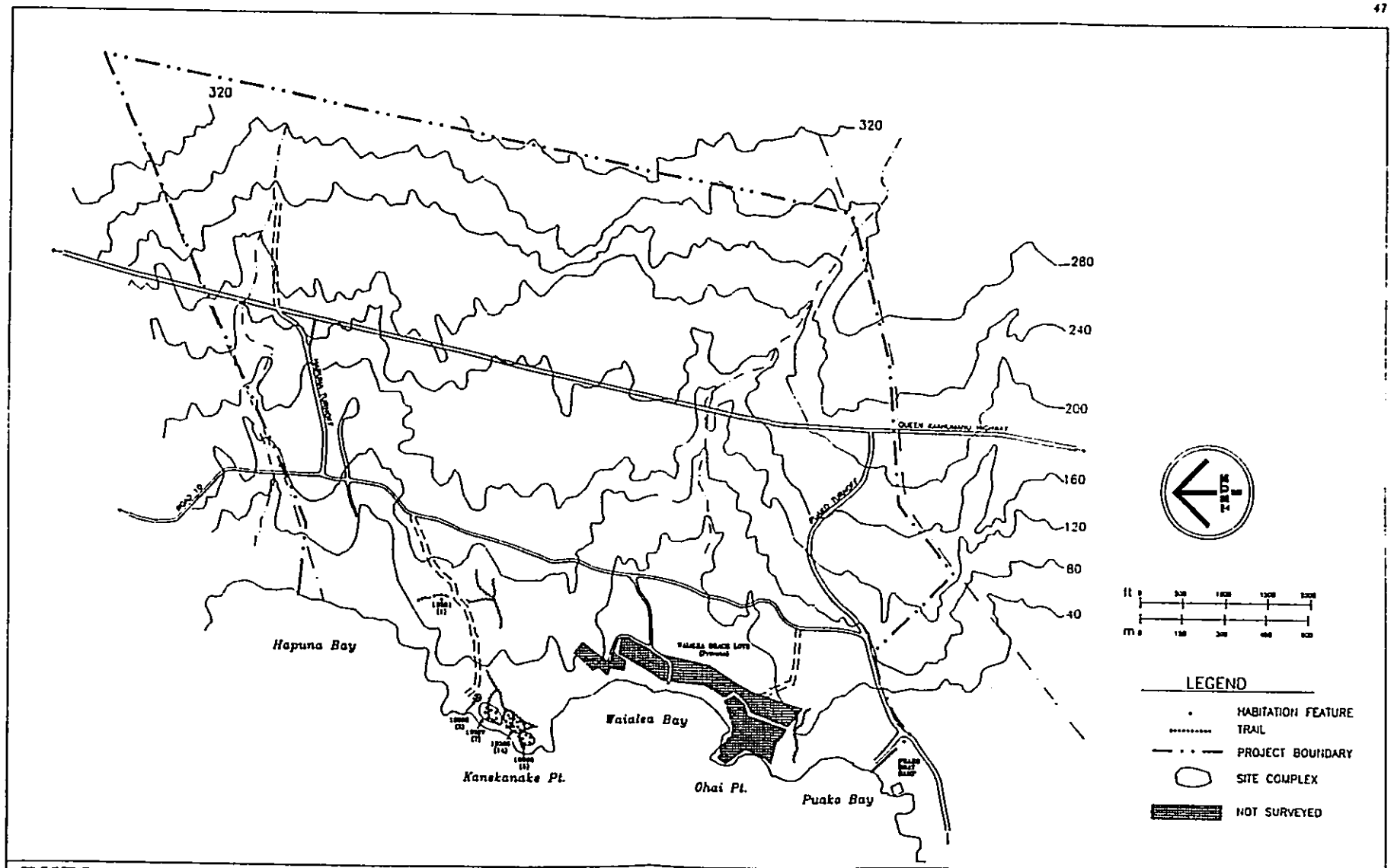
Extending a considerable length along the coastal cliff plateau ,among rolling terrain (see Figure 3), this site contains 28 separate feature areas and was easily accessed via the well-defined coastal trail system. Features present include terraces and terrace remnants, walls, mounds, C-shapes, circular alignment, D-shaped alignment, cairns, circular enclosures, a midden concentration, cleared areas, and a well-defined fire hearth. Fourteen shovel test pits ranging in depth from 10 to over 60 cm depth were excavated among various features throughout the site area. These excavations yielded waterworn cobbles and coral, as well as artifacts and ecofactual remains consistent with an interpretation of habitation. Figures 4, 5, and 6 illustrate several of the primary features at this site, including Feature A enclosure (Figure 4), Feature O enclosure (Figure 5), and a series of contiguous cleared areas and other features accessed by a primary coastal trail system (Figure 6).

Temporary Habitation Features

As noted in the introduction to the discussion of surface findings, a total of 97 features are believed to represent temporary habitation or possible temporary habitation (see Table 6). A fairly narrow range of formal feature types occur in association with these site types, including principally C-Shapes and variants thereof, low circular walls, modified outcrops, small terraces, and light surface midden scatters.

This functional assignment was based on the absence of high densities of clustered features, the generally small size and simple architecture of individual features, and the absence of substantial accumulations of midden or portable artifactual material. It should be noted, however, that existing data allow only a preliminary evaluation of function, and it is possible that some assignments could change given additional data from one or more of the features.

Temporary habitation represents the most frequently encountered functional feature type within the project area, with 97, or about 40.93%, of the 237 indigenous features being assigned this function. As with the features ascribed a permanent habitation function (see discussion, above), the distribution of temporary habitation features was also generally predictable on the



PHRI PAUL H. ROSENDAHL, Ph.D., INC.
ARCHAEOLOGICAL • HISTORICAL • CULTURAL
RESOURCE MANAGEMENT STUDIES & SERVICES

305 MOHOURI STREET
HILO, HAWAII 96720
(808) 969-1763, 961-8998(FAX)

Phased Archaeological Inventory Survey
Hapuna Beach State Recreation Area Expansion Project
Phased III – Data Analyses and Final Report
PHRI Project 92-1246

Figure 3.
DISTRIBUTION OF HABITATION SITES

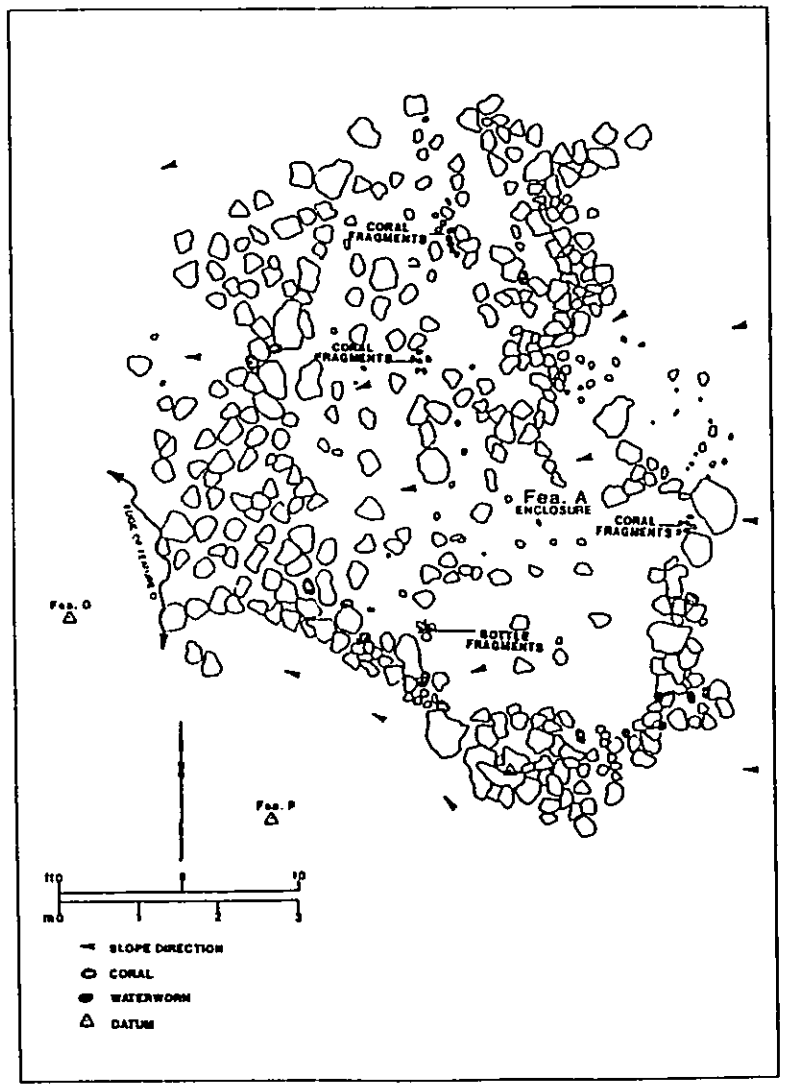


Figure 4. Feature A Enclosure at Site 19366

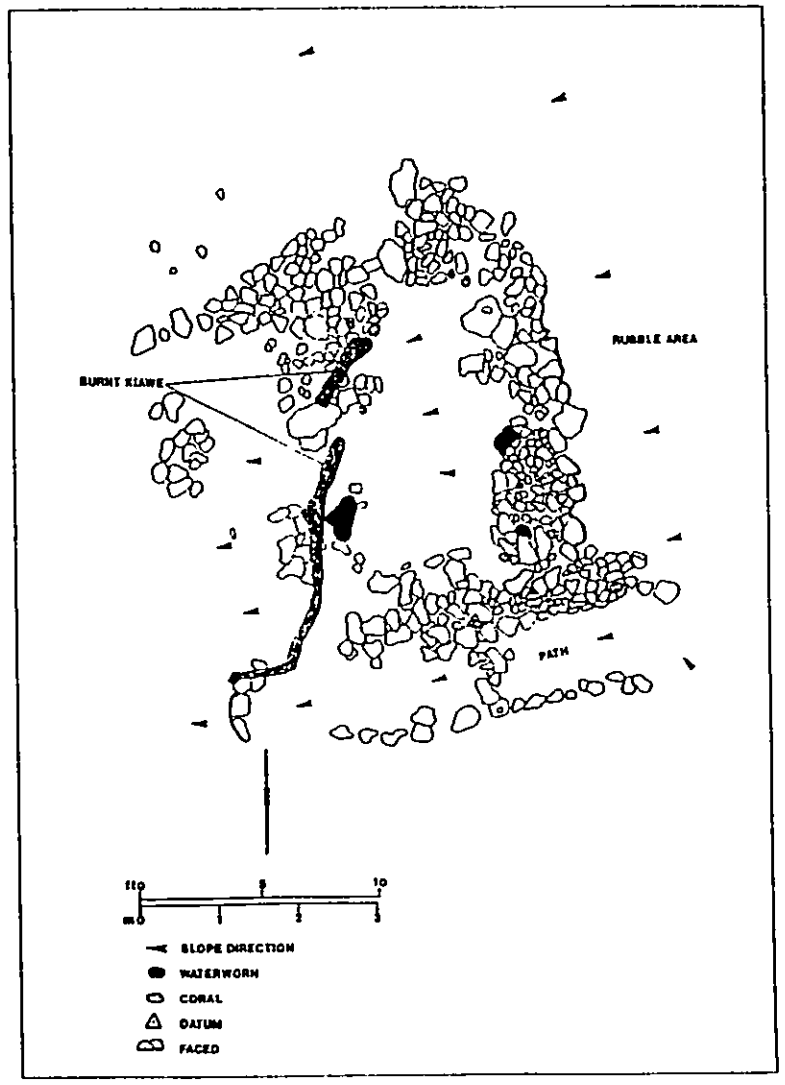


Figure 5. Feature O Enclosure at Site 19366

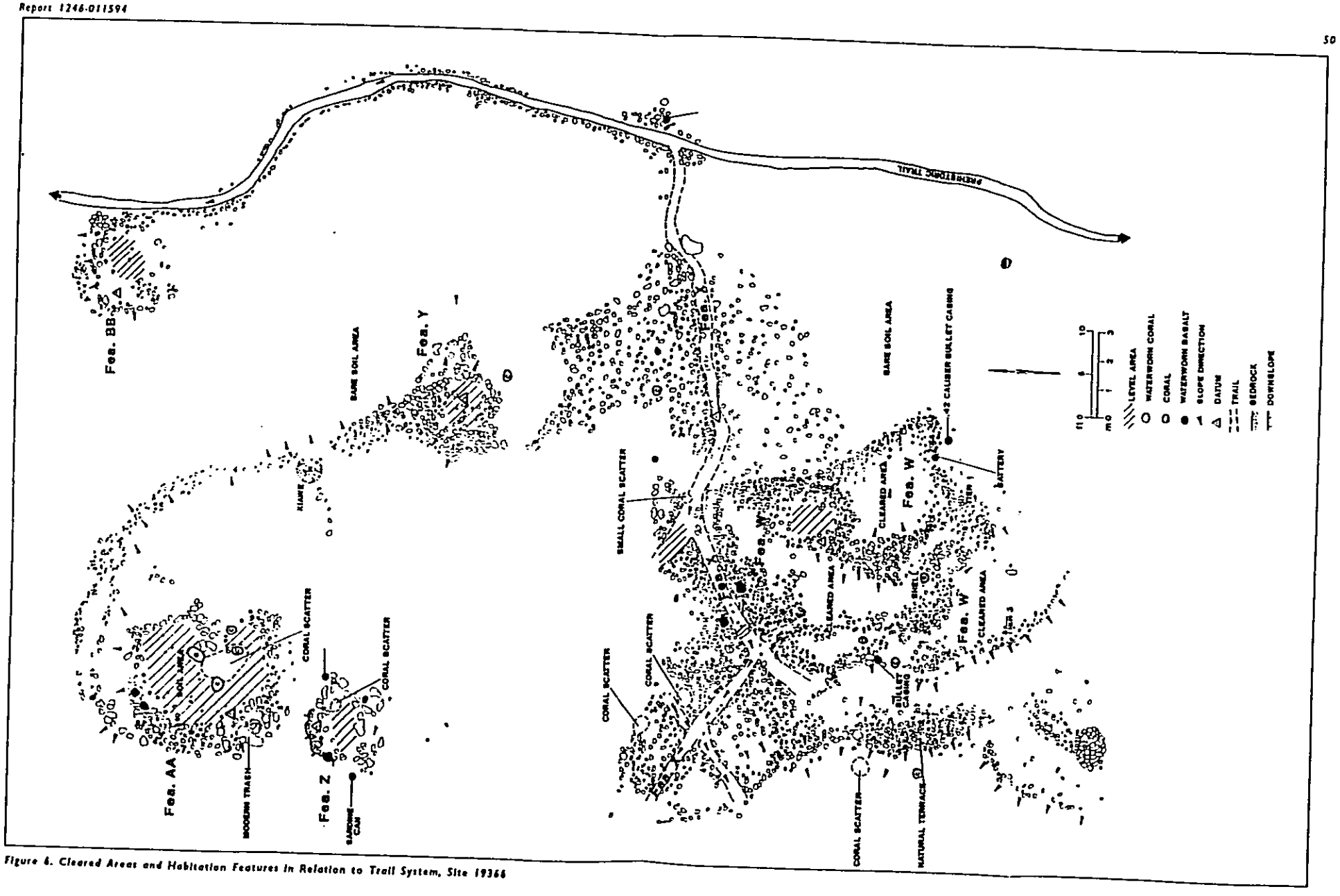


Figure 6. Cleared Areas and Habitation Features in Relation to Trail System, Site 19366

basis of existing regional models of prehistoric and historic patterns of land use. While permanent features within this area of Hawaii Island tend to cluster at coastal fresh-water seeps near areas which also exhibit good coastal or off-shore fishing, temporary habitation features are typically much more extensive in their distribution (see, for example, Jensen 1988; Kirch 1976). The present Hapuna Beach project area proved to be no exception.

In Figure 7, the 47 sites containing all 97 temporary habitation features have been plotted within the boundaries of the project area. These 47 sites include 19265, 19266, 19273, 19281, 19294, 19295, 19296, 19303, 19304, 19306, 19312, 19313, 19314, 19317, 19318, 19319, 19326, 19329, 19330, 19333, 19334, 19335, 19336, 19337, 19338, 19339, 19340, 19342, 19345, 19346, 19347, 19354, 19356, 19357, 19358, 19360, 19361, 19362, 19370, 19371, 19375, 19376, 19378, 19389, 19391, 19395, and 19404. The pattern of distribution in Figure 7 clearly contrasts with the pattern exhibited in Figure 3 for the 37 habitation features. While there is no question that coastal examples of temporary habitation are present, these features are much more widely distributed. Although more widely distributed, it is also clear that the pattern of distribution is not random — i.e., even the inland examples tend to cluster, in this case along the margins of a surface water source located within the project area.

As with all of the habitation features, most of the temporary habitation features have been subjected to extensive surface and subsurface disturbances, most often as a result of having been re-utilized during WWII training operations in this area.

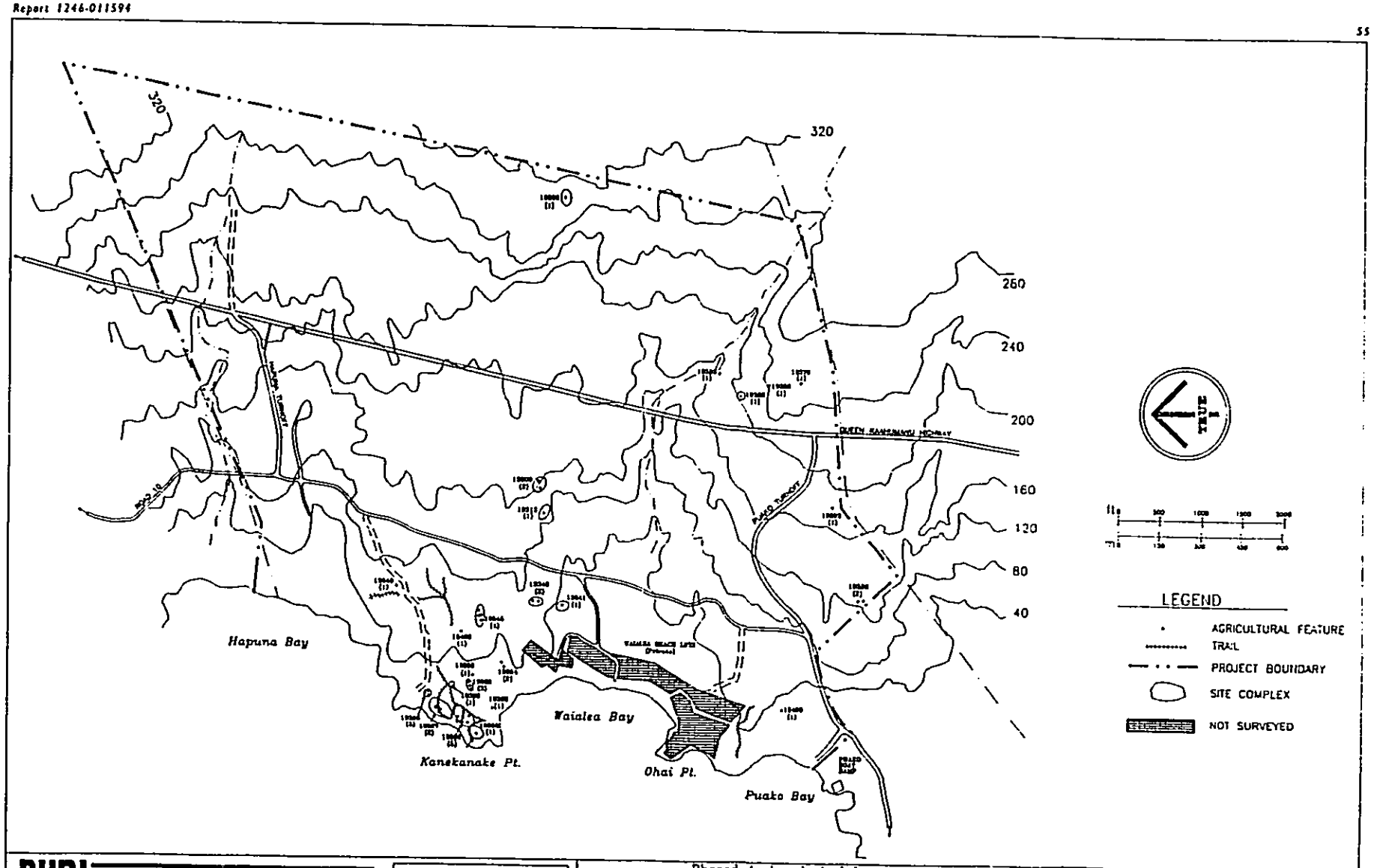
Limited, usually surface-occurring midden scatters are present at some of the features, particularly the small enclosures which provided some protection from strong diurnal winds. Due to the observed midden deposits, several of the features were subjected to shovel test pit and/or test unit excavation in order to recover dating samples, and to assess artifact and midden constituents and depth.

Site 19342 typifies the feature types occurring at small, multiple-component sites assigned a predominant temporary habitation function. In this case, a well-defined C-shape structure is present, and this structure contains a small surface scatter of midden. In apparent association was a short wall segment, which also contained at least one surface artifact and a very light surface midden scatter (Figure 8).

Agricultural Features

As noted in the introduction to the discussion of surface findings, a total of 62 features are believed to represent agriculture or possible agricultural activities within the project area (see Table 6). As with temporary habitation features, a fairly narrow range of formal feature types represents this functional activity, including primarily poorly defined and/or poorly built terraces, cleared areas, modified outcrops, short wall segments which may be remnants of terraces or terrace systems, occasional mounds, and several low C-shape structures. Agriculture represents the second most frequently encountered functional feature type within the project area, with 62, or about 26.16%, of the 237 indigenous features being assigned this function.

These features typically co-occur with temporary habitation or habitation complexes, and are especially concentrated at coastal sites and along the margins of a well-defined gulch system which proceeds roughly east-west through the south-central portion of the project area. This pattern of distribution conforms with expectations derived from data for other similar settings in West Hawaii. While permanent habitation features tend to cluster at coastal



PHRI PAUL H. ROSENDAHL, Ph.D., INC.
ARCHAEOLOGICAL • HISTORICAL • CULTURAL
RESOURCE MANAGEMENT STUDIES & SERVICES

305 WAIOHULI STREET
HILO, HAWAII 96720
(808) 969-1763 961-8063(FAX)

Phased Archaeological Inventory Survey
Hapuna Beach State Recreation Area Expansion Project
Phased III – Data Analyses and Final Report
PHRI Project 92-1246

Figure 9.
DISTRIBUTION OF AGRICULTURAL SITES

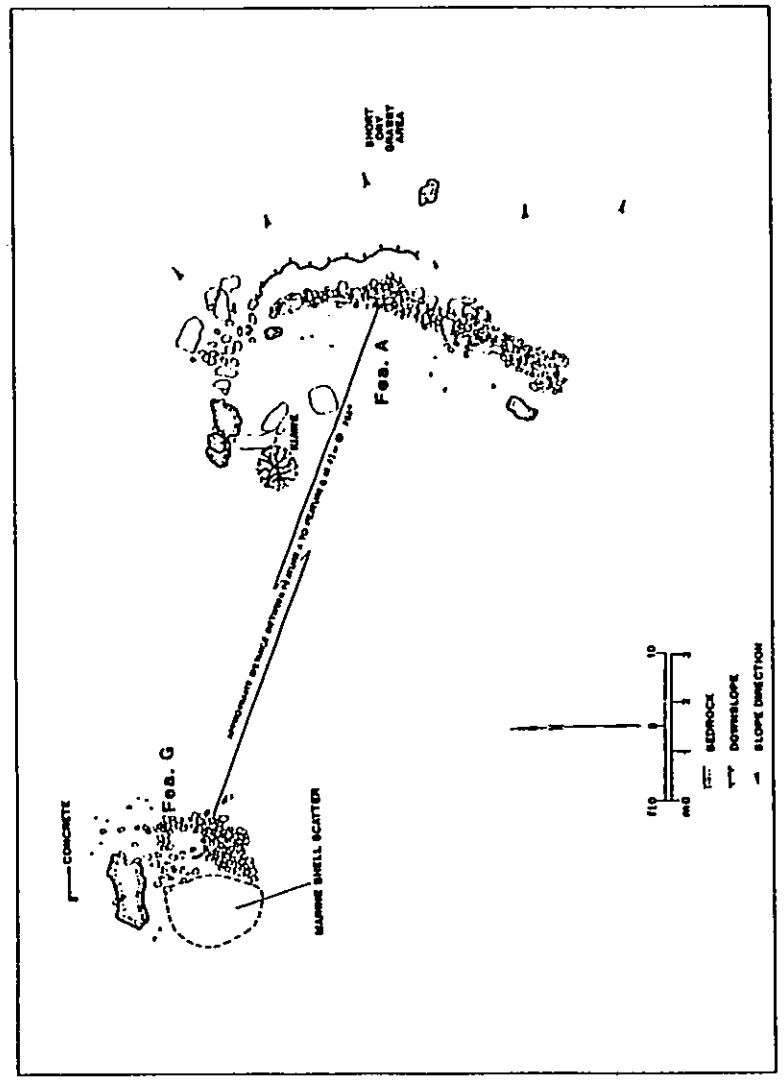


Figure 8. Site 19342, Features A and G, Multi-Component Site Exhibiting a Temporary Habitation Function

locations in association with fresh-water seeps near areas which also exhibit good coastal or off-shore fishing, agricultural activities and associated temporary habitation features are frequently found not only in coastal contexts but in more inland zones, especially along natural surface water courses (see, for example, Jensen 1990). In Figure 9, the 36 sites containing the 62 agricultural feature components have been plotted within the boundaries of the project area. These 36 sites include 19271, 19273, 19281, 19293, 19295, 19306, 19313, 19328, 19338, 19340, 19341, 19345, 19347, 19349, 19354, 19359, 19360, 19362, 19363, 19365, 19366, 19367, 19368, 19374, 19376, 19377, 19380, 19382, 19383, 19385, 19388, 19390, 19395, 19398, 19400, and 19409. The pattern of distribution in Figure 9 is more closely aligned with the distribution of temporary habitation features than habitation features (compare Figure 9 with Figures 3 and Figure 7). As with temporary habitation features, agricultural feature distribution is not random, but rather is simply more extensive, with the inland focus being along the margins of the primary surface water source in this area. Agricultural and temporary habitation features are undoubtedly directly associated at many of the inland sites.

As with all of the habitation features and many of the temporary habitation components as well, a variety of impacts have affected the agricultural features, including especially WWII training, subsequent recreation and road grading projects, and most recently fire-suppression activities, and equipment used to engage the Puako brush fires via Hapuna access roads.

Other Features

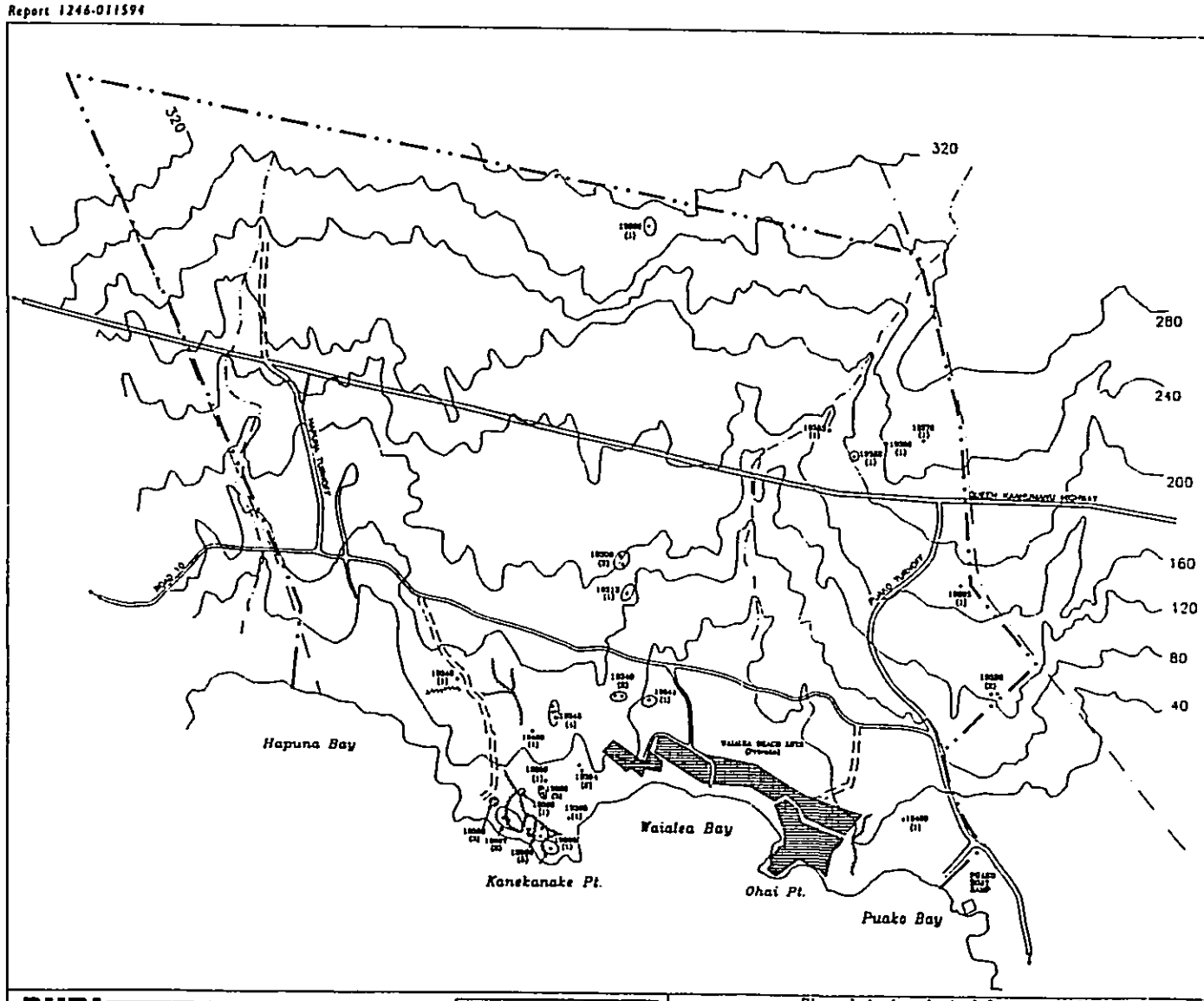
The remaining functional feature types include marker, transportation, hearth/possible recreation, possible ceremonial, possible burial, and indeterminate. Together, these types total 41 separate features, or approximately 17.3% of the 237 features attributed to indigenous use and occupation of the project area.

Transportation among site and feature complexes located within the project area is clearly documented by a series of partially interconnected trail segments. Two of these trail segments were recorded in association with larger site complexes (Sites 19365 and 19366), and in the three remaining cases the trails were recorded as separate sites (Sites 19406, 19410 and 19413). A semi-circular alignment directly associated with one of the trail segments and located at coastal site complex (Feature K of Site 19366) has been included with features assigned a transportation function (see Table 6). Lastly, while listed separately in Table 6, the sixteen features described as "markers" during formal site recording may actually have served a "transportation" function since at least some appear to have been constructed to identify the locations of trails or habitation and temporary habitation features.

The location of trail segments is depicted in Figure 2. It should be emphasized that a much more extensive network may at one time have existed within the project area, prior to impacts associated with military and subsequent recreational activities at and around Hapuna.

As noted above, a possible ceremonial function has been ascribed to three features, two of which are located at Site 19366 (Features F and J), and one at Site 19305.

The Feature F mound at 19366 (see Figure 10) is located near the shore and may have been faced prior to having been disturbed. Waterworn coral, branch coral, marine shell, and waterworn cobbles are interspersed throughout the structure. A coral-lined path leads into the feature from the northeast.



PHRI PAUL H. ROSENDAHL, PhD., INC.
ARCHAEOLOGICAL • HISTORICAL • CULTURAL
RESOURCE MANAGEMENT STUDIES & SERVICES

305 MOHOUAI STREET
HILO, HAWAII 96720
(808) 969-1763, 961-8999(FAX)

Phased Archaeological Inventory Survey
Hapuna Beach State Recreation Area Expansion Project
Phased III – Data Analyses and Final Report
PHRI Project 92-1246

Figure 9.
DISTRIBUTION OF AGRICULTURAL SITES

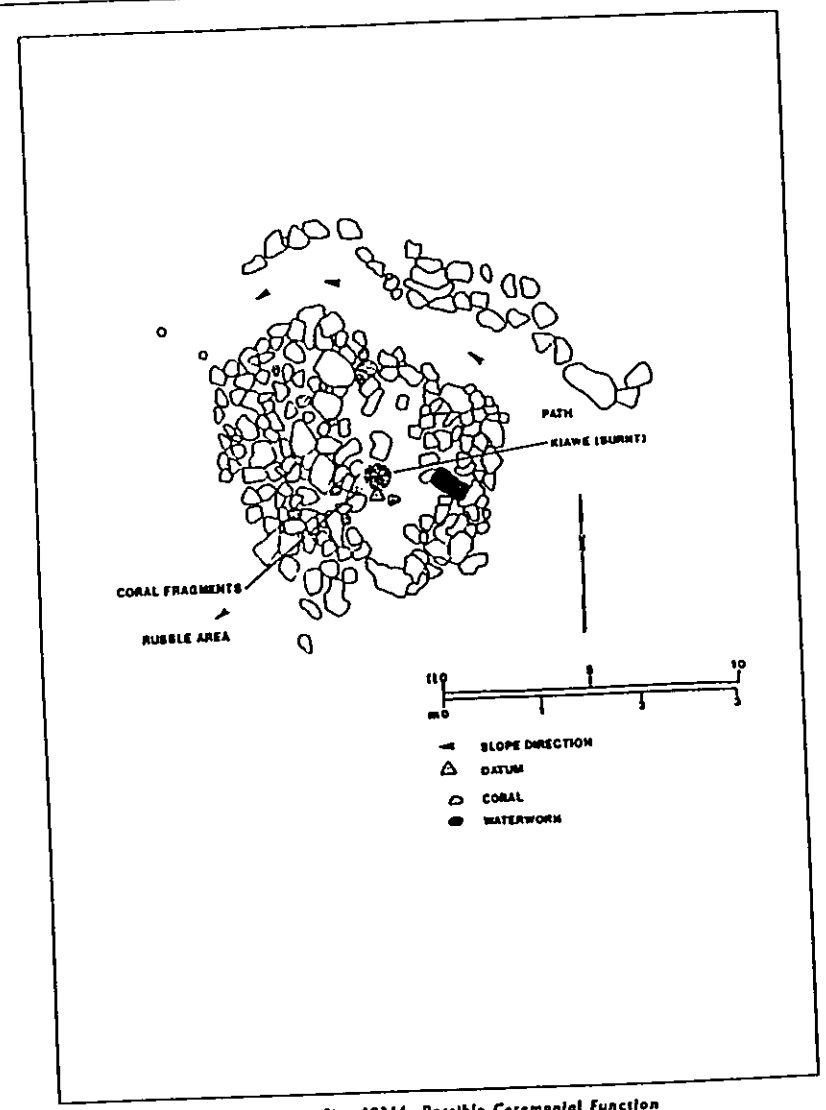


Figure 10. Feature F Mound at Site 19366, Possible Ceremonial Function

The Feature J alignment at this same site is less formally constructed than Feature F, but does contain a cluster of waterworn cobbles near the center of the D-shaped alignment of pahoehoe boulders and cobbles. Construction details and associated coral and branch coral suggest possible ceremonial activities were performed at these features. Finally, Site 19305 consists of a modified outcrop constructed by stacking waterworn boulders and cobbles on top of a basalt outcrop. Several large pieces of coral were incorporated into mixed boulders and cobbles, along with smaller coral pieces, several waterworn cobbles, and small quantities of marine shell.

Two additional project area features may represent burials. These include Features E and M at Site 19365. Feature E terrace measures approximately 3 meters-square and extends slightly more than 0.5 meters above the surrounding ground surface. There is a circular area at the east end of the feature from which some of the cobbles appear to have been removed. Trowel testing of the surface components to c. 10 cm depth identified loose silt covering cobble bedding containing numerous coral rock fragments

Feature M at 19365 is a mound constructed with irregular-shaped basalt cobbles, with numerous coral rock and waterworn cobbles incorporated into the feature. Remnant facing is visible along a portion of an exposed interior wall, while small quantities of marine shell and contemporary trash are scattered over the surface.

Figure 11 illustrates Features E and M at Site 13965 in plan view, and in the context of additional features located in the immediate vicinity of these two possible burials.

SUBSURFACE EVALUATIONS

As noted in the Introduction to this section, subsurface evaluations were undertaken both within specific site boundaries, and outside of site boundaries within areas believed to contain buried cultural deposits.

Non-Site-Specific Subsurface Testing

One of the goals of the inventory survey was to determine whether or not significant cultural deposits may have accumulated within sand or soil near the shore area. In order to evaluate this possibility, five north-south transects, each extending approximately 300 meters in length (labeled A-E in order to maintain field provenience) were established. The transects roughly paralleled the shoreline and were located within the southwest portion of the project area. Variable numbers of shovel test pits and hand-dug trenches were excavated along each of the transects. Designations for shovel test pits were "ST-" followed by the transect letter designation (A-E), which in turn was followed by the sequential numeric designation of the test pit for that transect. Ultimately, a total of 55 shovel test pits were excavated within non-site areas. Depths were quite variable, depending on underlayment, and ranged from 2 cm to 54 cm below the current ground surface. Very small quantities of shell midden and/or naturally-deposited marine shell fragments were encountered within 7 of the 55 test pits, while contemporary artifacts were recovered from only two of the excavations.

This work failed to identify any previously unidentified prehistoric or historic sites or features. The work is believed to have satisfactorily achieved the objective of ensuring that significant buried deposits are not likely to be present outside of established archaeological site

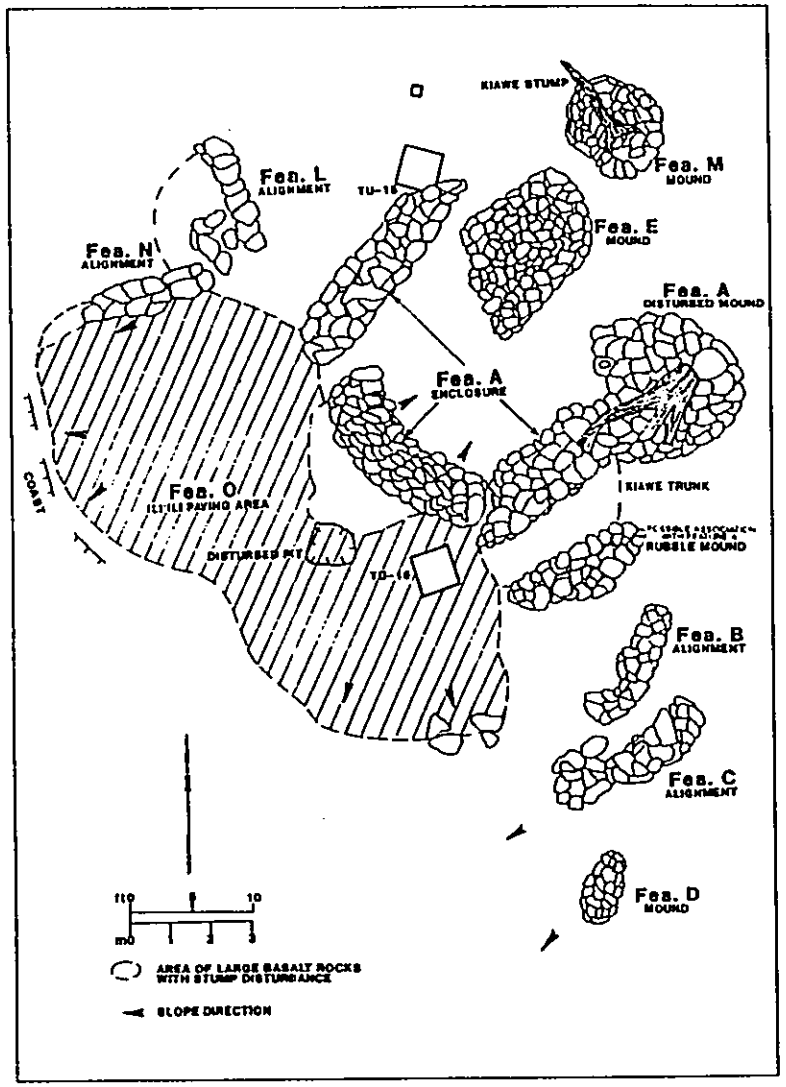


Figure 11. Features E and M at Site 19365, Possible Burial Features

boundaries, within beach areas or other soil types within the undeveloped coastal portions of the project area.

Site-Specific Subsurface Testing

As noted in the Introduction to this section, 32 shovel tests were excavated within Sites 19365, 19366, 19367, and 19368. In addition, 30 test units involving a total of 20.7 square meters of surface area were excavated at 24 features distributed among 17 separate sites. Indigenous portable artifacts collected from the excavations and surface collections include ground basalt tools, octopus lures, gourd fragments, worked marine shell, coral abraders, puka beads, volcanic glass flakes, and *opihi* shell scrapers. These are discussed below under "Data Analyses."

Generally, excavation work documented the presence of subsurface deposits of cultural material at several project area features. Although multiple layers were encountered at several of the features, along with buried features of various types (principally, hearths or hearth remnants), deep, stratified deposits appear to be absent from the project area. Detailed stratigraphic descriptions for all of the excavation units are presented in Appendix C.

Table 9 summarizes the shovel test pits and excavation units placed within and outside of specific site boundaries. The summary groups the data by site, and includes a general reference to the kinds (but not quantities) of cultural material and special samples recovered.

Table 9. Summary of Excavation

*SIHP Site No.	Fea.	Unit	Size (m^2)	Depth (mbs)	(Presence +/- Absence) Arts	Eco	C^{14}	Hf
Other	-	ST-A0#	0.00	-	-	-	-	-
	-	ST-A01	0.25	0.22	-	-	-	-
	-	ST-A02	0.25	0.19	+	+	-	-
	-	ST-A03	0.25	0.21	-	-	-	-
	-	ST-A04#	0.00	-	-	-	-	-
	-	ST-A05#	0.00	-	-	-	-	-
	-	ST-A06#	0.00	-	-	-	-	-
	-	ST-A07	0.25	0.20	-	+	-	-
	-	ST-A08	0.25	0.10	-	-	-	-
	-	ST-A09	0.30	0.90	-	-	-	-
	-	ST-A10	0.30	0.30	-	-	-	-
	-	ST-A14	0.30	0.30	-	+	-	-
	-	ST-B0#	0.00	-	-	-	-	-
	-	ST-B01	0.25	0.23	-	+	-	-
	-	ST-B15	0.25	0.23	+	-	-	-
	-	ST-C01	0.25	0.15	-	-	-	-
	-	ST-C03	0.25	0.54	-	-	-	-
	-	ST-C05	0.25	0.25	-	-	-	-
	-	ST-C09	0.25	0.26	-	-	-	-
	-	ST-C11	0.25	0.22	-	-	-	-
	-	ST-C13	0.25	0.70	-	+	-	-
	-	ST-C15	0.25	0.10	-	-	-	-
	-	ST-C17	0.25	0.18	-	-	-	-
	-	ST-C19	0.25	0.15	-	-	-	-
	-	ST-D01	0.25	0.31	-	-	-	-
	-	ST-D02	0.25	-	-	-	-	-
	-	ST-D03	0.25	0.42	-	-	-	-
	-	ST-D04	0.25	-	-	-	-	-
	-	ST-D06	0.25	-	-	-	-	-
	-	ST-D07	0.25	0.27	-	-	-	-
	-	ST-D09	0.25	0.25	-	-	-	-
	-	ST-D10	0.25	-	-	-	-	-
	-	ST-D11	0.25	0.37	-	-	-	-
	-	ST-D12	0.25	-	-	-	-	-

* State Inventory of Historic Places (SIHP) numbers. SIHP numbers are five-digit numbers prefixed by 50-10- (50=State of Hawaii; 10=Island of Hawaii; 82=USGS 7.5' series quad map ["Pu'u Hinai,Hawaii"]).

Set up, but never excavated.

** Features determined to be non-cultural; eliminated from Inventory Survey Listing.

Table 9. (cont.)

SIHP Site No.	Fea.	Unit	Size (m^2)	Depth (mbs)	(Presence +/- Absence) Arts	Eco	C^{14}	Hf
Other(cont.)	-	ST-D13	0.25	0.42	-	-	-	-
	-	ST-D14	0.25	-	-	-	-	-
	-	ST-D18	0.25	-	-	-	-	-
	-	ST-D19	0.25	0.25	-	-	-	-
	-	ST-D20	0.25	-	-	-	-	-
	-	ST-D21	0.25	-	-	-	-	-
	-	ST-D25	0.25	-	-	-	-	-
	-	ST-D27	0.25	0.42	-	-	-	-
	-	ST-E01	0.25	0.15	-	-	-	-
	-	ST-E03	0.25	0.34	-	-	-	-
	-	ST-E07	0.25	0.90	-	-	-	-
	-	ST-E09	0.25	0.11	-	-	-	-
	-	ST-E11	0.25	0.19	-	-	-	-
	-	ST-E13	0.25	0.18	-	-	-	-
	-	ST-E16	0.25	-	-	-	-	-
	-	ST-E18	0.25	-	-	-	-	-
	-	ST-E19	0.25	0.20	-	-	-	-
	-	ST-E20	0.25	0.33	-	+	-	-
	-	ST-E21	0.25	0.36	-	+	-	-
	-	ST-E23	0.25	-	-	-	-	-
	-	ST-E24	0.25	0.19	-	-	-	-
	-	ST-E25	0.25	-	-	-	-	-
	-	ST-E26	0.25	0.38	-	-	-	-
	-	ST-E27	0.25	-	-	-	-	-
	-	ST-E28	0.25	0.21	-	-	-	-
	-	ST-D26	0.25	0.10	-	-	-	-
Summary for Other	-	55 ST's	13.90	11.78	2	7	0	0
19265	-	TU-04	1.00	1.00	-	+	-	-
	-	TU-10	0.25	0.25	-	+	-	-
	-	TU-03	1.00	1.00	-	-	-	-
Summary for 19265	-	3 TU's	2.25	2.25	0	2	0	0
19273	A	TU-05	0.50	0.50	-	+	-	-
19294	A	TU-08	1.00	1.00	-	+	-	-
	B	TU-09	1.00	1.00	-	+	-	-
	B	TU-11	1.00	1.00	-	-	-	-
	C	TU-13	0.25	0.25	-	+	-	-

Table 9. (cont.)

SIHP Site No.	Fea.	Unit	Size (m^2)	Depth (mbs)	(Presence +/- Absence) Arts	Eco	C[11]	Hf
Summary for 19294	3 Feas Tested	4 TU's	3.25	3.25	0	3	0	0
19295	A	TU-12	1.00	1.00	-	+	-	-
19312	E	TU-26	0.25	0.25	-	+	-	-
19313	C	TU-23	1.00	1.00	-	-	-	-
19314	B	TU-28	1.00	1.00	-	+	-	-
	C	TU-27**	0.25	0.25	+	+	-	-
	E	TU-24	1.00	1.00	-	-	-	-
Summary for 19314	3 Feas. Tested	3 TU's	2.25	2.25	1	2	0	0
19315	I	TU-14**	1.00	1.00	-	+	-	-
19318	-	TU-22	0.25	0.25	+	+	+	-
	-	TU-25	0.25	0.25	-	+	-	-
Summary for 19318	-	2 TU's	0.50	0.50	1	2	1	0
19365	-	ST-C25	0.25	0.22	-	+	+	-
	-	ST-C26	0.25	0.20	-	+	-	-
	-	ST-C27	0.25	0.30	-	+	+	-
	A	ST-D29	0.25	0.15	+	+	-	-
	A	TU-15	1.00	1.00	+	+	+	-
	A	TU-16	1.00	1.00	+	+	-	-
	C	ST-E29	0.25	0.28	-	-	-	-
	L	ST-C28**	0.25	0.22	-	+	+	-
	N	ST-C25**	0.25	0.25	+	+	+	-
Summary for 19365	4 Feas. Tested	7 ST's 2 TU's	1.75 2.00	1.62 2.00	2 2	6 2	4 1	0 0
19366	-	ST-C14	0.25	0.25	-	-	-	-
	-	ST-C16	0.25	0.10	-	-	-	-
	-	ST-C18	0.25	0.22	-	-	-	-
	-	ST-C20	0.25	0.20	-	-	-	-
	-	ST-C21**	0.25	0.12	-	+	-	-
	-	ST-C22	0.25	0.61	-	+	-	-

Table 9. (cont.)

SIHP Site No.	Fea.	Unit	Size (m^2)	Depth (mbs)	(Presence +/- Absence) Arts	Eco	C[11]	Hf
19366(cont.)	-	ST-D21**	0.25	0.10	-	+	-	-
	-	ST-D22	0.25	0.23	-	-	-	-
	A	ST-D23	0.25	0.21	-	+	-	-
	O	ST-C23	0.25	0.24	-	+	+	-
	P	ST-D24	0.25	0.25	-	-	-	-
	S	ST-E22**	0.25	0.24	-	-	-	-
	W	ST-D17	0.25	0.22	-	-	-	-
	W	ST-E17	0.25	0.17	-	-	-	-
	X	ST-D16	0.25	-	-	-	-	-
	Y	ST-E15	0.25	0.12	-	-	-	-
	Z	ST-D15	0.25	0.38	-	-	-	-
Summary for 19366	8 Feas. Tested	17 ST's	4.25	3.76	0	5	1	0
19367	-	ST-C07**	0.25	0.23	-	-	-	-
	A	ST-D08	0.25	-	-	-	-	-
	F	ST-A12	0.25	0.22	-	-	-	-
	G	TU-17	1.00	1.00	-	+	-	-
	H	ST-A11	0.30	0.28	-	-	-	-
	H	ST-A15	0.35	0.21	-	-	-	-
	N	ST-A13**	0.35	0.24	-	-	-	-
Summary for 19367	5 Feas. Tested	6 ST's 1 TU's	1.75 1.00	0.45 0.73	0 0	0 1	0 0	0 0
19368	D	TU-18	1.00	1.00	+	-	-	-
	G	TU-19	1.00	1.00	+	-	-	-
	L	ST-D05	0.25	0.23	-	-	-	-
	L	ST-E05	0.25	0.17	-	-	-	-
Summary for 19368	3 Feas. Tested	2 ST's 2 TU's	0.50 2.00	0.40 2.00	0 2	0 0	0 0	0 0
19376	A	TU-01	0.25	0.25	-	+	-	-
	B	TU-02	1.00	1.00	+	+	-	-
	C	TU-07A	0.25	0.25	-	-	-	-
	C	TU-07B	0.25	0.25	-	-	-	-
Summary for 19376	3 Feas. Tested	4 TU's	1.75	1.75	1	2	0	0
19389	-	TU-06A	0.50	0.50	+	-	-	-
	-	TU-06B	0.25	0.25	+	-	-	-

Table 9. (cont.)

SIHP Site No.	Fea.	Unit	Size (m^2)	Depth (mbs)	(Presence +/- Absence) Arts	Eco	C^{14}	Hf
Summary for 19389	-	2 TU's	0.75	0.75	2	0	0	0
19391	B	TU-20	1.00	1.00	-	-	-	-
19409	TRAIL	TRENCH**	0.20	0.60	-	-	-	-
19410	-	TU-21	0.20	0.20	-	-	-	-

DATA ANALYSES

AGE DETERMINATIONS

Objectives and Methods

The purpose of age determination analysis is to provide initial chronological data to aid in assessing the relative significance of sites in the project area. As part of the inventory survey investigations, four samples were selected from discrete cultural deposits within Sites 19295 and 19365 for age determination using radiocarbon analysis. Samples were selected based on the amount and nature of datable material present, stratigraphic context, and association with portable remains. The samples were submitted for radiocarbon analysis to Beta Analytic, Inc. of Coral Gables, Florida.

Using standard procedures, the samples were pretreated with an acid, alkali, acid series of soakings to remove carbonates and humic acids. All of the samples except for Sample RC-1413 were determined to contain sufficient carbon for further analysis. After pretreatment, the samples were combusted to form carbon dioxide gas, were combined with lithium to separate the carbon, and were hydrolized for conversion to liquid form. The liquid was then catalyzed to form benzene and was placed in a liquid scintillation counter to determine the amounts of carbon-13 and carbon-12. The isotope values obtained during the counting process were then used to calculate the carbon-13/ carbon-12 ratio for the sample, with the final result being determined relative to international standards in order to reduce errors produced by carbon isotope fractionation. Processing of samples RC-1414, -1415 and -1416 proceeded normally.

Results

The results of the radiocarbon age determination are summarized in Table 10. The age for each sample is reported as a range corresponding to the calendric age +/- two standard deviations. Ages were calibrated using the formulas (Method B) provided in Stuiver and Reimer (1993), which correct for variations in marine and atmospheric carbon over time.

As shown in Table 10, Sample RC-1416 yielded a modern date (post AD 1950) while Samples RC-1414, and -1415 produced multiple calendric ranges. Multiple ranges are caused by "flat" regions in the calibration curve, which correspond to periods when atmospheric carbon decreased at a rate greater than 1.2 ppm/10 years, resulting in more than one possible fit of a sample to the calibration curve. While multiple ranges are more difficult to interpret archaeologically, detailed examination of the statistical curves, combined with evidence from feature stratigraphy, generally provides a means of selecting one range as more probable than the others. Based on these criteria, the most likely calendric ranges for Samples RC-1414 and -1415 are AD 1269-1515 (94% probability), and AD 1291-1526 (85% probability), respectively.

The results of the age determination analysis span a 681-year period extending from AD 1269 to the present (present = AD 1950). Within this period, the results from specific samples can be grouped into two clusters. The first cluster consists of Samples RC-1414 and -1415 from

Table 10. Summary of Radiocarbon Age Determinations

PHRI Lab.No. RC-	Lab. No. BETA-	Provenience	C-14 Age Yrs. B.P. (one sigma)	C-13/ C-12 Ratio	C-13 Adjusted C-14 Age Yrs. B.P.	*Calendric Range Yrs. AD
SITE 19295						
1413	—	Feature C, TU-11, Layer I, Level 2, 23-33 cmbs	—	—	—	Insufficient carbon
1414	55805	Feature C, TU-11, Layer II, Level 3 33-45 cmbs	580 ± 90	-27.7	540 ± 90	1269-1515 1598-1617
1415	55806	Feature C, TU-11, HF-1, Layer II, 24-45 cmbs	500 ± 80	-26.4	480 ± 80	1291-1526 1560-1631
SITE 19365						
1416	55807	Feature A, TU-15 Layer I, Level 5 30-40 cmbs	104.7±1.0%	-26.4	105 ± 1.0%	—

* *Calibrated according to Stuiver and Reimer (1993). Range at two sigmas.*

Feature C of Site 19295, both of which yielded prehistoric calendric ranges (AD 1269-1526). The samples were associated with sparse midden remains, but no other portable remains. Feature C is an enclosure with adjoining C-shapes, and is interpreted as a temporary habitation. The second cluster consists of Sample RC-1416 from Feature A of Site 19365, which yielded a modern date (post AD 1950). The sample was not associated with any portable remains. Feature A is an enclosure interpreted as a permanent habitation. With the exception of Sample RC-1416, which appears to have been contaminated by modern carbon, the interpreted age ranges for samples in all three clusters are consistent with known stratigraphic relationships, and do not appear to be affected by contamination.

Initial occupation of the project area most likely occurred during the mid-prehistoric period, beginning potentially as early as AD 1269 at Feature C. The association of the dating sample from this feature with sparse midden remains support the interpretation of the feature, and indicates that the focus of initial occupation was temporary habitation, possibly for exploitation of marine resources. The presence of both prehistoric and historic artifacts at several other sites suggests that the project area was utilized sporadically throughout the prehistoric and historic periods. Many of the sites have been interpreted as temporary habitations and, based on the presence of midden remains, were most likely utilized in association with marine resource exploitation. Until more of these sites have been excavated, and dating samples are submitted for analysis, however, our ability to reconstruct the chronology of settlement within the project area remains limited.

PORTABLE ARTIFACTS

A total of 150 artifacts were recovered from the project area, 138 of which are classified as indigenous artifacts. The remaining 12 artifacts are non-indigenous in classification and will be discussed in a later section. Indigenous artifacts are those fabricated using traditional Hawaiian manufacturing techniques and local raw materials, and range in type from tools and fishing gear to various decorative or religious items. The inventory of indigenous artifacts from the current project area is fairly narrow in content, and consists of fishing gear, flaked stone, tools, personal adornments, and several artifacts of uncertain function. A detailed tabulation of artifacts by archaeological site, feature, and unit is presented in Table 11. The results of the artifactual analysis are discussed below.

Fishing Gear

Three specimens of indigenous fishing gear (Cat# 2, 24, and 40) were recovered from the project area during the current investigation. The artifacts are complete cowrie shells (Cypraeidae) that have been perforated on opposing sides of the dorsal surface just above the natural indentation of the lip (Figure 12). Cat# 2 is an isolated find collected from the surface of the project area. It exhibits the double perforation noted above, but has also been modified by the removal of a hemispherical portion from one ventral lip; presumably to aid in attaching the lure to the toggle assembly. The specimen measures 6.0 x 4.4 x 3.3 cm. Cat# 24 is also perforated on both ends, but lacks the ventral notch. It measures 2.7 x 2.0 x 1.3 cm. Cat# 40 has only one perforation, but is notched. It measures 2.7 x 2.1 x 1.4 cm. Octopus lures hooks are composites which consist of a point and shank, generally manufactured from wood, which are lashed together at the base and attached to a hackle. A perforated cowry shell (Cypraiedae), or octopus lure, is tied to one side of the toggle assembly, and a basalt sinker is attached to the opposing side of the toggle. According to Buck (1957:359), the cowrie lure assemblage was

DOCUMENT CAPTURED AS RECEIVED

Table 11. Detailed Distribution of Portable Remains

State No.	Other Total	19315 Total	19306 Total	19314 Total	19310 Total	19321 Total	19351 Total	19365 Total	19368 Total	19376 Total	19389 Total	Grand Total
INDIGENOUS												
FISHING GEAR												
Shell												
Octopus lure	1	0	0	0	0	1	0	1	0	0	0	3
SUBTOTAL FISHING GEAR	1	0	0	0	0	1	0	1	0	0	0	3
FLAKED STONE												
Basalt												
Core	0	0	0	0	0	0	0	0	0	0	4	4
Flake	0	0	0	0	0	0	0	0	0	2	7	9
Volcanic glass												
Core	0	0	0	0	0	0	0	1	0	0	0	1
Flake	0	0	0	1	0	0	0	69	0	10	0	80
SUBTOTAL FLAKED STONE	0	0	0	1	0	0	0	70	0	12	11	94
PERSONAL ADORNMENT												
Shell												
Perforated	0	0	0	0	0	0	0	2	0	0	0	2
SUBTOTAL PERSONAL	0	0	0	0	0	0	0	2	0	0	0	2
TOOLS												
Basalt												
Whetstone	0	0	1	0	0	0	0	0	0	0	0	1
Coral												
Abrader	1	0	0	0	0	0	0	2	0	0	0	3
Echinoid												
Abrader	0	0	0	0	1	0	0	4	0	0	0	5
SUBTOTAL TOOLS	1	0	1	0	1	0	0	6	0	0	0	9
UNCERTAIN FUNCTION												
Basalt												
Hammer	0	0	0	0	0	0	0	1	0	1	0	2
Modified	0	0	0	0	0	0	0	1	0	0	0	1
Shell												
Modified	0	0	0	1	0	0	0	23	2	0	0	26
Wood/Gourd												
Modified	1	0	0	0	0	0	0	0	0	0	0	1
SUBTOTAL UNCERTAIN FUNCTION	1	0	0	1	0	0	0	25	2	1	0	30
TOTAL INDIGENOUS	3	0	1	2	1	1	0	104	2	13	11	138
NON INDIGENOUS												
MISCELLANEOUS												
Metal												
Can	0	0	0	0	0	0	1	0	0	0	0	1
Fragments	0	1	0	0	0	0	1	0	0	0	0	2
Plastic												
Fragments	0	0	0	0	0	0	0	2	0	0	0	2
SUBTOTAL MISCELLANEOUS	0	1	0	0	0	0	2	2	0	0	0	5
MONEY												
Metal												
Nickel	0	0	0	0	0	0	0	0	1	0	0	1
Penny	0	0	0	0	0	0	0	2	0	0	0	2
SUBTOTAL MONEY	0	0	0	0	0	0	0	2	1	0	0	3
PERSONAL ADORNMENT												
Metal												
Pendant	1	0	0	0	0	0	0	0	0	0	0	1
Safety Pin	0	0	0	0	0	0	0	0	1	0	0	1
SUBTOTAL PERSONAL ADORNMENT	1	0	0	0	0	0	0	0	1	0	0	2
WEAPONS												
Metal												
Shell casing	2	0	0	0	0	0	0	0	0	0	0	2
SUBTOTAL WEAPONS	2	0	0	0	0	0	0	0	0	0	0	2
TOTAL NON INDIGENOUS	3	1	0	0	0	0	2	4	2	0	0	12
GRAND TOTAL	6	1	1	2	1	1	2	108	4	13	11	150

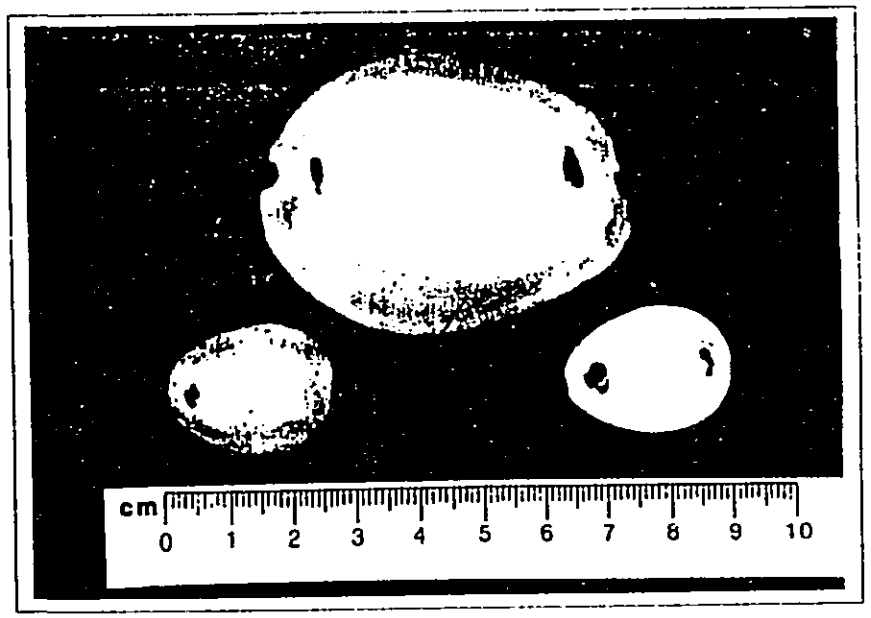


Figure 12. Octopus Lures (Neg. 4405-4a)

DOCUMENT CAPTURED AS RECEIVED

generally used to catch squid in water 80-120 fathoms deep, but was also used by aristocrats to catch squid for sport in more shallow waters.

Flaked Lithics

A total of 94 flaked lithic artifacts was recovered from Sites 19365 and 19376. Thirteen were manufactured from aphanitic basalt, while 81 were manufactured from volcanic glass.

All flaked stone material was evaluated with respect to flake/core type. Following established procedures for evaluating flaked stone material (Phagan 1980), diagnostic (primary) flakes are defined as those flakes having a complete or partial striking platform and a bulb of percussion. Non-diagnostic (secondary) flakes are broken flakes or fragments which lack the platform and/or bulb. Shatter represents the debris associated with flaked stone tool manufacture, and may include partial flakes, or "flake-like" chips. Cores tend toward multi-faceted polyhedral shapes dominated by one or more platforms, and typically show little evidence of subsequent use as tools. Primary cores exhibit only flake scars, while secondary cores are actually flakes with a bulb from which other flakes have been removed. Based on the these criteria, the 94 specimens can be separated as follows: four primary and one secondary cores, five diagnostic flakes, and 84 pieces of shatter.

Cores - Compositionally, the four primary cores are manufactured from basalt and the secondary core is manufactured from volcanic glass. The primary cores range from 2.3-5.4 cm in length, 1.0-2.5 cm in width and 1.1-2.1 cm in thickness; and they are generally polyhedral in shape (Figure 13). The secondary core measures 1.3 x 1.2 x 0.7 cm and is distally contracted in plan view. All five of the cores exhibit multiple platforms (2-3), the majority of which are intact and unmodified. The platforms are associated with one to three flake scars. Cortex was noted on the body of one primary core and the secondary core, suggesting that these specimens were utilized to a lesser extent than the other cores prior to discard.

Flakes - One of the diagnostic flakes and eight pieces of shatter were manufactured from basalt, while four of the diagnostic flakes and 76 pieces of shatter were manufactured from volcanic glass. The volcanic glass flakes are primarily trachytic in appearance (95%), and were matched in hand specimen to trachyte from Puu Anahulu. The remaining flakes are manufactured from poor quality volcanic glass and basalt, and could not be matched to a specific source area.

The diagnostic flakes range from 1.7-2.7 cm in length and 1.3-2.4 cm in width, while shatter ranges from 0.6-2.5 cm in length and 0.3-2.2 cm in width. Flakes and shatter manufactured from aphanitic basalt are generally larger than those manufactured from volcanic glass, due to the relative flaking properties of the materials.

Uses for flaked lithic artifacts have been suggested both by Barrera (1971) and Kirch (1973), who observed:

> The possible functions ... are many and varied. Basaltic glass holds a fine sharp edge and the tools make excellent cutting and scraping implements. They may have been used in food preparation, for cutting and scraping plant materials, or for delicate woodworking ... [t]hese artifacts are extremely common, being found in virtually every type of [Hawaiian] site. The suggestion, then, is that the ubiquitous basaltic glass flakes functioned as a prehistoric "pocketknife", to use a modern analogy... (1973:185-6).

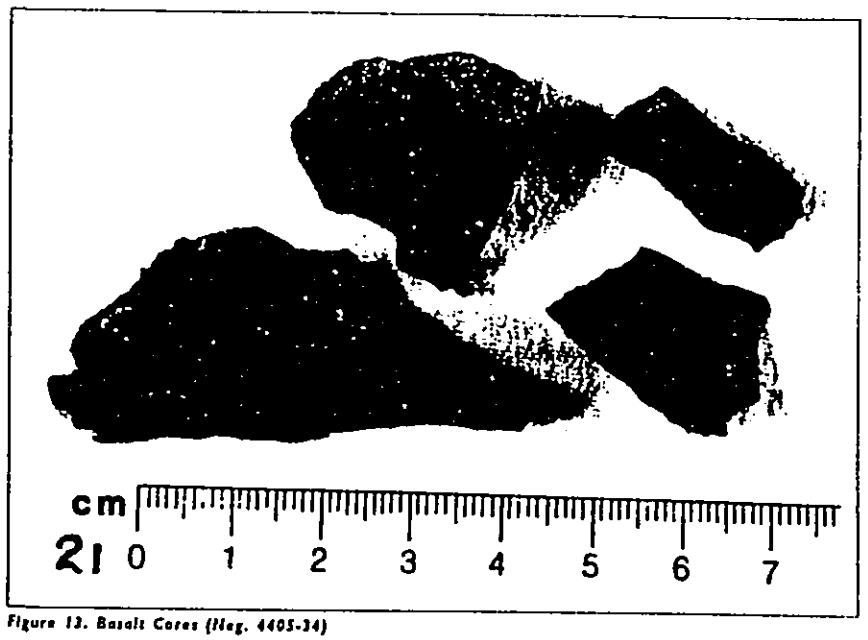


Figure 13. Basalt Cores (Neg. 4405-34)

DOCUMENT CAPTURED AS RECEIVED

Personal Adornment

Two artifacts interpreted as personal adornments (Cat# 59) were recovered from Site 19365. Both artifacts are *Nerita picea* shells that have been perforated at one end, presumably for stringing (Figure 14). Cat# 59a measures 1.2 x 0.9 x 0.7 cm and Cat# 59b measures 0.9 x 0.7 x 0.5 cm. *Nerita* shells were commonly used in shell *leis*. As Buck (1957) notes:

> *Nerita* shell necklaces (*lei pipipi*) ... were popular because of their numerous shades of color and varied markings. In this shell a hole was made through the large whorl behind the shell aperture. ...the convex surface of the whorl was filed down thin and the hole punched through. Thus many of the holes are irregular in shape and show no signs of drilling. The cord or ribbon is threaded through the hole and the shell aperture to form a long single chain. In some necklaces the shells are turned alternately on the cord so that the apertures of each pair face each other. The shell commonly used was *Nerita polita* (*kupe'e*); but *N. picea* and *N. neglecta*, both called *pipipi* were used occasionally... (1957:543).

Tools

Nine artifacts identified as tools were recovered from Sites 19306, 19318, 19365 and from the surface of the project area. The tools include eight abraders and a whetstone. The tools are described by type and function below.

Abraders - Coral and scoria abraders are evaluated according to their overall shape in plan view, following the classification system and nomenclature set forth by Suggs (1961) to describe coral abraders found at Nuku Hiva in the Marquesas Islands, French Polynesia. In this system, abraders are either informal, meaning that the shape of the raw material is dominant; or formal, indicating that the characteristics of the raw material have been extensively modified by use. Cross-sections are generally taken perpendicular to the tip and butt of the abrader, while the number of abrasion faces is indicative of preferential abrasion on a given surface.

Of the eight abraders encountered in the project area, three are manufactured of coral and five are manufactured from echinoid spine. Two of the coral abraders are complete (Cat# 47 and 54), and one is an abrader fragment (Cat# 56) (Figures 15 and 16). Cat# 47 is informal in description, with a plano-convex cross-section and one heavily abraded face. It is roughly triangular in plan view and measures 14.1 x 9.7 x 4.3 cm. Cat# 54 is a formal abrader recovered in two pieces and subsequently mended. It is convex-lateral in cross-section and blunt in plan view, and has been ground on all surfaces. It measures 1.5 x 0.7 x 0.5 cm. Cat# 56 is a fragment of an informal abrader. It is irregular in cross-section and plan view, and has four heavily to moderately abraded faces. It measures 5.8 x 5.5 x 3.1 cm.

The echinoid abraders include one complete specimen, one partial specimen, and three fragments. The complete specimen measures 3.2 x 0.7 x 0.6 cm, while the partial specimens and fragments range from 2.1-4.0 cm in length and 0.5-0.6 cm in width. The number of abraded faces on the echinoid abraders and abrader fragments varies from 1-3 (the complete abrader is evenly abraded on all surfaces), with the most common type of face being a bevel extending from the midsection to the distal end. The fragments represent portions of the proximal end or midsection, due apparently to the preferential use of distal ends on the abraders. All of the echinoid abraders are informal in shape, but show a great deal of variation in the degree of abrasion represented.

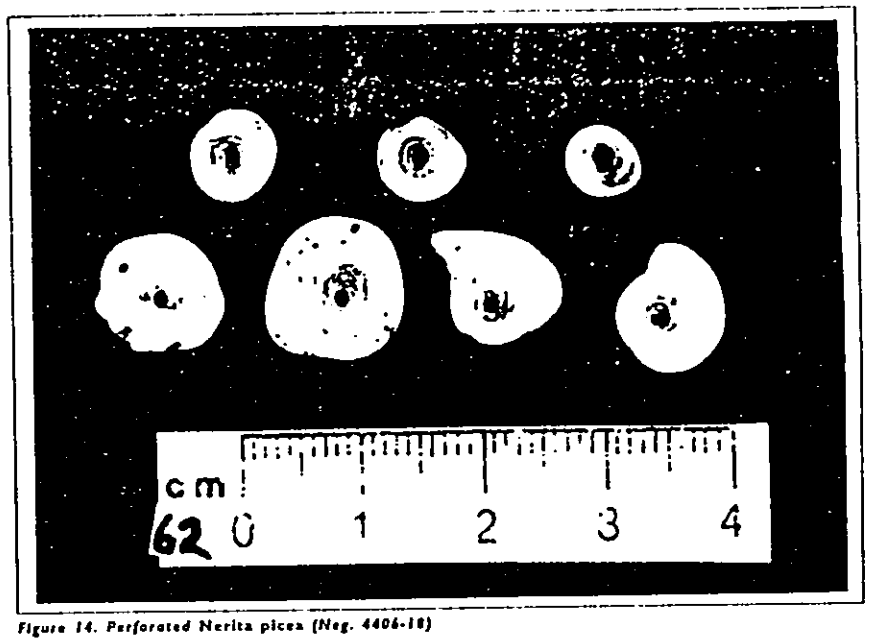


Figure 14. Perforated Nerita picea (Neg. 4406-18)

DOCUMENT CAPTURED AS RECEIVED

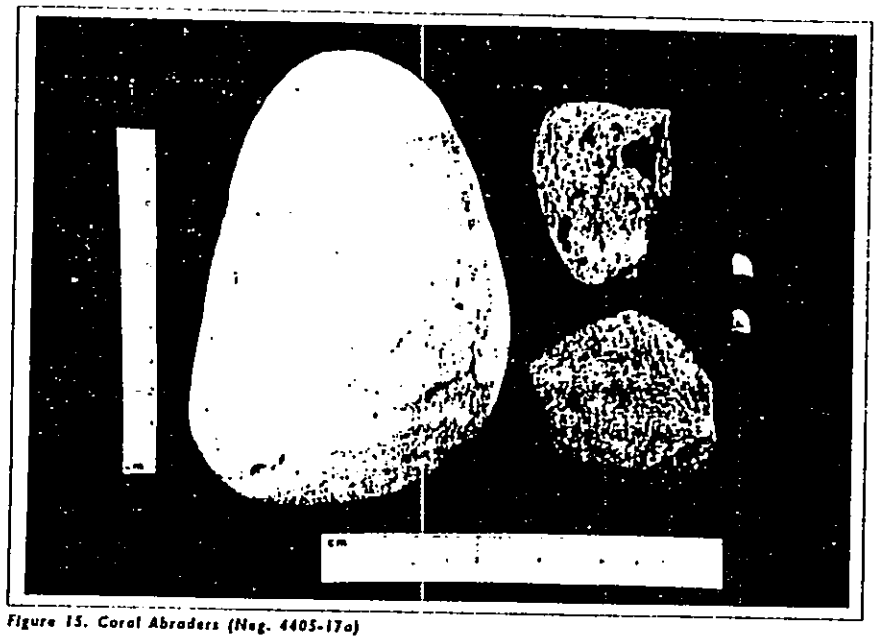


Figure 15. Coral Abraders (Neg. 4405-17a)

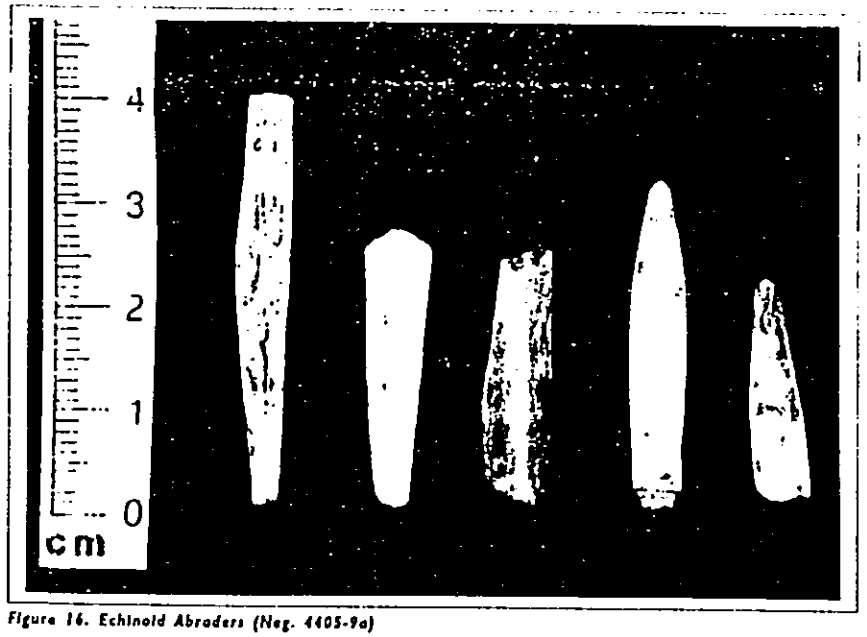


Figure 16. Echinoid Abraders (Neg. 4405-9a)

DOCUMENT CAPTURED AS RECEIVED

Coral abraders apparently served multiple purposes prehistorically, ranging from "rubbers" used to finish canoes and wooden bowls (Buck 1957), to saws or files used in the manufacture of bone and shell fishhooks (Emory, Bonk, and Sinoto 1968; Suggs 1961). The variety of shapes, edges and worn surfaces represented by the abraders in the assemblage suggest that the abraders served as multipurpose tools. Use of a particular surface over a period of time might generate a sawing or filing edge, which in turn would wear down during use to a new shape which could serve a new purpose. Echinoid abraders, in contrast, are small and fairly soft, and were probably used for finishing and more specialized tasks.

Whetstone - The whetstone fragment is manufactured from dark gray, aphanitic basalt and derives from the surface of Feature A of Site 19306 (Figure 17). It is formal in description and has one concave surface. It is irregular in cross section and measures 13.5 x 8.5 x 5.2 cm, and is good condition. Whetstones were used for sharpening the cutting edges of other tools, such as adzes or flaked tools.

Uncertain Function

Modified Basalt - One modified basalt artifact was recovered from Site 19365. The artifact is manufactured of vesicular basalt and, based on the presence of several ground surfaces, may have functioned as an abrader or a small pestle (Figure 18). It measures 6.0 x 5.1 x 3.2 cm and is good condition.

Modified Gourd - One modified gourd artifact was recovered from the surface of the project area (IF# 2). It appears to be a portion of a small gourd bowl or container, given the presence of an abraded "rim" at one opening, but did not retain sufficient portions of the base to definitively identify (Figure 19). It measures 7.7 x 6.5 x 5.1 cm and is in fair condition.

Modified Shell - Twenty-six modified shell artifacts were recovered from 19314, 19365, and 19368. All are disk-like apices of Conus shells which have been perforated through the center (Figure 20). These shells are often washed onto the beach, where the hole is created by progressive erosion in the surf rather than by human action, but they were occasionally collected and strung as necklaces. They range in diameter from 0.5-1.6 cm.

Manuports - Two basalt manuports (Cat# 15 and 35) were recovered from Sites 19365 and 19376. Both artifacts are small waterworn pebbles, similar to those used in *'ili'ili* pavements. Cat# 15 measures 2.1 x 1.5 x 1.6 cm and Cat# 35 measures 2.8 x 2.6 x 1.1 cm.

Non-Indigenous Artifacts

Eleven artifacts of recent historic manufacture were recovered from the project area. The artifacts include money, personal adornments, weapons and miscellaneous items recovered from Sites 19351, 19365, 19368 and from ST-17F.

Miscellaneous - Miscellaneous items recovered from the project area include a metal can fragment, two metal fragments and two plastic fragments. The items were recovered from Sites 19351 and 19365 and, except for indicating historic period or recent activity at these sites, provide little information concerning place or date of manufacture or function.

Money - A nickel and two pennies were recovered from Sites 19368 and 19365, respectively. The nickel was minted in 1969. One of the pennies was minted in 1973; the other was extremely corroded and could not be dated.

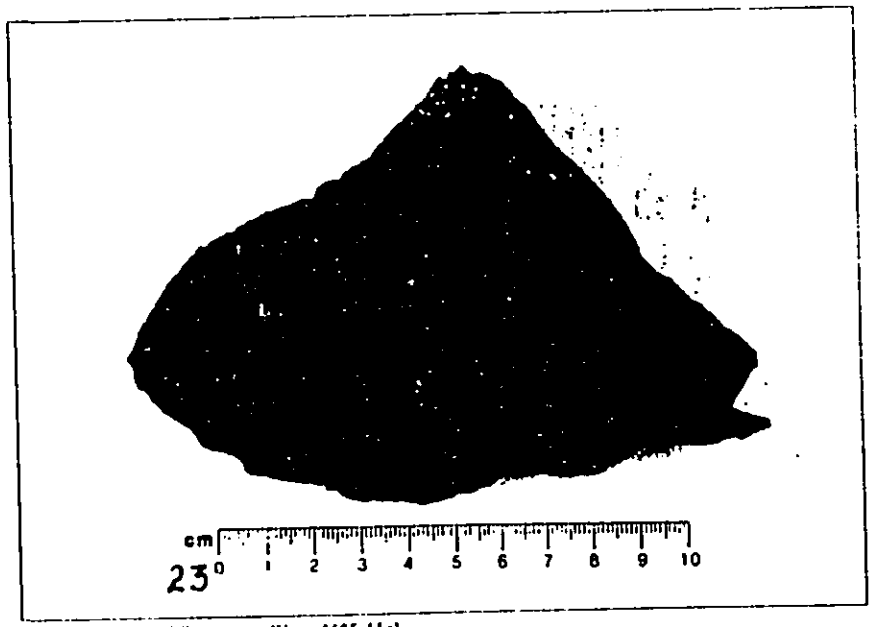


Figure 17. Basalt Whetstone (Neg. 4405-11a)

DOCUMENT CAPTURED AS RECEIVED

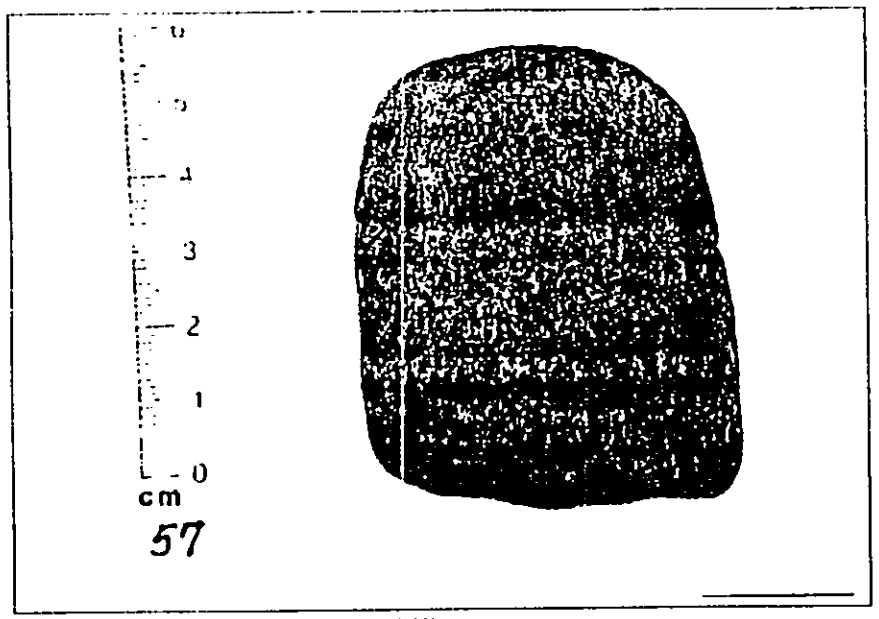


Figure 18. Modified Basalt Artifact (Neg. 4405-16)

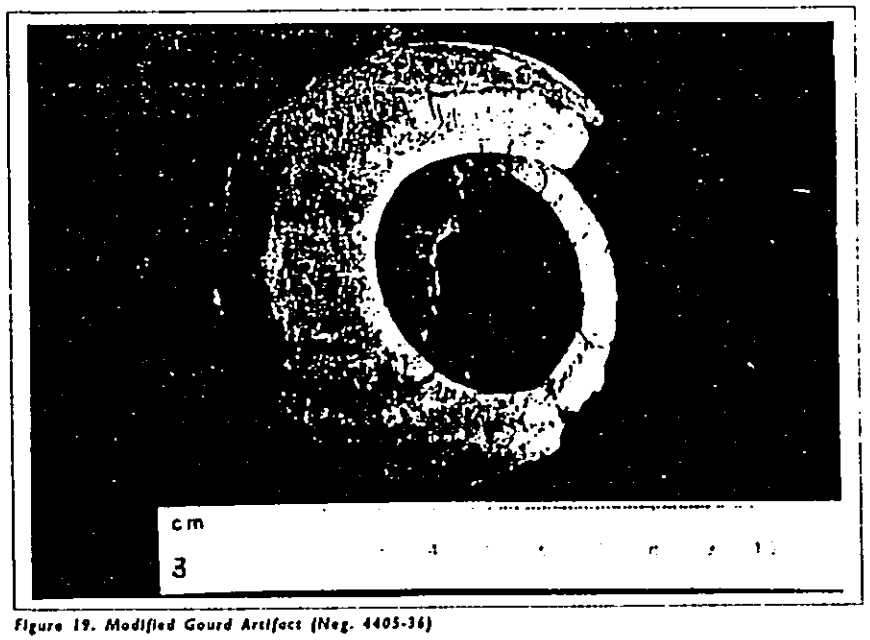


Figure 19. Modified Gourd Artifact (Neg. 4405-36)

DOCUMENT CAPTURED AS RECEIVED

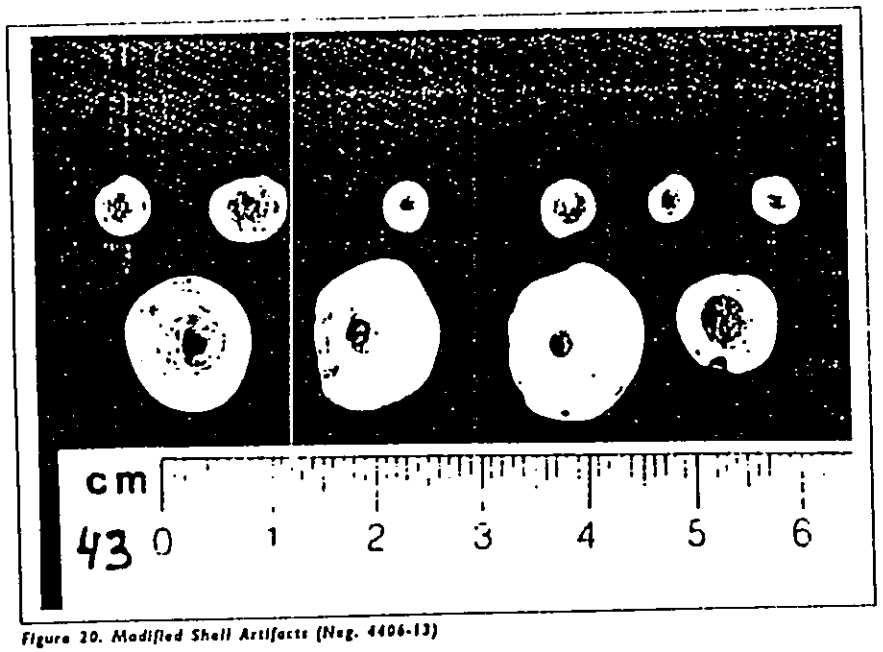


Figure 20. Modified Shell Artifacts (Neg. 4406-13)

Personal Adornment - Two items utilized for clothing or personal adornment (Cat# 10 and 45) were recovered from Site 19368. Cat# 10 is a metal pendant (or keychain ornament) manufactured from cast iron. One side is decorated with a relief design of an eagle in flight on a background of pine trees and mountains. An emblem below the eagle reads "Alaska". The back of the pendant has a makers mark "@ 1984 Siekiyou Eucycle Co." Cat# 45 is a large metal safety pin, and based on the lack of rust noted on its surface, is probably a recent addition to the site.

Weapons - Two shell casings (Cat# 31a,b) were recovered from ST-17F. Both are from 42-caliber shells and are in good condition.

Discussion

Analysis of the artifact assemblage encountered during the current investigation suggests that prehistoric activities in the project area were focused primarily on subsistence. The range of activities represented is fairly narrow and probably included manufacture of shell artifacts, as well as the production of fishing gear, although these types of artifacts were encountered in limited numbers. Stone tool manufacture and use is indicated by the basalt and volcanic glass material, as well as the whetstone, and may have been accompanied by food processing and craft production activities which relied on the use of flaked stone tools. Woodworking, such as canoe manufacture or wooden tool production, is suggested by the coral abraders present in the project area assemblage.

The non-indigenous assemblage is also very narrow in content, and was most likely deposited in the project area through recent recreation or dumping activities rather than occupation. Those items that could be dated (money, pendant) were manufactured in the 20th century; the remaining artifacts are interpreted as recent based on condition.

Comparison of the project area assemblage with assemblages encountered elsewhere in West Hawaii indicates that a general similarity in the range, but not abundance of artifacts. Assemblages from Anaehoomalu (Jensen 1990), Makalewena (Donham 1986), Ooma II (Donham 1987b), Awakee (Donham 1987a), and Kalahuipuaa (Kirch 1984) have fairly high proportions of fishing gear and artifacts manufactured from marine materials (shell, sea urchins, etc.) but have lesser amounts of materials manufactured from bird or mammal bone. The relative abundance and variety of artifacts in the current assemblage is greater than that noted for Awakee (where wave action has destroyed many of the potential prehistoric sites), but is less than that encountered in the other areas. Based on this comparison, the current assemblage may indicate that the current project area was used for a more limited range of activities and/or more temporary occupation, or may indicate that the activities undertaken in the project area involved fewer formal artifacts and thus left fewer traces.

ECOFACTUAL REMAINS

Objectives and Methods

Ecofactual remains are archaeologically significant on a number of levels, as the variety and content of food remains contained within a given cultural deposit provide useful information concerning prehistoric diet and resource utilization patterns. The analysis of ecofactual remains for inventory survey projects thus has two primary objectives:

1. To determine the variety and distribution of ecofactual remains present in each cultural deposit encountered within the project area; and

2. To provide an indication of dietary and resource exploitation patterns for each site, and for the project area as a whole.

All ecofactual remains recovered from the project area underwent detailed analysis in the laboratory. Detailed analysis involved splitting the sample into two size classes by it through 1/4-in and 1/8-in screens. One hundred percent of the material retained in the 1/4-in screen was completely sorted to the lowest taxonomic level possible, while the material retained in the 1/8-in screen was inspected both for artifactual material and for taxa not encountered in the larger portion of the sample. Each category of identified invertebrate material was then bagged and individually weighed. Relative percentages of invertebrate types were calculated for each provenience, as well as for the site as a whole. Marine shell identifications were verified and augmented using Kay (1979). The vertebrate faunal remains derived from PHRI's investigations were submitted to Dr. Alan Ziegler of Kaneohe, Oahu for identification.

The sampling design outlined above is adapted from Kirch (1979), based on a series of experiments measuring the relative distribution of molluscan and bone material retained on each screen. Kirch concluded that use of the screening process increased the speed of the sorting process without decreasing either the accuracy or statistical validity of the overall analysis. The taxonomic distribution and weight of material retained on the 1/4-in screen should thus be considered as representative of the variety and relative percentages of each taxon present in the entire sample.

Results

Weight Data - Ecofactual remains were encountered in the deposits at Sites 19265, 19273, 19294, 19295, 19312, 19314, 19315, 19318, 19321, 19351, 19365, 19366, 19367, 19368, and 19376. The results of the analysis are presented in Table 12. Total weights for each taxon (in grams) are tabulated by unit, with subtotals indicating the combined weight per feature for each larger material class (e.g., gastropods). The total weight of each taxon within the assemblage is provided in the final column of each table, while the grand total represents the combined weight of all the ecofactual materials derived from the analyzed deposits.

By weight, 84.8% of the 2,555.46 grams of ecofactual remains recovered from the project area is contributed by marine gastropods, 17.8% by bivalves, 10.1% by other invertebrates, 0.07% by Chrondrichthyes, 1.5% by Osteichthyes, 0.21% by Mammalia, 0.01% by Indeterminate vertebrates, and 1.53% by vegetal remains. Thirty-seven species representing 32+ families were identified including 12 gastropod (marine), five bivalve, seven Osteichthyes, three Mammalia and two vegetal families. Members of the Family Cypraeidae were the most common invertebrate taxa identified, while members of the family Diodontidae were the most commonly identified vertebrate taxa. Vegetal remains were comprised primarily of charcoal, supplemented by small amounts of macadamia (*Macadamia integrifolia*), *kukui* (*Aleurites moluccana*) and unidentified wood.

The ecofactual assemblages associated with individual sites and features are fairly similar in content and relative distribution to the total assemblage discussed above. All of the deposits, except those at Site 19321, were dominated by marine gastropods (71-100% of each site deposit by weight). The deposits at Site 19321 comprised entirely Osteichthyes remains. Of the site

Table 12. Detailed Distribution of Portable Remains

Site No.	Other Total	19265 Total	19273 Total	19294 Total	19295 Total	19312 Total	19314 Total	19315 Total	19318 Total	19321 Total	19351 Total	19365 Total	19366 Total	19367 Total	19368 Total	19376 Total	Grand Total
INVERTEBRATES																	
MOLLUSCA																	
GASTROPODA																	
PATELLIDAE																	
Cellana sp	0.00	0.12	1.35	0.17	5.41	0.00	0.00	1.21	7.31	0.00	0.31	23.23	1.06	0.16	1.43	5.21	46.40
TROCHIDAE																	
Trochus intextus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	0.00	0.00	0.00	0.12	2.96
TURBINIDAE																	
Turbo sandwicensis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.35
NERITIDAE																	
Nerita picea	0.03	0.00	0.00	1.23	0.00	4.13	0.00	0.35	12.45	0.00	0.00	178.78	11.35	0.41	0.00	11.74	214.85
N. polita	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	1.16	0.00	0.00	0.11	2.52
LITTORINIDAE																	
Littorina pintado	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.18	0.00	0.00	3.51	0.00	0.00	0.00	0.00	4.27
PLANAXIDAE																	
Planaxis labiosa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.14	0.00	0.00	0.00	0.00	3.14
STROMBIDAE																	
Strombus maculatus	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.77	0.00	0.00	0.00	0.00	2.31
HIPPONICIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.94	0.00	0.00	0.00	0.00	2.94
CYPRAEIDAE	31.39	4.81	11.87	35.90	81.05	8.74	13.38	81.72	174.32	0.00	42.13	941.66	57.15	4.83	0.00	82.61	1628.91
CYMATIIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.21	0.00	0.00	0.00	0.49	5.70
THAIDIDAE	0.00	0.36	0.00	17.32	11.83	0.00	3.71	0.00	6.91	0.00	3.67	64.39	4.21	0.00	0.00	0.54	112.36
Drupa sp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.75	0.00	0.00	0.00	0.00	34.75
CONIDAE	4.06	0.00	0.20	16.93	4.33	0.00	0.00	0.00	0.43	0.00	0.00	97.50	0.00	0.30	0.00	0.20	125.45
SUBTOTAL GASTROPODA	36.78	5.39	12.43	73.30	113.29	12.87	16.10	84.18	301.78	0.00	46.11	1155.16	74.81	5.61	2.63	104.82	2167.86
BIVALVIA																	
MYTILIDAE																	
Brachidontes crebristriatus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.08
ISOGNOMONIDAE	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	11.34	0.35	0.00	0.00	0.00	11.94
Isognomon californicum	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.81	0.36	0.00	0.00	0.15	1.83
CHAMIDAE	0.00	0.00	14.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.41	0.00	0.00	0.00	0.00	23.79
TELLINIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.20	0.00	0.00	1.35	0.00	0.00	0.00	1.00	3.49
VENERIDAE	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	3.65	0.00	0.00	1.81	0.00	0.39	0.00	0.00	5.34
SUBTOTAL BIVALVIA	0.19	0.00	14.38	0.00	0.19	0.13	0.00	0.51	4.06	0.00	0.00	21.13	0.51	0.39	0.00	2.81	45.31
OTHER INVERTEBRATES																	
ECHINOIDEA	0.00	0.00	0.00	2.73	2.58	0.00	0.00	3.11	17.34	0.00	0.00	215.81	2.74	0.00	0.00	18.28	254.81
CRUSTACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	3.23	0.00	0.00	0.00	0.00	3.46
SUBTOTAL OTHER INVERTEBRATE	0.00	0.00	0.00	2.73	2.58	0.00	0.00	3.11	17.65	0.00	0.00	218.04	2.74	0.00	0.00	18.28	257.27
TOTAL INVERTEBRATES	36.47	5.39	64.80	75.83	116.06	13.00	16.10	87.80	323.35	0.00	46.11	1394.38	78.06	6.00	2.63	111.38	2472.94
VERTEBRATES																	
CHONDRICHTHYES																	
SHARK/RAY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.73	0.00	0.00	1.73
OSTEICHTHYES																	
MURAENIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.05	0.33
CARANGIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.28
LABRIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.69
SCARIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.17
ACANTHURIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.17
BALISTIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.54
DIODONTIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.48	19.06	0.00	0.00	0.00	0.00	0.00	0.00	34.54
UNIDENTIFIED FISH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.77	0.00	0.00	0.00	0.00	1.77
SUBTOTAL OSTEICHTHYES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.81	19.06	0.00	3.59	0.00	0.00	0.00	0.00	38.46
MAMMALIA																	
CANIDAE																	
Canis familiaris	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	2.00
SUIDAE																	
Sus scrofa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.00	0.00	0.00	0.00	1.09
BOVIDAE																	
Bos taurus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	0.00	0.00	0.00	0.00	1.92
ORDER AND FAMILY INDETER.																	
Small to medium mammal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.35
SUBTOTAL MAMMALIA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.36	0.00	0.00	0.00	0.00	5.36
INDETERMINATE																	
ORDER AND FAMILY INDETER.																	
Medium vertebrate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL VERTEBRATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.81	19.06	0.00	9.35	0.00	1.80	0.00	0.00	45.91
VEGETAL REMAINS																	
PROTEACEAE																	
Macadamia integrifolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39	0.00	0.00	0.00	0.00	1.39
EUPHORBIACEAE																	
Aleurites moluccana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.44
OTHER																	
Charcoal	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.17	0.00	0.00	24.81	0.63	0.00	0.00	0.00	25.87
Wood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.06	0.00	0.00	0.00	0.00	4.06
TOTAL VEGETAL REMAINS	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.17	0.00	0.00	29.36	0.63	0.44	0.00	0.00	29.86
GRAND TOTAL	36.47	5.39	64.80	75.83	116.06	13.00	16.37	87.80	339.33	19.06	46.11	1433.91	78.69	14.54	2.63	111.38	2555.46

deposits dominated by marine gastropods, three (19265, 19351 and 19368) were comprised entirely of marine gastropods; three (19295, 19315, and 19376) contained bivalves and other invertebrates; two (19273 and 19312) contained bivalves; two (19318 and 19365) contained bivalves, other invertebrates, vertebrates and vegetal remains; one (19294) contained other invertebrates; one (19314) contained vegetal remains; one (19366) contained bivalves, other invertebrates and vegetal remains; and one (19367) contained bivalves, vertebrates and vegetal remains.

Ubiquity Data - In addition to weight data, ubiquity values were calculated in order to correct for possible skewing of the data which can occur when weights alone are used to characterize importance of individual taxa in a site. Using weight calculations only, for example, a single large *Turbo* shell would be accorded more importance than many smaller shells which weigh less, but which may have been equally important food resources. Further, differential preservation of archeological remains results in the overrepresentation of more durable materials (like the larger, heavier shells) in sites. As Hastorf and Popper state:

> "In sum, ubiquity analysis is useful, within limitations, for showing general trends when one has little control over the sources of patterning in one's data. By measuring the frequency of occurrence instead of abundance, it reduces but does not eliminate the effects of differences in preservation and sampling" (Hastorf and Popper 1988: 64).

Ubiquity calculations treat all samples as independent, and of equal value; only the presence or absence of a taxon in a given level is noted. The number of samples in which a taxon appears is divided by the total number of samples from a site, giving a percentage of samples in which a taxon is represented at the site. In this manner, problems of differential preservation are partially offset.

In general, ubiquity values show a positive correlation with relative weight percentages (Table 13). Ubiquity calculations demonstrated that Echinoidea and members of the family Cypraeidae, both of which comprised high percentages of the assemblage by weight, were also the most consistently represented genera. Other taxa with high ubiquity scores and relatively high relative weight percentages included *Nerita picea*, Thaididae and Conidae.

Ubiquity calculations were additionally useful in highlighting instances where smaller shell taxa, such as *Cellana sp.*, appear scarce when characterized by weight percentage, but are present in more than 48% of the samples. The ubiquity of these taxa is important in terms of characterizing subsistence patterns throughout the project area, and making comparisons between site assemblages, and suggest that shellfish may have been collected based on flavor or availability, as well as amount of actual protein derived.

Discussion

The results of the ecofactual analysis indicate that subsistence patterns in the project area included the collection and consumption of a large variety of shell fish, ranging from several taxa of marine gastropods and bivalves to sea urchins and crustaceans. In general, the marine invertebrates included in the assemblage are common inhabitants of the shorelines, shallow-water areas, solution benches and fringing reefs of the windward islands of the Hawaiian chain and would have been easily accessible to local populations. The most common taxa are noted below, with comments on their occurrence and probable economic value (taken from Titcomb *et al.* 1978: 337-353):

Table 13. Ubiquity Values for Ecofactual Remains

CLASS	FAMILY/SPECIES	n	ubiquity
GASTROPODS	PATELLIDAE		
	Cellana sp.	31	48.43
	TROCHIDAE		
	Trochus intextus	3	4.69
	TURBINIDAE		
	Turbo sandwicensis	1	1.56
	NERITIDAE		
	Nerita picea	31	48.43
	Nerita polita	3	4.69
	LITTORINIDAE		
	Unorina pencida	6	9.37
	PLANAXIDAE		
	Planaxis labiosa	2	3.13
	STROMBIDAE		
	Strombus maculatus	2	3.13
	HIPPONICIDAE	4	6.25
	CYPRAEIDAE	47	73.44
	CYMATIDAE	3	4.69
	THAIDIDAE	20	31.25
	Drupa sp.	1	1.56
	CONIDAE	14	21.88
BIVALVES	MYTILIDAE		
	Brachidontes crebristriatus	1	1.56
	ISOGNOMONIDAE	8	12.50
	Isognomon californicum	6	9.37
	CHAMIDAE	3	4.69
	TELLINIDAE	3	4.69
	VENERIDAE	5	7.81
OTHER	ECHINOIDEA	32	50.00
INVERTEBRATES	CRUSTACEA	3	4.69
CHRONDRICHTHYES	Shark/Ray	1	1.56
OSTEICHTHYES	MURAENIDAE	1	1.56
	CIRRHITIDAE	1	1.56
	LABRIDAE	3	4.69
	SCARIDAE	1	1.56
	ACANTHURIDAE	1	1.56
	BALISTIDAE	3	4.69
	DIODONTIDAE	2	3.13
	Unidentified Fish	3	4.69
MAMMALIA	CANIDAE		
	Canis familiaris	2	3.13
	SUIDAE		
	Sus scrofa	1	1.56
	BOVIDAE		
	Bos taurus	1	1.56
	ORDER AND FAMILY INDETERMINATE		
	Small to medium mammal	1	1.56
INDETERMINATE	ORDER AND FAMILY INDETERMINATE		
	Medium Vertebrate	1	1.56
VEGETAL	PROTEACEAE		
	Macadamia integrifolia	1	1.56
	EUPHORBIACEAE		
	Aleurites moluccana	1	1.56
	OTHER		
	Charcoal	8	12.50
	Wood	1	1.56

Cypraeidae - Members of the family Cypraiedae were known as *leho* by the Hawaiians and were of major importance in the economy as food, ornaments, tools and octopus fishing lures. To prepare *leho* for consumption, the shells were broken open and the meat was removed and worked with salt. The flesh was then wrapped in *ti* leaves and cooked over coals. Some people merely boiled the shell and then removed the meat. For the shells, small yellow and white *leho* were reserved for the *ali'i* to use as ornaments and were occasionally used as currency. Larger shells were used to make scrapers for removing the skin from cooked taro and breadfruit, and for grating coconut. Cowrie scrapers with a sharp, serrated edge were also used to incise *wauke* bark to remove it from the plant. The *mauritius* and sometimes the tiger cowries were used as part of octopus lure assemblies.

In terms of habitat, the cowrie range from the intertidal to depths of about 100 m. The most common species in the Hawaiian Islands are found in shallow water under loose rocks and boulders along the shoreline and in crevices at the seaward edge of solution benches and fringing reefs.

Patellidae - Members of the family Patellidae, or limpets, were grouped together and called *'opihi* by the Hawaiians. The *'opihi* were extremely well-liked as a food item and were reportedly the most commonly eaten shells. The favorite method of preparation was raw and salted, either with or without seaweed. They were sometimes washed clean and then cooked in the shell, using a calabash with hot stones. The shells were picked out later. This method enabled the broth (*kai*) to be used, especially by the sick and young. The meat was pulled from the shells or sometimes scooped out with a smaller, empty *'opihi* shell. *'Opihi*, especially *'opihi'awa*, were used extensively as medicine, and were also associated with sorcery. Although no examples of utilized *'opihi* shells were encountered in the current project area, empty *'opihi* shells were often used for scooping, peeling and scraping because of their sharp edges.

Within the Hawaiian island chain, *Cellana spp.* are restricted in their occurrence to the shorelines of volcanic islands. They are generally found on basalt shorelines from the spray zone seaward to the calcareous algal zone, except for *C. talcosa* which occurs at depth of 1 to 10 cm along abrupt coastlines. Taxa recognized by the Hawaiians included *C. talcosa* (*'opihi ko'ele*), *C. sandwicensis* (*'opihi 'alinalina*) and *C. exarata* (*'opihi makaiauli*).

Neritidae - *N. picea* and *Theodoxus neglectus* are both known to the Hawaiians as *pipipi*. *Pipipi* is a general name for small mollusks used with modifying terms to indicate various species with habits and habitats similar to nerites. *N.picea* is the most common taxon of *pipipi*, as well as the dominant nerite along Hawaiian shorelines, and is abundant on all rocky substrates from the splash zone to the high water mark just above the littorines. *Theodoxus neglectus* are euryhaline and are found not only at seaward edges, but also in brackish water assemblages. They are found immersed, both on the surface of the substratum and under rocks and rubble. *Pipipi* were used as a food item, and required a needle or pick to remove the meat. Some were eaten as they were collected, while others were cooked by boiling or by wrapping the shell in leaves and broiling. Some people made a broth and added other shells for flavor. Empty shells were then commonly strung in *leis* or bracelets.

N. polita, a larger nerite, was known as *kupe'e*. *Kupe'e* were used as food items, much in the way described for *pipipi* above, but were most prized for their ornamental value. The Hawaiians had names for many *kupe'e* according to their color or markings: *kupe'e 'ula* (red), *anuenue* (rainbow - red or black striped), *palaoa* (whale tooth ivory - creamy white color), *'ele'ele* (black), *kani'o* (vertical stripes), *mahiole* (warrior's helmet - white with red stripes)

and the rare *puna*. The rarest of these were the *'ula*, *anuenue*, *mahiole* and *puna*, and were saved for chiefs. Drilled and made into bracelets, the *kupe'e* were an emblem of mourning for the *ali'i*. *Kupe'e* occur beneath the surface of the sand among boulders at the high tide line and are generally nocturnal, plowing through the sand and crawling up the algae covered rocks on which they feed.

Thaididae - Members of the Thaididae family were known variously as *aupupu*, *'awa*, *makaloa* and *pupu makaloa*. They were primarily used as a food source, but larger specimens with a long, sharp, strong lip were often made into small adzes. *Morula spp.* are common in the intertidal zone on hard substrates where there is strong wave action, while *Drupa spp.* are common on benches, reefs and basalt shores where there is heavy surf action and on rocky substrates to depths of 15 m. The shells are often covered with a growth of coralline algae.

Conidae - Members of the family Conidae were known either as *pupu-'ala* (cones that did not sting) or as *pupu poniuniu* (cones that did sting). Cones, although extremely common in the Hawaiian islands, were seldom used as food items, but were instead prized as ornaments. Kay (1949) reports that one species, *C. millepunctatus*, was used for food, but was not a preferred or common item in the diet. Cones are among the most conspicuous gastropods on reefs and benches that fringe the shoreline, and occur in deeper waters offshore. Of the 25 species identified in Hawaii, six are dominant on marine benches and two are dominant on subtidal reefs.

Bivalves - While none of the more common bivalves encountered in the current assemblage were extensively described by Titcomb, she does refer to use of bivalves as a general category. Bivalves were not extensively used as food items, although members of the families Chamidae (rock oysters), Mytilidae and Isognomonidae (mussels) were eaten when available. More common uses of bivalves included use as a raw material in fishhook manufacture, or collection for the sake of pearls lodged inside oysters. Most bivalves are found near the shorelines and within fringing reefs, where there are sandy areas for burrowing.

Fish, eels and shark/ray provided additional marine resources, with the majority being obtained from inshore habitats. Inshore taxa were generally obtained using a variety of techniques, including gathering, trapping, poisoning, snaring, spearing, netting, or shallow-line angling; while deeper sea taxa were obtained with long-line angling and trolling from canoes (Kirch 1979:208). The actual contribution of fish to the diet cannot be determined, due to the differential preservation of fish remains in archaeological contexts. It should be noted that marine vertebrates are neither abundant by weight or in terms of ubiquity, which suggests that invertebrates were the more important resource.

In addition to marine resources, the presence of terrestrial mammal and vegetal remains in the deposits from Sites 19314, 19318, 19365, 19366, and 19367 indicates that terrestrial resources were also utilized by local populations. All of the terrestrial taxa included in these deposits, with the exception of *Bos taurus* and *Macadamia integrifolia*, are prehistoric introductions but, given their continued use throughout both the prehistoric and historic periods, provide little definitive information concerning site age.

CONCLUSION

GENERAL SUMMARY OF FINDINGS

The present inventory survey has generally confirmed the previous survey findings of Yent and Griffin (1978). These researchers observed that the project area (1) contains a number of intact and partially intact archeological sites, which are (2) comprised of both single and multiple component examples, and (3) reflect both prehistoric occupation and exploitation as well as post-1940's activities (especially military). Also clearly documented in 1978 and during the present work is the fact that the post-1940's activities within the project area have extensively impacted many of the pre-existing components.

Despite prior impacts, formal feature types still represented in the project area include adjoining C-shapes, alignment, cairn, cairn with adjoining wall, cleared area, circular alignment, circular enclosure, circular wall, C-shape, C-shape wall, C-shape with adjoining wall, depression, enclosure, enclosure with adjoining C-shape, foundation, hearth, D-shaped alignment, L-shaped wall, L-shaped alignment, midden scatter, modified outcrop, mound, overhang, parallel walls, paved area, paved terrace remnant, pylons, ramp, remnant enclosure, remnant terrace, remnant U-shape, rubble concentration, semi-circular alignment, terrace, terrace with adjoining wall, trail, trail segment, U-shape, upright stones, wall, wall remnant, and wall segment. These feature types exceed those identified by Yent and Griffin during their earlier survey report, in part because the present survey involved a much larger project area.

Functional feature types include agriculture, fencing, habitation, hunting blind, indeterminate, marker, military, park maintenance, possible agriculture, possible ceremonial, possible marker, possible military, possible post support, possible temporary habitation, recreation, temporary habitation, trail marker, transportation, and water transportation. In some cases more than one functional interpretation was assigned to a single feature.

From the listing of functional feature types, above, it is clear that occupation of the project area represents not only Native Hawaiian activities, but also intensive post-1940's, non-subsistence-related, non-indigenous uses. Indeed, up to 188 of the project area's 425 recorded features are believed to represent post-1940's presence. Many of these features are believed to have been constructed during episodes of military training at Hapuna and Puako during and following WWII, while other features appear to have been created during the 1950's-1980's by hunters and others engaged in recreational activities. Some of the identified rock features are even believed to represent State Park maintenance activities. As noted above, these same observations were made by Yent and Griffin during their 1978 survey (Yent and Griffin 1978: 3-4). Also shared with Yent and Griffin is the conclusion that none of these features are considered to retain significant information, interpretive, or cultural values.

Needless to say, assessments of Native Hawaiian settlement and land use within the project area proceeded only after extracting non-indigenous features from the data base. Considering only features which represent indigenous occupation, Native Hawaiian functional activities appear to have included exploitation of the area's marine resources, coupled with limited agriculture along a single-stream course which proceeds roughly east-west through the south central portion of the project area. Marine resource extraction and agricultural activities appear

to have been engaged while operating from temporarily occupied features and small site complexes which are widely scattered throughout the project area, as well as from permanently to semi-permanently occupied, larger site complexes located primarily along the coastal cliffs and coastal plateau. The relative percentage of occurrence of the inferred functions for indigenous feature types are graphically illustrated in Figure 21.

Radiocarbon age determinations document that these various functional activities span at least 681 years, beginning potentially as early as AD 1269 and continuing through to the present. Fully prehistoric occupation has been confirmed for Feature C at Site 19295, from which one radiocarbon age range suggests occupation between AD 1269 and AD 1526. This particular site represents a small complex containing five features believed to represent temporary habitation. Presumably, more intensive use, including possible permanent or semi-permanent occupation, occurred at a later date at several of the larger coastal complex sites. These complexes are represented principally by the remains at Sites 19365, 19366, 19367, and 19368. Unfortunately, the extensive post-1940's disturbances to all of these sites, combined with limited data collected during the present inventory survey, have conspired to limit the data supporting the above hypothesis. Since this issue remains unresolved, and since additional, though limited, information is still present at several of these sites, additional data recovery work is justified and is being recommended for several project area sites.

As noted above, Figure 21 graphically portrays the relative proportion of indigenous functional feature types. This portrayal, which is based on data from Table 6, compares fairly closely with other nearby coastal zones where inventory surveys have been similarly restricted to coastal margins and only a narrow band of the middle zone (cf., Jensen 1988). At many of these other locales (i.e., Puako, Paniau, Kapalaoa, Kalahuipuaa, Anaehoomalu, coastal Waikoloa), it appears that the inhabitants relied most heavily, for subsistence, on collected marine resources. Despite the absence of definite evidence of agriculture at many of the coastal sites, however, minimal agricultural features have been documented during surveys further inland (e.g., Rosendahl 1972), and of course several such features were identified along the shallow gulch/stream course located within the present project area.

In addition to engaging in subsistence-related activities, the residents of these coastal zones, especially at Waikoloa and Anaehoomalu, also undertook numerous specialized tasks, including scoria quarrying and abrader manufacture (as at Waikoloa and Anaehoomalu), extensive petroglyph etching (as a Puako, Paniau, Waikoloa, and Anaehoomalu), and production of a variety of tool types, particularly fishing-related gear. Interestingly, the absence of significant fishing gear constitutes one of the most significant contrasts between the present project area and these other coastal locations. Cultural deposits at Anaehoomalu, Waikoloa, Kalahuipuaa, and northward along the coast toward Kawaihae have typically yielded a wide range and relatively high density of fishhooks and secondary tools related to fishhook manufacture. The present project area, however, yielded very few such items. These discrepancies could possibly be explained by sampling error, itself at least partially accounted for by the extensive disturbance to which many of the Hapuna project area sites have been subjected. Further evaluation of this possibility provides some of the justification for recommending additional data recovery work at several of the Hapuna area sites and features.

The information above, combined with the results of previous archaeological research within West Hawaii generally and the specific findings of historic documentary research within the project area (see Appendix D), have been utilized in developing final conclusions concerning the residual research potential, information value, and cultural/historical values of specific sites and features within the project area. These conclusions concerning residual

Figure 21: Graphic Portrayal of Percentage Distribution of Functional Feature Types Related to Indigenous Use and Occupation of the Project Area.

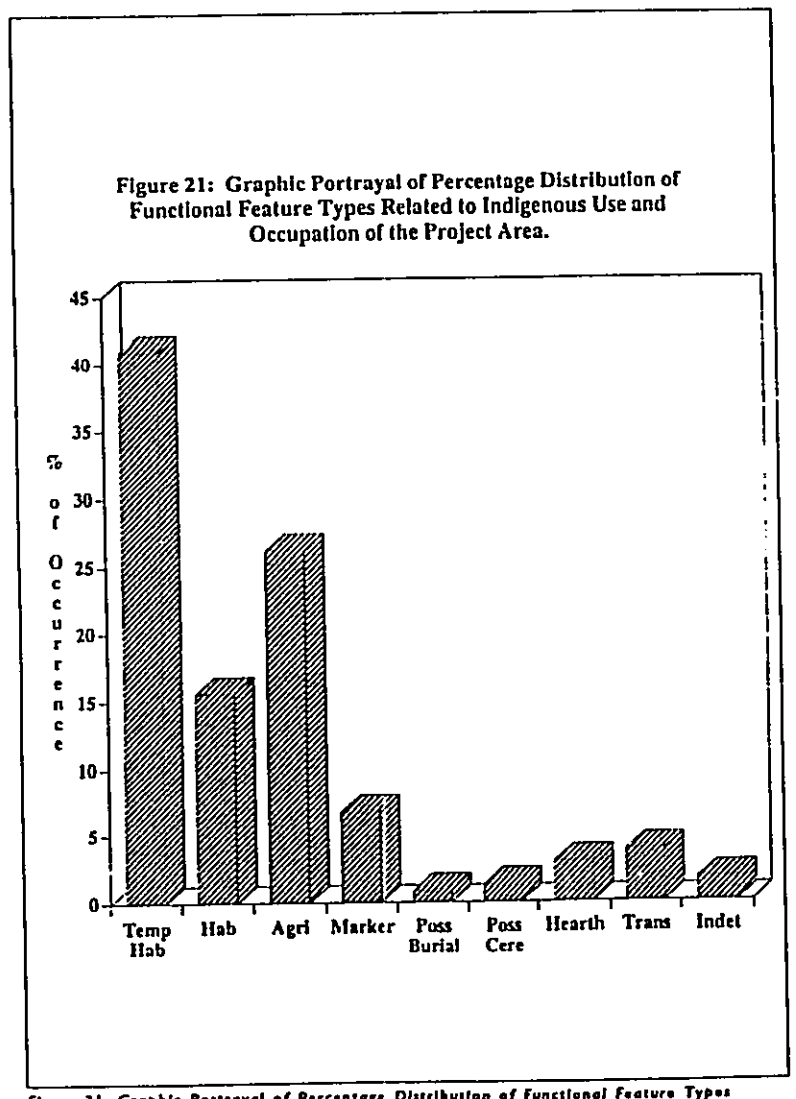


Figure 21. Graphic Portrayal of Percentage Distribution of Functional Feature Types Related to Indigenous Use and Occupation of the Project Area

significance have, in turn, been utilized to develop final treatment recommendations for the 164 sites which have been identified within the project area.

GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

Significance categories used in the site evaluation process are based on the National Register criteria for evaluation, as outlined in the Code of Federal Regulations (36 CFR Part 60). The DLNR-SHPD, and the Hawaii County Planning Department, use these criteria for evaluating cultural resources. Sites determined to be potentially significant for information content are evaluated under Criterion D, which defines significant resources as ones which "...have yielded, or may be likely to yield, information important in prehistory or history." Sites potentially significant as representative examples of site types are evaluated under Criterion C, which defines significant resources as those which "...embody the distinctive characteristics of a type, period, or method of construction...or that represent a significant and distinguishable entity whose components may lack individual distinction."

Sites with potential cultural significance are evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (Draft Report, August 1985). The guidelines define cultural value as "...the contribution made by an historic property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historical depth." The guidelines further specify that "[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value."

To further facilitate management decisions regarding the subsequent treatment of resources, the general significance of the archaeological resources identified during the reconnaissance survey have also been evaluated in terms of potential scientific research, interpretive, and/or cultural values (PHRI Cultural Resource Management Value Modes). Research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and cultural processes at the local, regional, and interregional levels of organization. Interpretive value refers to the potential of archaeological resources for public education and recreation. Cultural value, within the framework for significance evaluation used here, refers to the potential of archaeological resources for the preservation and promotion of cultural and ethnic identity and values.

The project's findings and conclusions concerning general site significance and recommended general treatments are summarized in Table 14. These findings and recommended treatments may be summarized further, as follows.

Of the 164 sites identified and recorded within or immediately adjacent to the project area, 156 are assessed as being significant or potentially significant solely for information content. However, for 138 of these sites, the present level of documentation (detailed recording of sites and features, surface collections, and limited test excavations) is considered sufficient to have recovered all of the significant information values represented by these sites, and no further archaeological data collection is warranted or recommended. Moreover, since none of these 138 sites represent unique, one-of-a-kind, or excellent site type examples, no preservation or interpretive development has been recommended for any of these 138 sites. These sites are listed in Table 14 under Significance Category "X" and Recommended Treatment Category "NFW".

Table 14. Summary of General Significance Assessments and Recommended General Treatments

*SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
19250	-	+	-	-	-	+	-	-
19251	-	+	-	-	-	+	-	-
19252	-	+	-	-	-	+	-	-
19253	-	+	-	-	-	+	-	-
19254	-	+	-	-	-	+	-	-
19255	-	+	-	-	-	+	-	-
19256	-	+	-	-	-	+	-	-
19257	-	+	-	-	-	+	-	-
19258	-	+	-	-	-	+	-	-
19259	-	+	-	-	-	+	-	-
19260	-	+	-	-	-	+	-	-

General Significance Categories:

A = Important for information content, further data collection necessary (PHRI=research value)

X = Important for information content, no further data collection necessary (PHRI=research value, SHPO=not significant)

B = Excellent example of site type at local, region, island, State, or National level (PHRI=interpretive value); and

C = Culturally significant (PHRI=cultural value).

Recommended General Treatments:

FDC = Further data collection necessary (detailed recording, surface collections, and limited excavations, and possibly subsequent data recovery/mitigation excavations);

NFW = No further work of any kind necessary, sufficient data collected archaeological clearance recommended, no preservation potential;

PID = Preservation with some level of interpretive development recommended (including appropriate related data recovery work);

PAI = Preservation "as is", with no further work (and possible inclusion into landscaping), or possibly minimal further data collection necessary

* *State Inventory of Historic Places (SIHP) numbers. SIHP numbers are five- digit numbers prefixed by 50-10-82 (50=State of Hawaii; 10=Island of Hawaii; 82=USGS 7.5' series quad map ["Pu'u Hinai, Hawaii"]).*

* *Provisional assessment; definite assessment pending completion of further data collection.*

Table 14. (cont.)

SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
19261	-	+	-	-	-	+	-	-
19262	-	+	-	-	-	+	-	-
19263	-	+	-	-	-	+	-	-
19264	-	+	-	-	-	+	-	-
19265	-	+	-	-	-	+	-	-
19266	-	+	-	-	-	+	-	-
19267	-	+	-	-	-	+	-	-
19268	-	+	-	-	-	+	-	-
19269	-	+	-	-	-	+	-	-
19270	-	+	-	-	-	+	-	-
19271	-	+	-	-	-	+	-	-
19272	-	+	-	-	-	+	-	-
19273	-	+	-	-	-	+	-	-
19274	-	+	-	-	-	+	-	-
19275	-	+	-	-	-	+	-	-
19276	-	+	-	-	-	+	-	-
19277	-	+	-	-	-	+	-	-
19278	-	+	-	-	-	+	-	-
19279	-	+	-	-	-	+	-	-
19280	-	+	-	-	-	+	-	-
19281	-	+	-	-	-	+	-	-
19282	-	+	-	-	-	+	-	-
19283	-	+	-	-	-	+	-	-
19284	-	+	-	-	-	+	-	-
19285	-	+	-	-	-	+	-	-
19286	-	+	-	-	-	+	-	-
19287	-	+	-	-	-	+	-	-
19288	-	+	-	-	-	+	-	-
19289	-	+	-	-	-	+	-	-
19290	-	+	-	-	-	+	-	-
19291	-	+	-	-	-	+	-	-
19292	-	+	-	-	-	+	-	-
19293	-	+	-	-	-	+	-	-
19294	-	+	-	-	-	+	-	-
19295	-	+	-	-	-	+	-	-
19296	-	+	-	-	-	+	-	-
19297	-	+	-	-	-	+	-	-
19298	-	+	-	-	-	+	-	-
19299	-	+	-	-	-	+	-	-
19300	-	+	-	-	-	+	-	-
19301	-	+	-	-	-	+	-	-
19302	-	+	-	-	-	+	-	-
19303	-	+	-	-	-	+	-	-
19306	-	+	-	-	-	+	-	-
19307	-	+	-	-	-	+	-	-
19308	-	+	-	-	-	+	-	-

Table 14. (cont.)

SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
19309	-	+	-	-	-	+	-	-
19310	-	+	-	-	-	+	-	-
19311	-	+	-	-	-	+	-	-
19315	-	+	-	-	-	+	-	-
19316	-	+	-	-	-	+	-	-
19317	-	+	-	-	-	+	-	-
19320	-	+	-	-	-	+	-	-
19321	-	+	-	-	-	+	-	-
19322	-	+	-	-	-	+	-	-
19323	-	+	-	-	-	+	-	-
19324	-	+	-	-	-	+	-	-
19325	-	+	-	-	-	+	-	-
19326	-	+	-	-	-	+	-	-
19327	-	+	-	-	-	+	-	-
19328	-	+	-	-	-	+	-	-
19329	-	+	-	-	-	+	-	-
19330	-	+	-	-	-	+	-	-
19331	-	+	-	-	-	+	-	-
19332	-	+	-	-	-	+	-	-
19333	-	+	-	-	-	+	-	-
19334	-	+	-	-	-	+	-	-
19336	-	+	-	-	-	+	-	-
19337	-	+	-	-	-	+	-	-
19339	-	+	-	-	-	+	-	-
19340	-	+	-	-	-	+	-	-
19341	-	+	-	-	-	+	-	-
19342	-	+	-	-	-	+	-	-
19343	-	+	-	-	-	+	-	-
19345	-	+	-	-	-	+	-	-
19346	-	+	-	-	-	+	-	-
19347	-	+	-	-	-	+	-	-
19348	-	+	-	-	-	+	-	-
19350	-	+	-	-	-	+	-	-
19351	-	+	-	-	-	+	-	-
19352	-	+	-	-	-	+	-	-
19353	-	+	-	-	-	+	-	-
19355	-	+	-	-	-	+	-	-
19356	-	+	-	-	-	+	-	-
19357	-	+	-	-	-	+	-	-
19358	-	+	-	-	-	+	-	-
19359	-	+	-	-	-	+	-	-
19360	-	+	-	-	-	+	-	-
19361	-	+	-	-	-	+	-	-
19362	-	+	-	-	-	+	-	-
19363	-	+	-	-	-	+	-	-
19369	-	+	-	-	-	+	-	-

Table 14. (cont.)

SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
19370	-	+	-	-	-	+	-	-
19371	-	+	-	-	-	+	-	-
19372	-	+	-	-	-	+	-	-
19373	-	+	-	-	-	+	-	-
19374	-	+	-	-	-	+	-	-
19375	-	+	-	-	-	+	-	-
19376	-	+	-	-	-	+	-	-
19377	-	+	-	-	-	+	-	-
19378	-	+	-	-	-	+	-	-
19379	-	+	-	-	-	+	-	-
19380	-	+	-	-	-	+	-	-
19381	-	+	-	-	-	+	-	-
19382	-	+	-	-	-	+	-	-
19383	-	+	-	-	-	+	-	-
19384	-	+	-	-	-	+	-	-
19385	-	+	-	-	-	+	-	-
19386	-	+	-	-	-	+	-	-
19387	-	+	-	-	-	+	-	-
19388	-	+	-	-	-	+	-	-
19389	-	+	-	-	-	+	-	-
19390	-	+	-	-	-	+	-	-
19392	-	+	-	-	-	+	-	-
19393	-	+	-	-	-	+	-	-
19394	-	+	-	-	-	+	-	-
19395	-	+	-	-	-	+	-	-
19396	-	+	-	-	-	+	-	-
19397	-	+	-	-	-	+	-	-
19398	-	+	-	-	-	+	-	-
19400	-	+	-	-	-	+	-	-
19402	-	+	-	-	-	+	-	-
19404	-	+	-	-	-	+	-	-
19405	-	+	-	-	-	+	-	-
19408	-	+	-	-	-	+	-	-
19409	-	+	-	-	-	+	-	-
19411	-	+	-	-	-	+	-	-
Subtotal:	**0**	**138**	**0**	**0**	**0**	**138**	**0**	**0**
19304	+	-	-	-	+	-	-	-
19312	+	-	-	-	+	-	-	-
19313	+	-	-	-	+	-	-	-
19314	+	-	-	-	+	-	-	-
19318	+	-	-	-	+	-	-	-
19319	+	-	-	-	+	-	-	-
19335	+	-	-	-	+	-	-	-
19338	+	-	-	-	+	-	-	-

Table 14. (cont.)

SIHP Site Number	Significance Category A	X	B	C	Recommended Treatment FDC	NFW	PID	PAI
19344	+	-	-	-	+	-	-	-
19349	+	-	-	-	+	-	-	-
19354	+	-	-	-	+	-	-	-
19364	+	-	-	-	+	-	-	-
19391	+	-	-	-	+	-	-	-
19399	+	-	-	-	+	-	-	-
19401	+	-	-	-	+	-	-	-
19403	+	-	-	-	+	-	-	-
19407	+	-	-	-	+	-	-	-
19412	+	-	-	-	+	-	-	-
Subtotal:	**18**	**0**	**0**	**0**	**18**	**0**	**0**	**0**
19406	-	+	-	+	-	+	-	-
19410	-	+	-	+	-	+	-	-
19413	-	+	-	+	-	+	-	-
Subtotal:	**0**	**3**	**0**	**3**	**0**	**3**	**0**	**0**
19367	+	-	+	-	+	-	+	-
19368	+	-	+	-	+	-	+	-
Subtotal:	**2**	**0**	**2**	**0**	**2**	**0**	**2**	**0**
19365	+	-	+	+	+	-	+	*
Subtotal:	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**1**
19366	+	-	+	+	+	-	+	-
Subtotal:	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**0**
19305	+	-	-	*	+	-	*	-
Subtotal:	**1**	**0**	**0**	**1**	**1**	**0**	**1**	**0**
Total:	**23**	**141**	**4**	**6**	**23**	**141**	**5**	**1**

Of the remaining 18 sites considered significant solely for information content, further data collection/recovery work is recommended. This recommendation is based on the finding that these sites, or specific features within site complexes, retain additional information which may be important to an understanding of local and/or regional prehistory or history. Implementation of additional data collection work is intended to result in a finding of "Affect, No Adverse Effect Through Data Recovery" for the proposed State Park expansion project.

The remaining eight project area sites are considered significant under multiple criteria, for which the following treatment recommendations have been made.

Coastal Complex Sites Significant for Information and Interpretive Value (2 sites):

> Sites 19367 and 19368 represent two of four large coastal complex sites believed to contain permanent or semi-permanent habitation features. Both retain potentially significant information value, and both may possess feature configurations which warrant some level of preservation and interpretive development. For both of these sites, further data recovery work, followed by some level of preservation with interpretive development, has been recommended.

Coastal Complex Site Significant for Information, Interpretive, and Cultural Value (1 site):

> Site 19366, as with Sites 19367 and 19368, represents a large coastal complex habitation site which retains significant information value and value as a site type. As well, this site contains two trail segments and two possible ceremonial features (Features F and J), rendering the site significant for cultural value as well. Additional data recovery work, followed by some level of preservation with interpretive development, is therefore recommended for this site.

Coastal Complex Site Significant for Information, Interpretive, and Cultural Value, and Possibly Containing Two Burial Features (1 site):

> Site 19365, as with Sites 19366, 19367 and 19368, represents a large coastal complex habitation site which retains significant information value and value as a site type. This site also contains a trail segment, rendering the site significant for cultural value. As well, this site contains two possible burial features (Features E and M). Additional data recovery work, followed by some level of preservation with interpretive development and possible preservation "as is" for any identified human remains, has been recommended for this site. In conducting any additional data recovery work, it is recommended that the procedures of Act 265 S.L.H. 1988 (Chapter 6E, Sec. 43 - Historic Preservation, Haw. Rev. Stat., as amended) be followed.

Trails (3 sites):

> Three single-component sites consisting of trails or trail segments are assessed as being significant for information value as well as culturally significant (19406, 19410, 19413). For these three sites, the present level of recording is considered sufficient to have recovered all of the significant

information values represented by these sites, and no further data collection is warranted or recommended. Although culturally significant per criteria of DLNR-SHPD, preservation is not considered essential because the trail sections present are not primary trail routes nor are they excellent examples of a particular type. Moreover, additional, equally representative examples are already preserved elsewhere within the immediate vicinity of the project area, and specifically will be preserved within other project area sites for which preservation with interpretive development is being recommended (see above, sites 19365 and 19366).

Single-Component Site Comprised of a Possible Ceremonial Feature (1 site):

Site 19305 consists of a modified outcrop and has been assessed as significant for residual information value as well as potentially cultural significant because the feature present may be ceremonial in nature. For this site, further data recovery work is recommended, with a provisional recommendation of preservation with interpretive development, pending the results of additional data recovery work.

REFERENCES CITED

ACHP (Advisory Council on Historic Preservation)
1985 Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review. Washington, D.C.: Advisory Council on Historic Preservation. (Draft report, August)

Barrera, W.J., Jr.
1971a Anaehoomalu: A Hawaiian Oasis. *Pacific Anthropological Records* No. 15. Department of Anthropology, B.P. Bishop Museum.

1971b Archaeological Excavations and Survey of Keauhou, North Kona, Hawaii. Report Series 71-10, Department of Anthropology, B.P. Bishop Museum.

Barrera, W. Jr., and M. Kelly
1973 Archaeological and Historical Surveys of the Waimea to Kawaihae Road Corridor, Island of Hawaii. *Departmental Report Series* 74(1). Department of Anthropology, B.P. Bishop Museum.

Boudreau, M., and D.K. Graves
1993 Archaeological Mitigation Program, Puako Road Extension Corridor, Phase II - Data Recovery and Interim Site Preservation, Land of Lalamilo, South Kohala District, Island of Hawaii (3-6-9:01:12,17). PHRI Report 1187-050193. Prepared for Paniau Partners.

Buck, P.H. (Te Rangi Hiroa)
1957 *Arts and Crafts of Hawaii.* B.P. Bishop Museum Special Publication 45. Honolulu: B.P. Bishop Museum.

Burgett, B., and P.H. Rosendahl
1990 Preliminary Report: Background, Summary of Findings, and General Significance Assessments and Recommended General Treatments, Phase I - Site Identification Phased Archaeological Inventory Survey, Hapuna State Park Expansion Area. Land of Lalamilo, South Kohala District, Island of Hawaii. PHRI Report 855-092790. Prepared for Mr. Warren M. Harrison.

Burgett, B., P.H. Rosendahl, and S.T. Goodfellow
1992 Archaeological Inventory Survey, Paniau Development Parcel Project Area. Land of Lalamilo, South Kohala District, Island of Hawaii (TMK:3-6-9-01:7). PHRI Report 715-051892. Prepared for Paniau Partners.

Carlson, A.K., and P.H. Rosendahl
1990 Interim Report: Summary of Findings, and General Significance Assessments and Recommended General Treatments, Phase II - Data Collection, Phased Archaeological Inventory Survey, Queen's Lands at Mauna Kea, Land of Kawaihae 2nd, South Kohala District, Island of Hawaii. PHRI Report 591-030990. Prepared for Mauna Kea Properties, Inc.

CFR (Code of Federal Regulations)
36 CFR Part 66. Recovery of Scientific, Prehistory, Historic, and Archaeological Data: Methods Standards and Reporting Requirements. Washington D.C.: Department of the Interior, National Park Service. (Proposed guidelines)

Ching, F.K.W.
1971 The Archaeology of South Kohala and North Kona: From the *ahupua'a* of Lalamilo to the *ahupua'a* of Hamanamana. Surface Survey Kailua-Kawaihae Road Corridor (Section III). Hawaii State Archaeological Journal 71-1. Department of Land and Natural Resources, Division of State Parks.

Ching, F.K.W., and H.H. Hammatt
1980 Archaeological Reconnaissance, Golf Course Expansion, Mauna Kea Beach Hotel, Ouli, Kohala, Hawai'i Island. ARCH 14-185. (Letter Report of 11 March 1980 to William Mielcke, Mauna Kea Properties, Inc.)

Clark, J.T.
1981 Archaeological Survey of the Proposed Lalamilo Agricultural Park, South Kohala, Island of Hawaii. Ms. on file. B.P. Bishop Museum Library.

Clark, J.T., and P.V. Kirch, (Eds.)
1983 Archaeological Investigations of the Mudlane-Waimea-Kawaihae Road Corridor, Island of Hawaii. An Interdisciplinary Study of an Environmental Transect. Departmental Report Series 83-1. Department of Anthropology, B.P. Bishop Museum.

Cordy, R.H.
1971 Archaeology at Anaehoomalu (Hawaii Island): A Reanalysis of Social Organization. Manuscript. Department of Anthropology, University of Hawaii-Manoa.

Donham, T.K.
1987a Archaeological Reconnaissance Survey, Proposed Awakee Resort Development Project Area, Land of Awakee, North Kona, Island of Hawaii. PHRI Report 265-081286. Prepared for Kahala Capital Corp.

1987b Archaeological Survey and Testing, Ooma II Resort Project Area, Land of Ooma II, North Kona, Island of Hawaii. PHRI Report 245-081286. Prepared for Helber, Hastert, Van Horn & Kimura.

1986 Archaeological Reconnaissance Survey, Makalawena Coastal Development Area, Land of Makalawena, North Kona, Island of Hawaii. PHRI Report 245-091886. Prepared for Kamehameha Schools/B.P. Bishop Estate.

Dunn, A.
1992 Phased Archaeological Inventory Survey, Phase II - Data Collection: Field Work and Interim Report. Hapuna Beach State Recreation Area Expansion, Land of Lalamilo, South Kohala District, Island of Hawaii. PRHI Report 1245-080692. Prepared for Harrison Associates.

Dunn, A., and P.H. Rosendahl
1991 Phased Archaeological Inventory Survey, Puako Beach Road Extension Corridor, Land of Lalamilo, South Kohala District, Island of Hawaii (TMK: 3-6-9-01:Por.12,Por.17). PHRI Report 975-050592. Prepared for Paniau Partners.

Emory, K.P., W.J. Bonk, and Y.H. Sinoto
1959 *Hawaiian Archaeology: Fishhooks.* B.P. Bishop Museum Special Publication 47. Honolulu: B.P. Bishop Museum.

Fornander, A.
1969 *An Account of the Polynesian Race: Its Origins and Migrations* Vol. II. Rutland and Tokyo: Charles E. Tuttle and Co. (Reprint of the 1878-1880 editions.)

Graves, D.K.
1992 Interim Report, Archaeological Mitigation Program, Phase II - Archaeological Data Recovery, The Bluffs at Mauna Kea, Land of Ouli, South Kohala District, Island of Hawaii, PHRI Report 1042-013192. Prepared for Mauna Kea Properties, Inc. c/o Belt, Collins & Associates.

Hammatt, H.H., and W.H. Folk II
1980 Archaeological Survey and Excavations of Coastal Sites, Ouli, Kohala, Hawai'i Island. ARCH 14-185 II. Prepared for Mauna Kea Properties, Inc.

Handy, E.S. Craighill, and M.K. Pukui
1958 The Polynesian Family System in Ka'u, Hawaii. Wellington, New Zealand: The Polynesian Society.

Hastorf K., and V. Popper
1988 Current Paleoethnobotany: Analytical Methods and Cultural Interpretation of Archaeological Plant Remains. Chicago: University of Chicago Press.

Hommon, R.J.
1976 The Formation of Primitive States in Pre-Contact Hawaii. Ph.D. dissertation. University of Arizona.

Jensen, P.M.
1988a Interim Report: Summary of Findings, Archaeological Data Recovery Program, Lots 1, 2, 3, 6, 7, 8, Waikoloa Beach Resort, Land of Anaehoomalu, South Kohala District, Island of Hawaii. PHRI Report No. 468-100488. Prepared for Transcontinental Development Co.

1988b Archaeological Inventory Survey, Mauna Lani Marina Project, Mauna Lani Resort, Lands of Kalahuipuaa and Waikoloa, South Kohala District, Island of Hawaii. PHRI Report 588-060589. Prepared for Belt, Collins & Associates.

1989a Archaeological Data Recovery and Site Perimeter Flagging at the Mauna Lani New Golf Course, Land of Waikoloa, South Kohala District, Island of Hawaii. PHRI Report 546-032289. Prepared for Mauna Lani Resort, Inc.

1989b Archaeological Data Recovery Program Lots 1, 2, 6, 7, 17, 24, Waikoloa Beach Resort, Land of Anaehoomalu, South Kohala District, Island of Hawaii. PHRI Report 468-061489. Prepared for Waikoloa Development Company.

1991 Archaeological Data Recovery, Mauna Lani Cove, Land of Kalahuipuaa and Waikoloa. South Kohala District, Island of Hawaii. PHRI Report 1027-033191. Prepared for Mauna Lani Resort.

Kay, E.A
1979 *Hawaiian Marine Shells. Reef and Shore Fauna of Hawaii, Section 4: Mollusca.* Special Publication 64(4). Honolulu: B.P. Bishop Museum Press.

Kennedy, J.
1980 The Archaeology of Paniau. Archaeological Consultants of Hawaii. Report prepared for Kep, Alui, Inc.

Kirch, P.V.
1973 *Archaeological Excavations at Kahalu'u, North Kona, Island of Hawaii.* Report Series 73-1, B.P. Bishop Museum, Honolulu.

1975 Preliminary Report on Phase II Archaeological Investigations at Kalahuipua'a, South Kohala, Hawaii Island. Manuscript. Department of Anthropology, B.P. Bishop Museum, Honolulu.

1979 Marine Exploitation in Prehistoric Hawai'i: Archaeological Investigations at Kalahuipua'a, Hawai'i Island. *Pacific Anthropological Records* 29. Department of Anthropology, B.P. Bishop Museum.

1985 *Feathered Gods and Fishhooks; An Introduction to Hawaiian Archaeology and Prehistory.* Honolulu: University of Hawaii Press.

Phagan, C.J.
1980 Chapter 6: Lithic Technology: Flake Analysis. IN MacNeish et al. Prehistory of the Ayacucho Basin, Peru. Volume III: Non-Ceramic Artifacts. Ann Arbor: University of Michigan Press.

Reinecke, J.E.
n.d. Survey of Hawaiian Sites: From Kailua, Kona, to Kalahuipuaa, Kohala. Unpublished Manuscript. Department of Anthropology, B.P. Bishop Museum.

Rosendahl, P.H.
1969 An Archaeological Survey of the Ouli Coastal Lands Between Hapuna Bay and Kaunaoa Bay, South Kohala, Hawaii; Including Excavations at Site E4-14, Kaunaoa Point. Ms. 040069. Department Anthropology, B.P. Bishop Museum.

1972a Archaeological Salvage of the Hapuna-Anaehoomalu Section of the Kailua-Kawaihae Road, Island of Hawaii. *Departmental Report Series* 72-5, Department of Anthropology, B.P. Bishop Museum.

1972b Aboriginal Agriculture and Domestic Residence Patterning in Upland Lapakahi, Island of Hawaii. Ph.D. dissertation. University of Hawaii, Manoa.

1985 Preliminary Archaeological Reconnaissance Survey, Kukio Resort Development Project Area, Kukio 1st, North Kona, Island of Hawaii. PHRI Report 148-010285. Prepared for Phillips, Brandt, Reddick & Associates and Huehue Ranch.

1992 Additional Archaeological Inventory Survey, Testing of Potential Burial Features, the Bluffs at Mauna Kea, Land of Ouli, South Kohala District, Island of Hawaii. PHRI Memorandum 948-120790. Prepared for Mauna Kea Properties, Inc.

Rosendahl, P.H., and M.W. Kaschko
1983 Archaeological Investigation of Ouli Coastal Lands: Land of Ouli, South Kohala, Island of Hawaii. Intensive Survey and Test Excavations on Mauna Kea Beach Resort Lands Between Hapuna Bay and Kaunaoa Bay. PHRI Report Ms 38-030183.

Soil Survey Staff
1962 U.S. Department of Agriculture-Soil Conservation Service. *Handbook* No. 18. Washington D.C. Government Printing Office.

Stuiver, M., and Reimer, P.J.
1993 *Radiocarbon*, 35:215-230.

Suggs, R.C.
1961 *Archaeology of Nuku Hiva, Marquesas Islands, French Polynesia.* Anthropological Papers of the American Museum of Natural History 49 (1).

Titcomb, M. *et al.*
1979 *Native Use of Marine Invertebrates in Old Hawaii.* Honolulu: University of Hawaii Press.

Tomonari-Tuggle, M.J.
1982 An Archaeological Reconnaissance Survey of a Parcel Adjoining the Puako Petroglyph Fields, Puako, Hawai'i. Prepared for Waimea Hawaiian Civic Club and Mauna Lani Resort.

Walker, A.T., and P.H. Rosendahl
1987 Archaeological Reconnaissance, Intensive Survey, and Testing, Southernmost Portion, South Kohala Resort. PHRI Report 199-092585. Prepared for Belt, Collins & Associates.

Welch, D.
1984 Archaeological Reconnaissance of the Area South of the Puako Petroglyph Archaeological District, South Kohala, Hawaii Island. Department of Anthropology, B.P. Bishop Museum, Honolulu. Prepared for Mauna Lani Resort, Inc.

1988a Field Summary Report. Archaeological Investigations at the Site of the Ritz-Carlton Hotel, Mauna Lani Resort. International Archaeological Research Institute, Inc. Prepared for Belt, Collins & Associates and Mauna Lani Resort, Inc.

1988a Field Summary Report. Mauna Lani Project Phase 2. International Archaeological Research Institute, Inc. Prepared for Belt, Collins & Associates and Mauna Lani Resorts, Inc.

1989 Archaeological Investigations at Pauoa Bay, Ritz Carlton Mauna Lani Resort, South Kohala, Hawaii: Final Report. International Archaeological Research Institute Inc. Prepared for Belt Collins and Associates.

Yent, M., and A. Estioko-Griffin
1978 Results and Recommendations of the Archaeological Reconnaissance Conducted at Hapuna Beach State Park, District of South Kohala, Hawaii. Memorandum. Prepared for Department of Land and Natural Resources, State of Hawaii.

APPENDIX A: Site Descriptions

STATE NO.: 19250 PHRI TEMP. NO.: 855-003
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating low ridges and swales. Much exposed and deteriorating bedrock.
VEGETATION: Moderate density of grass, sparse *kiawe*.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DESCRIPTION:This site complex consists of two C-shapes (Feature A and B).

FEATURE A: C-shape
ADJACENT TERRAIN: Undulating bedrock pahoehoe outcrops on a west facing slope
VEGETATION: Short brown grass, *kiawe*.
FUNCTION: Hunting blind
DIMENSIONS: 2.10 m (200-20 degrees) by 1.95 m by 0.41 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high, one to two courses wide. The rocks are c. 0.45 m in length/diameter. The feature is located c. 1/4 mile *mauka* (E) of the highway, c. 36.00 m, 13 degrees from Feature B. Surface remains were not detected. A cultural deposit was not excavated. It rests on bedrock; trowel was prodded to a depth of c. 0.05 mbs.

FEATURE B: C-shape
ADJACENT TERRAIN: Undulating bedrock outcrops on a west facing slope.
VEGETATION: Short brown grass, *kiawe*.
FUNCTION: Hunting blind
DIMENSIONS: 1.90 m (206-26 degrees) by 1.25 m by 0.55 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high. Rocks c. 0.30 m in length/diameter. Feature A is c. 36.00 m 13 degrees to Feature B. Surface remains were not detected. A cultural deposit was unexcavated. It lies on bedrock; trowel was prodded to a depth of c. 0.10 mbs.

STATE NO.: 19251 PHRI TEMP. NO.:855-004
SITE TYPE: C-shape
TOPOGRAPHY: Knoll is located to the north. Undulating terrain sloping to the west with much exposed bedrock.
VEGETATION: Moderate density of grass, sparse *kiawe*.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 2.00 m (354 degrees) by 1.40 m by 0.47 m

DESCRIPTION: A c-shape consisting of c. 20 subangular basalt cobbles ranging from c. 0.10-0.20 m in diameter. Crudely stacked one to two courses high. Cobbles are stacked two courses high towards the middle of the feature. C-shape opens to the east. Height ranges from c. 0.05-0.47 m. Site is north of the southernmost gully/gulch in project area c. 100.0 m at 188 degrees. Also Site 3 Feature B is 188 degrees at 59.00 m from this site. Surface remains were not observable. The site was trowel tested and no cultural deposit found.

STATE NO.: 19252 PHRI TEMP. NO.:855-005
SITE TYPE: C-shape
TOPOGRAPHY: Undulating bedrock outcrops on a west facing slope.
VEGETATION: Moderate density of grass, sparse *kiawe*.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 2.50 m (220-40 degrees) by 1.90 m by 0.78 m
DESCRIPTION: Pahoehoe small boulders and cobbles stacked one to three courses high. Largest rocks are c. 0.80-1.30 m in length/diameter. The feature sits on the highest part of a short ridge which runs E-W. Located c. 1/4 mile E (*mauka*) of highway. Surface remains were not detected. Military debris present. Nature of cultural deposit was unexcavated. Trowel prodded into soil hits rock c. 0.10 mbs.

STATE NO.: 19253 PHRI TEMP. NO.: 855-006
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating knolls and swales with much exposed bedrock, sloping to the west.
VEGETATION: Moderate density of grass, sparse *kiawe*.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind/Military
DESCRIPTION: This site complex consists of two C-shapes (Feature A and B). The overall site dimensions are 38.0 m at 90 degrees by 5.00 m.

FEATURE A: C-shape
ADJACENT TERRAIN: Hills and valleys
VEGETATION: Sparse *kiawe* trees and ankle-high grasses.
FUNCTION: Hunting blind/Military
DIMENSIONS: 1.90 m (224 degrees) by 1.30 m by 0.60 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This feature contains c. 30 angular basalt stones ranging in size from 0.10-0.50 m in diameter. The entire feature is stacked three to four courses high. The feature opens to the east and is built north-south, lengthwise. It is located on top of a small ridge and slopes westward. Feature B is c. 36.80 m at 90 degrees from this feature. Site 8 is c. 100.0 m at 292 degrees. Site 7 is c. 60.0 m at 240 degrees. Surface remains were not observable. The feature was trowel tested and no cultural deposit was found.

FEATURE B: C-shape
ADJACENT TERRAIN: Gently sloping from the NE, undulating with many low exposures of decomposing bedrock. Sloping more steeply to the south where a small dry gulch is oriented east/west.
VEGETATION: Low dry thick grass. Sparse clumps of *kiawe* trees are located upslope; *kiawe* tree is located c. 7 m to the SSE of feature.
FUNCTION: Hunting blind/Military
DIMENSIONS: 1.85 m (239 degrees) by 1.45 m by 0.43 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: The feature is oriented SSE/NNW, and opens to the SSE. Construction consists of subangular basalt cobbles. The stacking ranges from two to three courses high and is fairly uniform. The SE side/arm of the structure appears to be constructed on bedrock. The distance between the arm ends is greater than the overall depth of the interior space of the feature. The feature is located c. 40.00-50.00 m ENE from 855-7, and c. 36.8 m at 90 degrees mag. from Feature A. No surface remains or cultural deposits were noted.

STATE NO.: 19254 PHRI TEMP. NO.:855-007
SITE TYPE: C-shape
TOPOGRAPHY: Undulating exposed bedrock within mantle of aeolian silt.
VEGETATION: Moderate density of grass, sparse *kiawe*.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 1.80 n (N/S) by 1.35 m (E/W) by 0.70 m
DESCRIPTION: This C-shape was constructed with weathered subangular basalt cobbles and small boulders (ranging in size c. from 0.10-0.35 m in diameter). It is stacked two to four courses high. The feature opens to the east. The west side of the feature is partially collapsed but the arms of the c-shape are extant and are 0.35 m high (S), and 0.55 m high (N). The interior space is c. 0.70 m (N/S) by 0.70 m (E/W). The feature appears to have a good view of the surrounding terrain, but does not provide much protection from the prevailing wind. The feature is located in the SE portion of the *mauka* parcel. Portable remains or cultural deposits were not noted.

STATE NO.: 19255 PHRI TEMP. NO.:855-008
SITE TYPE: Mound
TOPOGRAPHY: Slope to the west. Undulating bedrock outcrops.
VEGETATION: Moderate density of grass, *kiawe*.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.90 m (194-14 degrees) by 1.40 m by 0.55 m
DESCRIPTION: Loosely piled basalt cobbles, c. 0.40 m in diameter. Constructed mostly on bedrock. Located in the SE portion of the *mauka* parcel, c. quarter mile (E) of the highway. No portable remains noted. Unexcavated. A trowel driven into the ground at numerous points around the site hit rock at c. 0.10 mbs.

STATE NO.: 19256 PHRI TEMP. NO.:855-009
SITE TYPE: Cairn
TOPOGRAPHY: Undulating, low ridges and swales. Much exposed and deteriorating bedrock.
VEGETATION: Moderate density of low grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.35 m (E/W) by 0.77 m by 0.46 m
DESCRIPTION: Roughly oval in shape. Subangular weathered basalt cobbles are stacked two courses high in an informal method of construction, partially constructed on bedrock. Cobbles average c. 0.20 m in diameter. Located in the ESE boundary area of *mauka* parcel c. 20.0-30.0 m SW of 855-10. Portable remains were not noted.

STATE NO.: 19257 PHRI TEMP. NO.:855-010
SITE TYPE: Cairn
TOPOGRAPHY: Undulating hills, basalt rock scatter and outcroppings
VEGETATION: *Kiawe*, dry grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.00 m by 0.60 m by 0.45 m
DESCRIPTION: Loosely stacked subangular basalt rock, slightly rectangular shaped. Stacked on small basalt outcrop. The immediate surrounding area is relatively flat, 0.03-0.05 m of gravely soil on bedrock. Oriented at 290 degrees c. 30.0 m north of Site #9. Central east section of project is inland from main highway, very close to eastern project boundary. No portable remains were noted.

STATE NO.: 19258 PHRI TEMP. NO.:855-011
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating hills, ridges, ravine.
VEGETATION: Unknown grass with *kiawe* (c. 15 m west)
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site complex consists of two mounds (Feature A and B). The overall site dimensions are c. 25.00 m (N/S) by 10.0-12.0 m (E/W).

FEATURE A: Mound
ADJACENT TERRAIN: Undulating hills, ridges and ravines.
VEGETATION: Unknown grass.
FUNCTION: Military
DIMENSIONS: 2.00 m (N/S) by 2.00 m (N/S) by 0.60 m
CONDITION: Good
INTEGRITY: Unaltered

DESCRIPTION: Feature A was a circular mound with uneven surface (i.e. not level or consistently sloping). It was constructed with subangular pahoehoe cobbles and boulders (ranging in size from c. 0.10-0.40 m) piled one to five courses high. Feature A was one of five mounds located on the side slope of a hill and ridge spur. It was the largest of these mounds and was located downhill of all but one; this other mound is located c. 9.80 m (center to center) at 5 degrees (off TN). It is c. 1.20 m (E/W) and c. 1.10 m (N/S). The feature is located c. 19.00 m at 189 degrees (off TN). Surface remains are two cowrie shells and concrete on rocks. The cowrie shells may be the only remnant of prehistoric occupation in this area, but they may also be from tire or cattle transportation. No cultural deposits were noted.

FEATURE B: Mound
ADJACENT TERRAIN: Undulating hills, ridges and ravines
VEGETATION: Unknown grass
FUNCTION: Military
DIMENSIONS: 1.00 m (N/S) by 0.90 m (E/W) by 0.40 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Feature B was a circular-shaped mound with an uneven surface (i.e. not level or consistently sloping) constructed with subangular pahoehoe cobbles and boulders piled two to three courses high. It is located c. 19.00 m at 9 degrees (off TN) to Feature A. Surface remains or cultural deposits were not noted.

STATE NO.: 19259 PHRI TEMP. NO.:855-012
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating hills with basalt outcroppings and basalt rock scatter.
VEGETATION: *Kiawe*, dry grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site complex consists of two cairns (Features A and B).

FEATURE A: Cairn
ADJACENT TERRAIN: Undulating hills
VEGETATION:
FUNCTION: Military
DIMENSIONS: 0.60 m by 0.60 m by 0.36 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Stacked subangular basalt rocks; one large rock resting on an outcrop and three slightly smaller rocks. Average size of rocks is 0.30-0.40 m. The feature is in the central east portion of the inland parcel. Feature B is c. 2.00 m at 309 degrees. Portable remains were marine shell. No deposits were noted.

FEATURE B: Cairn
ADJACENT TERRAIN: Undulating hills, basalt outcropping
VEGETATION: *Kiawe* and dry grass.
FUNCTION: Military
DIMENSIONS: 1.00 m by 0.80 m by 0.60 m
CONDITION: Good

INTEGRITY: Unaltered
DESCRIPTION: Loosely stacked subangular (fairly large) basalt rocks, c. 2.00 m NW of associated Feature A (also cairn). Trowel test for cultural remains was negative; c. 0.07-0.10 m gravely silt on bedrock. The feature is in the central east project area, near the most eastern boundary inland from the main highway on top of the ridge. Portable remains were not noted.

STATE NO.: 19260 PHRI TEMP. NO.:855-013
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Small ridges and knolls sloping to the west.
VEGETATION: Moderate-sparse grass, sparse *kiawe*, no trees in immediate area of features.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site complex consists of two cairns (Features A and C), and a mound (Feature B). The overall site dimensions are c. 40.00 m by 20.00 m.

FEATURE A: Cairn
ADJACENT TERRAIN: Undulating hills and basalt outcroppings, top of fairly high knoll.
VEGETATION:
FUNCTION: Military
DIMENSIONS: 1.20 m by 1.00 m by 0.60 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Loosely stacked subangular basalt rock, more oval than round or square. The cairn abuts a basalt outcrop. A trowel test revealed c. 0.03-0.05 m gravely silt. The feature is oriented at 322 degrees c. 32.00 m east of Feature B and c. 30.00 m from Feature C at 174 degrees. It is located in the central east portion of the project area inland from the main highway near the easternmost boundary. Portable remains were not noted.

FEATURE B: Mound
ADJACENT TERRAIN: Fairly flat, rock ridge top. Slopes to the W and N. Gulch bottom to N, which is oriented roughly E/W
VEGETATION: Sparse grass.
FUNCTION: Military
DIMENSIONS: 1.60 m (N/S) by 1.00 m by 0.43 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Roughly linear mound of subangular basalt cobbles. Cobbles range from c. 0.14-0.46 m in diameter. The west portion of the feature is constructed on decomposing bedrock. Cobbles are stacked one to two courses high; very informal construction. The feature is located c. 20.00 m NW from Feature A. Portable remains were not noted.

FEATURE C: Cairn
ADJACENT TERRAIN: Small knoll. Flat to the east, gently sloping to the north and west, steep slope to the south.
VEGETATION: Sparse grass.
FUNCTION: Military
DIMENSIONS: 0.96 m (N/S) by 0.94 m by 0.38 m

CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Small roughly circular in overall shape. Subangular and subrounded basalt cobbles are stacked two to three courses high. The cairn is constructed on rocky, decomposing bedrock. It is located c. 20.00 m south of Feature A. No portable remains were noted.

STATE NO.: 19261 PHRI TEMP. NO.:855-014
SITE TYPE: Cairn
TOPOGRAPHY: On top of a hill at the western edge. Terrain slopes down west.
VEGETATION: Sparse *kiawe* and ankle-high grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 2.20 m (360 degrees) by 1.10 m
DESCRIPTION: Medium-sized basalt angular stones arranged in a circular cone. These stones range in size from c. 0.20-0.40 m in diameter. A *kiawe* tree is growing in the center of the feature. Height of the cairn is from c. 0.39-0.48 m. It is located c. 30.00 m north of the second gully in the southern end of the project area, c. 1000 feet east of the highway. Observatories are at 102 degrees. Southern water tanks are at 240 degrees. Foxhole 1245-301 is c. 50.00 m at 86 degrees. Portable remains were not observed. It was trowel tested to c. 0.08 m deep and no cultural material was found.

STATE NO.: 19262 PHRI TEMP. NO.:855-016
SITE TYPE: Depression
TOPOGRAPHY: Undulating hills with basalt outcroppings.
VEGETATION: *Kiawe*, and dry grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.50 m (diameter)
DESCRIPTION: Depression on north side of east end of ridge. It is lined with small (> 0.20 m) basalt rocks on all sides but the southeast. It is situated right below a concentration of broken (large rocks) outcropping. It appears to be filled in somewhat by natural erosion. Trowel test c. 0.10 m soil in center. Average height c. 0.30 m. This feature appears to be a military foxhole. It is in the central east portion of project inland almost to most eastern boundary from main highway, next ridge north of Site #15. Portable remains were not noted.

STATE NO.: 19263 PHRI TEMP. NO.:855-017
SITE TYPE: Cairn
TOPOGRAPHY: Fairly flat wide knoll, top sloping down in all directions.
VEGETATION: Sparse grass clumps.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.50 m by 0.43 m by 0.61 m

DESCRIPTION: Ten subangular basalt cobbles ranging from 0.08-0.40 m in diameter, stacked three courses high and two courses wide on bedrock. The cairn is just south of the fence line (located south of water tank by Hapuna turn-off) c. 500 ft. SE of water tank. Portable remains were not noted.

STATE NO.: 19264 PHRI TEMP. NO.:855-022
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating hills, ridges and ravines. Old roadway between cairns and dozed areas to all sides.
VEGETATION: Unknown grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site complex consists of two small cairns (Feature A and B).

FEATURE A: Cairn
ADJACENT TERRAIN: Undulating hills, ridges and ravines.
VEGETATION: Unknown grass.
FUNCTION: Military
DIMENSIONS: 1.50 m (E/W) by 0.80 m (N/S) by 0.30 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This oval cairn was constructed with subangular pahoehoe boulders and cobbles (ranging c. 0.15-0.30 m diameter/length) piled two courses high. It is located on the north edge of a roadway that extends to the SW. The NE extension of the road is problematic because of the extensive bulldozer modification. The cairn is located within the northern half of the upland parcel (east of highway) near the southern edge of this half. Feature B is 165 degrees (off TN) c. 4.40 m (center to center). No portable remains or cultural deposits were noted.

FEATURE B: Cairn
ADJACENT TERRAIN: Undulating hills, ridges and ravines.
VEGETATION: Unknown grass.
FUNCTION: Military
DIMENSIONS: 0.60 m (N/S) by 0.45 m (E/W) by 0.40 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This cairn was constructed with subangular pahoehoe cobbles and boulders (ranging c. 0.10-0.40 m diameter/length) piled next to a bedrock outcrop. It is located south of the roadway, which extends to the SW, but if the road continued, bulldozer activity has removed traces. The cairn is located within the northern half of the upland parcel (east of highway) near the southern edge of this half. Feature A is 345 degrees (off TN) c. 4.40 m (center to center). No surface remains or cultural deposits were noted.

STATE NO.: 19265
PHRI TEMP. NO.:855-027
SITE TYPE: Modified outcrop
TOPOGRAPHY: Sloping to the west, generally. Immediate area of site is a knoll top sloping

steeply to the south. A fairly large gulch is c. 30.00 m to the south of the site and is oriented roughly E/W.
VEGETATION: Sparse grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 7.00 m (N/S) by 5.75 m
DESCRIPTION: Bedrock outcrop with two small low walls circling off of it. The first wall circles from the north and south ends of the outcrop, extending a maximum of c. 4.00 m from the outcrop face. Another small wall segment is located c. 1.00 m downhill (to the NW) of the first wall and runs parallel to the slope. The low walls are constructed of subangular basalt cobbles and small boulders crudely stacked one to three courses wide and one to two courses high. The interior area is clear and fairly level. The site is located in the central portion of the *mauka* parcel. Portable remains are 42 mm caliber shells, marine shell (N. picea, cowrie, and turbinidae). A possible temporary habitation deposit is inside the area between the bedrock outcrop and the first wall. Two test units were subsequently placed at the feature, TU-4 and TU-10. They revealed a very sparse deposit.

STATE NO.: 19266 PHRI TEMP. NO.:855-028
SITE TYPE: Terrace
TOPOGRAPHY: Gently sloping to the west. A gulch (oriented roughly E/W) is located c. 2 m to the south.
VEGETATION: Thick grass, a small *kiawe* in center of feature.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: Rectangular in overall shape; oriented north-south. The north boundary consists of bedrock and a few stacked basalt cobbles; the west boundary consists of a linear outcrop of bedrock flush with the terrace interior and c. 0.40 m above the exterior ground surface. The south and east boundaries consist of an L-shaped terrace, the south side being flush with the interior and the east side c. 0.24-0.56 cm higher than the interior and roughly flush with the exterior. The NW end is stacked above the surrounding ground surface. Overall the L-shape's retaining walls are stacked two to four courses high and one to three courses wide. The interior is flat and soil covered. The site is located in the central portion of the *mauka* parcel, c. 50.0-60.0 m to the SW of Site 855-27. No portable remains were noted. There is a c. 0.10+ m soil deposit on the terrace that should be tested. The feature was tested. A test unit, TU-3, was excavated in the center of the terrace. No cultural habitation deposit was revealed.

STATE NO.: 19267 PHRI TEMP. NO.:855-029
SITE TYPE: Mound
TOPOGRAPHY: Undulating hills.
VEGETATION: Grass, *kiawe*.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 2.70 m (292 degrees) by 1.90 m by 0.70 m

DESCRIPTION: Stacked angular/subangular basalt rocks (three to four courses). Average size of rocks is c. 0.20-0.30 m. The mound is situated on top of a knoll. The mound is located in the central portion of the inland parcel. No portable remains or cultural deposits were noted.

STATE NO.: 19268 PHRI TEMP. NO.:855-030
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills, ridges and ravines; Site 30 overlooks (to the northwest) a gulch.
VEGETATION: Unknown grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind/military
DIMENSIONS: 250 degrees (E/W) by 1.40 m (N/S) by 0.50 m
DESCRIPTION: Site 30 was an "L" shaped wall built on a bedrock ledge at the northern edge of a ridge. It was constructed with subangular pahoehoe cobbles and boulders stacked two to three courses high. The wall were one to two stones wide. It is more subsequently built than other walls (i.e. military or hunting blinds within the project area. The north edge included reinforcement stones. The primary wall is oriented 145/326 degrees. The secondary wall was oriented 65/245 degrees (off TN). Located within center of northern half (1/2) of parcel east (upland) of highway. Site 31 is c. 23.00 m at 279 degrees (off TN), (Feature 30 east edge of Feature 31 west edge). No portable remains were noted. Small test revealed no cultural deposit.

STATE NO.: 19269 PHRI TEMP. NO.:855-031
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills, ridges and ravines. Located on northern edge of ridge before drop-off.
VEGETATION: Unknown grass, *kiawe* shrubs at 10 m to north.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 1.95 m (E/W, 76/256 degrees) by 0.90 m (N/S)
DESCRIPTION: This crescent shaped wall was constructed with two to three courses of piled subangular pahoehoe cobbles and boulders (ranging from 0.10-0.40 m diameter/length). The arms of the wall face south and the wall overlooks a gulch area to the north. The north side of the wall utilized a bedrock outcrop. The NE area is the thickest (c. 0.90 m wide), but this is from slumpage or reinforcement. The wall itself is only one stone wide. The height is c. 0.25-0.44 m. The wall is located within the center section of the northern half of the parcel east (upland) of the highway. Feature 30 is c. 23.00 m at 99 degrees (off TN). No portable remains or cultural deposits were noted. The site is oriented at 76 degrees/256 degrees.

STATE NO.: 19270 PHRI TEMP. NO.:855-034
SITE TYPE: Rubble concentration
TOPOGRAPHY: Undulating low knolls with much exposed bedrock.
VEGETATION: Sparse-moderate density of low dry grass.

CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 2.00 m by 1.14 m by 0.20 m
DESCRIPTION: Amorphous area of small-medium subangular basalt cobbles placed one to two courses high on the south top side of a WWII knoll. Located in the central *mauka* parcel, c. 1000 ft. east of highway. No portable remains or cultural deposits were noted.

STATE NO.: 19271 PHRI TEMP. NO.:855-035
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating hills, with scattered basalt outcroppings.
VEGETATION: *Kiawe*, dry grasslands.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DESCRIPTION: This site complex consists of two cairns (Feature A and B). The overall site dimensions are 1.90 m in diameter, 1.20 m (north), and 0.60 m (south).

FEATURE A: Cairn
ADJACENT TERRAIN: On the top of a gulch that slopes to the NNE in an open field area.
VEGETATION: *Kiawe* and short, brown sage-like grasses.
FUNCTION: Marker
DIMENSIONS: 1.41 m (150 degrees) by 1.18 m by 1.02 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Piled and stacked subangular basalt cobbles ranging in size from c. 0.08-0.47 m appear to be constructed on top of bedrock. Smaller cobbles are towards the middle of the feature while the larger ones are towards the outside. The feature appears to be marking an area where the top of the gulch is. It is circular in shape and three to four courses high. It is located c. 34.00 m at 150 degrees away from Feature B cairn. No surface remains or cultural deposits were noted.

FEATURE B: Cairn
ADJACENT TERRAIN: Undulating hills with basalt outcroppings (small and scattered).
VEGETATION: *Kiawe* trees, dry grassland.
FUNCTION: Marker
DIMENSIONS: 1.90 m by m by 1.20 m (north), 0.60 m (south)
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Basalt rock stacked seven to eight courses high and rounded in appearance. The cairn is faced on the north side, with some slumping on the south side. Rocks are subangular and are stacked on basalt outcropping. Rock size ranges from 0.15-0.40 m length, with some fist-sized basalt cobbles. The surrounding soil is gravely sandy silt with intermittent basalt outcroppings. The feature is located c. 35.00 m at 330 degrees from Feature A. c. half mile east of the main highway, c. 60.00 m west of large gully. Surface remains are a paper shotgun shell (spent) on ground right behind (west side) cairn (not collected). No cultural deposit was noted in a probe of the surrounding area.

STATE NO.: 19272 PHRI TEMP. NO.:855-036
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: On a rise sloping greatly to the north and south.
VEGETATION: *Kiawe*, grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DESCRIPTION: This site complex consists of two walls (Features A and B). The overall site dimensions are c. 40.00 m by 0.30 m.

FEATURE A: Wall
ADJACENT TERRAIN: On top of the gulch on a small rise just below a northerly sloping hill.
VEGETATION: *Kiawe*, brown sage-like grass.
FUNCTION: Hunting blind
DIMENSIONS: 1.33 m (90 degrees) by 0.30 m by 0.58 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Subangular basalt cobbles (ranging in size from c. 0.15-0.32 m) are roughly stacked three to four courses high on top of an outcrop ledge. The ledge is c. 0.44 m above ground surface on the north side and level with the ground surface on the south side. The construction appears to be recent in that it is only one course wide and thus very flimsy. It was identified earlier as military. It may have been a hunting blind due to the fact that the shotgun shells were not used by the military. It was built on a rise that slopes down into a gulch to the north end; it slopes greatly at the south end. It is located c. 40.00 m at 280 degrees away from 855-36B. Nine shotgun shells (Peter victor 16) made in U.S.A. were the surface remains. A cultural deposit was not observed (minimal soil).

FEATURE B: Wall
ADJACENT TERRAIN: North side slopes down to the gully 60.00 m. The highway is 1/4 mile to the west.
VEGETATION: *Kiawe*, grass.
FUNCTION: Hunting blind
DIMENSIONS: 1.50 m (330 degrees) by 0.30 m by 0.55 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Low wall three to four courses high, one course wide. It is constructed of angular/subangular basalt rocks, average size c. 0.25 m. At the foot of the wall on the south side are fist-sized subangular basalt cobbles, not stacked, possibly adding support between the slope and the base of the wall. The wall is located on the north side of the ridge which runs E/W. The wall is c. 2.00 m from the crest, and is parallel to the ridge. Surface remains and cultural deposits were not noted.

STATE NO.: 19273 PHRI TEMP. NO.:855-037
SITE TYPE: Complex (7 Features)
TOPOGRAPHY: Undulating pahoehoe bedrock outcrops.
VEGETATION: Short brown grass, *kiawe*.
CONDITION: Fair
INTEGRITY: Unaltered

PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of four features: a modified outcrop (Feature A), a pair of upright stones (Feature B), a cairn (Feature C), and four terraces (Feature D). The overall site dimensions are c. 40.00 m by 20.00 m.

FEATURE A: Modified outcrop
ADJACENT TERRAIN: Rolling pahoehoe bedrock outcrops on a west-facing slope.
VEGETATION: *Klawe*, short brown grass.
FUNCTION: Temporary habitation
DIMENSIONS: 1.20 m (186-06 degrees) by 1.10 m by 0.60 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A knob of bedrock sticking out the ground, with a small boulder and numerous cobbles piled against it. It is located within 100.00 m of highway. Several marine shell fragments were scattered about. There was one piece of coral c. 0.09 m by 0.06 m by 0.04 m thick. TU-5 was excavated; the cultural deposit was very sparse.

FEATURE B: Upright stones
ADJACENT TERRAIN: Rolling pahoehoe bedrock outcrops on a west-facing slope.
VEGETATION: *Klawe*, short brown grass.
FUNCTION: Possible military
DIMENSIONS: 0.16 m (thickness) by 0.30 m by 0.41 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Two slabs of pahoehoe c. 0.51 m and 0.41 m long, placed in upright positions carty corner to each other. The feature is located within c. 100.00 m of the highway. Surface remains were not noted. The feature was unexcavated; a trowel probed into soil around the feature hits rock at c. 0.05 mbs.

FEATURE C: Cairn
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops on a west-facing slope.
VEGETATION: *Klawe*, short brown grass.
FUNCTION: Military
DIMENSIONS: 0.60 m (diameter) by 0.53 m (height)
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked four courses high. Cobbles are c. 0.30 m length/diameter. The cairn is located within c. 100.00 m of the highway. No surface remains were noted. The feature was unexcavated; a trowel probed into soil hits rock at c. 0.05 mbs.

FEATURE D: Terraces (4)
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops.
VEGETATION: *Klawe*, short brown grass.
FUNCTION: Possible agriculture
DIMENSIONS: 5.00 m (310-130 degrees) by 3.00 m by 0.30 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Four short terraces made from a single row of pahoehoe cobbles extending downslope in a zig-zag pattern. The feature is located within c. 100.00 m of the highway. No surface remains were noted. The feature was unexcavated; a trowel probed into the soil in several spots is stopped by rock at c. 0.10 mbs.

STATE NO.: 19274 PHRI TEMP. NO.:855-038
SITE TYPE: Cairn
TOPOGRAPHY: Sloping to the south on side of gulch. Exposed and decomposing bedrock.
VEGETATION: Sparse-medium density of low dry grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.52 m by 0.50 m by 0.37 m
DESCRIPTION: Low and rather cylindrical in overall shape. It is two to three courses high and one to two courses wide. It is constructed of large subangular basalt cobbles. The cairn is constructed on top and along the edge of an exposed tier of bedrock. The site is located c. 50.00 m ESE of Site 855-39, cairn. No portable remains or deposits were noted.

STATE NO.: 19275 PHRI TEMP. NO.:855-039
SITE TYPE: Cairn
TOPOGRAPHY: Gently sloping to the south to gulch bottom, undulating surface of exposed and deteriorating bedrock.
VEGETATION: Sparse-medium density of low dry grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.90 m by 0.80 m by 0.48 m
DESCRIPTION: Of crude construction, rather conical in overall shape. It is four courses high, with the base of cairn four courses wide. Construction material consists of small-medium subangular basalt cobbles. It is located in the SW corner of the *mauka* parcel, c. 400 feet *mauka* of the highway. Portable remains or deposits were not noted.

STATE NO.: 19276 PHRI TEMP. NO.:855-041
SITE TYPE: Alignment
TOPOGRAPHY: Gently sloping to the west.
VEGETATION: Sparse-moderate clumps of grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 2.40 m by 0.40 m by 0.44 m
DESCRIPTION: The alignment is a single course high and wide, and constructed on the ground surface. It consists of nine subangular basalt cobbles oriented WNW/ESE, and ranges in height from c. 0.31-0.44 m. It is located in the central west portion of the *mauka* parcel. No portable remains or cultural deposits were noted.

STATE NO.: 19277 PHRI TEMP. NO.:855-042
SITE TYPE: Modified outcrop
TOPOGRAPHY: On top of east side of knoll, sloping to the NE and north. Many low outcrops of bedrock.
VEGETATION: Moderate density of low grass and 1 *KIAWE* tree on top of knoll.

CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind/military
DIMENSIONS: 1.70 m (E/W) by 0.90 m
DESCRIPTION: Bedrock outcrop oriented E/W, with a couple subangular basalt cobbles stacked on top. Extending from the north side of the outcrop is a small, short low wall. This portion of the feature is two courses wide and one to two courses high. It is of very crude construction, with a length of c. 1.05 m by 0.53 m and c. 0.28 m high. The site is located in the central west portion of the *mauka* parcel, c. 300 feet east of the highway. No portable remains or cultural deposits were noted.

STATE NO.: 19278 PHRI TEMP. NO.:855-043
SITE TYPE: Modified outcrop
TOPOGRAPHY: Undulating ridge with much decomposing bedrock.
VEGETATION:
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 0.80 m by 0.70 m by 0.57 m
DESCRIPTION: Six subangular basalt cobbles stacked two courses high atop a low, small bedrock outcrop. One of the stacked cobbles has concrete and a piece of shrapnel on it. The site is located on the top south edge of same the gulch as Site 855-44, located c. 40.00-50.00 m SSW. Military shrapnel was noted as portable remains. No deposit was noted.

STATE NO.: 19279 PHRI TEMP. NO.:855-044
SITE TYPE: Mound
TOPOGRAPHY: Undulating flat ridge top on south side of steep gulch face.
VEGETATION: Sparse-moderate density of grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 1.60 m by 1.60 m by 0.46 m
DESCRIPTION: Small circular mound, formally constructed, with no apparent facing. Subangular basalt cobbles (0.30 m in diameter) are stacked two to three courses high, partially on a bedrock outcrop. Some collapsed cobbles are around the north, east, and west base of the mound. This feature could have possibly been a cairn at one time. It is located up the second gulch south of the Hapuna turn-off c. 400-500 feet *mauka* of the highway. Conus shell was noted as portable remains. No deposit was noted.

STATE NO.: 19280 PHRI TEMP. NO.:855-045
SITE TYPE: Cairn
TOPOGRAPHY: Flat wide ridge with smaller gulches on either side, oriented roughly E/W, much exposed bedrock.
VEGETATION: Sparse-moderate density of grass.
CONDITION: Fair-good

INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 1.70 m (E/W) by 1.30 m 0.71 m
DESCRIPTION: Circular in overall construction, atop bedrock. It is four to five courses high, with subangular basalt cobbles and small boulders. The center has a open cavity c. 0.30 m deep. The west side at base has a few stones stabilizing the cairn. The cairn is located in the NW portion of the project area by the water tank, c. 40 degrees magnitude and c. 5-700 feet. No portable remains or deposits were noted.

STATE NO.: 19281 PHRI TEMP. NO.:855-047
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Undulating pahoehoe bedrock outcrops on a W-facing slope. Site is on the E end of an E-W running ridge which is bisected by the highway.
VEGETATION: *Kiawe*, short brown grass.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of four features. A cairn (Feature A), modified outcrop (Feature B), wall (Feature C), and a terrace (Feature D). The overall site dimensions are c. 5.00 m by 6.80 m.

FEATURE A: Cairn
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops.
VEGETATION: *Kiawe*, short brown grass.
FUNCTION: Marker
DIMENSIONS: 1.20 m (10-190 degrees) by 1.16 m by 0.82 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe bedrock cobbles stacked five to six courses high. Cobbles are c. 0.35 m length/diameter, most c. 0.25 m. The feature is located c. 50.00 m east of the highway. It sits at the east end of a short ridge which is bisected by the highway. No surface remains were noted. The subsurface was unexcavated.

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION: *Kiawe*, short brown grass.
FUNCTION: Possible post support
DIMENSIONS: 0.20 m by 0.07 m by 0.35 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A slit-shaped depression in the ground, the rim of which is lined with gravel and small cobbles. The long axis of the opening is oriented west 258 degrees and east 78 degrees. The north side has a small overhang c. 0.24 m deep. Rocks lining the opening are c. 0.15-0.26 m in length/diameter. The feature is located c. 50.00 m east of the highway. It is on the east end of a short ridge which bisects the highway. No portable remains were noted.

FEATURE C: Wall
ADJACENT TERRAIN: Undulating hills.

VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 4.00 m (350 degrees) by 1.00 m by 0.84 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: S-shaped wall constructed of subangular basalt rocks (two to four courses). Rocks average c. 0.20-0.30 m in size. It is situated on the north side of the ridge running E/W. The wall runs along the slope which declines to the north. The highest point of the ridge is about 7.00 m to the S/E, where features A, B, and D of site are located. The feature is located in the central portion of the east parcel c. 50.00 m inland from the highway. No portable remains were noted. The surface of the site consists of basalt rocks, cobbles, and outcrops. Very thin layer of silt is present.

FEATURE D: Terrace
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION: *Kiawe*, short brown grass.
FUNCTION: Possible agriculture
DIMENSIONS: 4.70 m (E-W) by 3.90 m (N-S) by 0.60 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high. Cobbles are c. 0.45 m in length/diameter. One section runs E-W along the upper south slope of the ridge. At its west end, another section runs north perpendicular to the ridge. The long axis runs 278-98 degrees. The terrace is located c. 50.00 m east of the highway. It sits on the east end of the ridge which is bisected by the highway. No portable remains were noted. The feature was unexcavated; a trowel poked into the soil around the feature is stopped by rock c. 0.05 mbs.

STATE NO.: 19282 PHRI TEMP. NO.:855-049
SITE TYPE: Cairn
TOPOGRAPHY: Ridge of exposed bedrock oriented E/W. N/S fence line to c. 10.00 m to W. Gulches to N and S.
VEGETATION:
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.53 m by 0.52 m by 0.58 m
DESCRIPTION: Subangular basalt cobbles averaging c. 0.25 m in diameter stacked three to four courses high on bedrock outcrop. The cairn is only two courses wide. It is on the *mauka* side and a little south of the turn-off to Hapuna. No portable remains were noted.

STATE NO.: 19283 PHRI TEMP. NO.:855-051
SITE TYPE: Cairn
TOPOGRAPHY: Undulating hills with basalt outcroppings and basalt rock scatter.
VEGETATION: *Kiawe*, dry desert-like grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military

DIMENSIONS: 1.60 m by 0.95 m
DESCRIPTION: Subangular basalt rock stacked on basalt outcropping. Some downhill slumping is on the east side, which is c. 0.80 m high. Trowel test on east slope; c. 0.05-0.07 m on compact soil. The cairn is oriented at 86 degrees. It is located in the central portion of the project area c. 50.00 m west of the main highway. No portable remains or cultural deposits were noted.

STATE NO.: 19284 PHRI TEMP. NO.:855-052
SITE TYPE: C-shape wall
TOPOGRAPHY:
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.75 m by 0.75 m
DESCRIPTION: C-shape wall constructed of subangular basalt rocks (two courses). Rocks are c. 0.30-0.40 m in size. The wall is situated on a hilltop. Immediately to the NE is a bedrock outcrop which is badly broken up. The wall is located in the center portion of the west parcel, c. 160.00 m west of the highway. A large amount of 30 cal. cartridges was noted as portable remains.

STATE NO.: 19285 PHRI TEMP. NO.:855-053
SITE TYPE: Wall
TOPOGRAPHY: Undulating surface of soil and decomposing bedrock.
VEGETATION: Knee high dried grass, sparse *Kiawe*.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind/military
DIMENSIONS: 1.90 m by 0.30 m (+1.05 m collapsed portion)
DESCRIPTION: Five to six (c. 0.15-0.25 m) angular basalt cobbles are aligned 0 degrees/180 degrees, with the north end stacked four courses high. The south end is collapsed, but it appears that it was once stacked like the north end. There are rifle cartridges, shrapnel, and an artillery shell located in the vicinity of the south end of the wall. They appear to have impacted this end of the wall, resulting in the present collapse. The wall is located in the NE portion of the *makai* parcel.

STATE NO.: 19286 PHRI TEMP. NO.:855-054
SITE TYPE: Terrace
TOPOGRAPHY: Hilly-located on top of hill (ridge) with steep slope south at north
VEGETATION: Grass
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.40 m (N/S) by 1.80 m (E/W)

DESCRIPTION: A small terrace is built off the south slope of a hill, with the north portion flush to ground surface. The terrace is one to three courses high, resting on a natural bedrock outcrop. It is constructed of subangular basalt cobbles and boulders (some with cement on them) c. 0.05-0.30 m in diameter. The surface is fairly nicely paved. The terrace is located in the NE portion of the *makai* parcel, 100 feet from the highway (E). No portable remains were noted.

STATE NO.: 19287 PHRI TEMP. NO.:855-055
SITE TYPE: C-shape
TOPOGRAPHY: Very hilly. On top of hill with steep S/W slope and gentle N/E slope.
VEGETATION: *Kiawe* in center of feature, grass all through and around.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 3.00 m (310 degrees) by 1.50 m
DESCRIPTION: C-shape wall built off of and around a natural bedrock outcrop, of subangular basalt cobbles and boulders two to five courses high. Width of the wall is c. 0.40 m. The NE wall is roughly faced. The wall continues from the NW around east to the SE. The SW portion has a small pile (six cobbles) in a square, stacked mound. The wall is built going down a steep slope (S/E). It is located in the NE portion of the *makai* parcel. No portable remains were noted.

STATE NO.: 19288 PHRI TEMP. NO.:855-056
SITE TYPE: Mound
TOPOGRAPHY: Hilly-located on fairly flat bulldozed land with slope going S (toward cut for drainage under highway).
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 1.75 m (320 degrees) by 0.90 m
DESCRIPTION: Piled subangular cobbles and boulders amorphous in shape. Incorporating bedrock in the S/SE portion. The east portion is destroyed by bulldozing. The site is located in the north portion of the *makai* parcel, c. 75.00 m from west of highway. No portable remains were noted.

STATE NO.: 19289 PHRI TEMP. NO.:855-057
SITE TYPE: Ramp
TOPOGRAPHY: Moderate hills built on N slope down, also sloping W.
VEGETATION: *Kiawe*, grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 2.50 m (N/S) by 2.30 m (E/W)
DESCRIPTION: Rectangular shaped with walls constructed due N/S and E/W. The east wall is faced and c. 0.90 m tall and five courses high. The north and south walls slope down from

c. 0.90 m westward to ground surface, and the west wall is at ground surface. The surface of the feature is paved with small (0.05-0.10 m in diameter) subangular basalt cobbles. The perimeter at the base is made with subangular basalt boulders c. 0.20-0.50 m in diameter. The feature does not look collapsed, but ramp-like. There is a small amount of fall by the NE corner; also a few pieces of coral scattered in, on, and around the feature. It is located in the north portion of the *makai* parcel c. 20.00 m west of the highway, c. 50.00 m south of Hapuna beach road. No portable remains were noted.

STATE NO.: 19290 PHRI TEMP. NO.:855-058
SITE TYPE: Cairn
TOPOGRAPHY: Undulating hills with basalt outcroppings and basalt rocks scattered.
VEGETATION: *Kiawe*, dry desert-like grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.00 m by 0.60 m
DESCRIPTION: Subangular basalt rock stacked on basalt outcropping. c. 0.50 m high, oriented at 330 degrees. Trowel test c. 0.07 m of semi-compact soil. Located central section c. 100.00 m west of main highway. Metal fragment (possibly half of a clamp found c. 0.60 m west of site) was noted as portable remains.

STATE NO.: 19291 PHRI TEMP. NO.:855-059
SITE TYPE: Pylons (6)
TOPOGRAPHY: Undulating pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION: *Kiawe*, short brown grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Water transport
DESCRIPTION: This site complex consists of two features: two sets of three pylons (Features A and B). The overall site dimensions are 160.00 m by 3.00 m.

FEATURE A: Pylon (3)
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION: *Kiawe*, short brown grass.
FUNCTION: Water transport
DIMENSIONS: 13.30 m (15-195 degrees) by 1.42 m by 1.56 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles mortared together two to eight courses high. The three structures are in a line running 15-195 degrees. The line traverses a gully running E-W between two low ridges. Each structure has an indentation along the top which is in a direct line with the indentations on the other two structures, as if they had once been holding up a single pipe. The tops of all three are roughly level with one another; the middle one is c. 0.10-0.15 m below the other two. The south structure is c. 1.00 m (E-W) by 0.50 m by 0.40 m high on the north side. The middle structure is c. 1.42 m (E-W) by 0.91 m by 1.56 m high on the north side. The north structure is c. 0.76 m (E-W) by 0.62 m by 0.77 m high on the south side. The base of the each is rectangular. The tops are also rectangular but smaller, so the walls are sloping as on a

pyramid. Mortared rocks are scattered in line with these structures at least 10.00 m to the north and 50.00 m south. It is c. 5.35 m from the south structure to the middle structure, and c. 6.50 m from the middle structure to the north structure. Cobbles used in construction are c. 0.20-0.35 m length/diameter. This feature is directly in line with Feature B, which is c. 133.00 m south. This feature is located c. 100.00 m west of the highway. Two rusty pipe couplings were noted as portable remains. The feature is unexcavated. A trowel poked in the ground hits rock at c. 0.10 mbs.

FEATURE B: Pylon (3)
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe*, short brown grass.
FUNCTION: Water transport
DIMENSIONS: 13.60 m (15-195 degrees) by 0.90 m by 1.21 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles c. 0.20-0.40 m length/diameter, mortared together four to eight courses high. The three structures are directly in line with one another, traversing a small gully which runs roughly E-W. The south structure is c. 0.98 m (E-W) by 0.76 m 1.21 m high on the north side. The middle structure is c. 0.86 m (E-W) by 0.82 m by 0.94 m high on the south side. The north structure is c. 0.87 m (E-W) by 0.60 m by 0.69 m high on the south side. The middle is slightly higher than the south structure. The north structure is c. 0.20 m higher than the middle. Each has an indentation across the top which is in line with the other two, as if they were all carrying a single pipe. The distance between the south and middle structure is c. 5.75 m. The distance between the middle and north structure is c. 5.70 m. This feature is directly in line with Feature A, which is c. 133.00 m north. Mortared rocks and spilled mortar are scattered between the two features. The structures are rectangular at the base but smaller at the top, so the sides slope upward, as on a pyramid. Construction is basically identical to Feature A. The feature is located c. 150.00 m west of the highway. Several #16 shotgun shells were noted as portable remains. The feature is unexcavated; a trowel poked in ground hits rock at c. 0.10 mbs.

STATE NO.: 19292 PHRI TEMP. NO.:855-064
SITE TYPE: C-shape
TOPOGRAPHY: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe*, short brown grass
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind/military
DIMENSIONS: 2.50 m (N-S) by 1.90 m (E-W)
DESCRIPTION: Subangular pahoehoe cobbles and small boulders stacked one to six courses high. The opening of the C-shape faces east, toward the highway. Cobbles are c. 0.18-0.53 m in length/diameter. The axis is 24-204 degrees. The interior height is c. 0.63 m; the exterior c. 0.85 m. The lowest height near the ends is c. 0.45 m. It is located c. 50.00 m west of Queen Kaahumanu highway. Portable remains were noted as one half gallon glass jug, several spent military shells, several #20 shotgun shells (paper). The site was unexcavated; a trowel poked in soil hits rock at c. 0.05 mbs.

STATE NO.: 19293 PHRI TEMP. NO.:855-069
SITE TYPE: Terrace

TOPOGRAPHY: Gently undulating hills.
VEGETATION: *Kiawe*, scrub grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 6.90 m by 6.65 m
DESCRIPTION: Stacked and partially faced pahoehoe boulders and cobbles forming a double terrace. The structure is built on naturally terraced bedrock. The first terrace is relatively flat on top and is oval in shape. To the east is a high bedrock outcrop; all other sides slope 30 degrees. The second terrace is narrow and extends along the west face of the top terrace. It is more randomly stacked than the top terrace and has no facing. The top terrace has a squarish *puka* near the SW end, but appears to be recent (five years or less) and was probably used for marijuana growing. The south end of the terrace curves around to the east for c. 2.00 m. A U.S. coast and geodetic survey reference mark (1948) lies c. 5.00 m to the east on top of the high bedrock outcrop. Facing on the top terrace consists of large, thin pahoehoe slabs placed vertically against the bedrock and supported on the outside by boulders. The second terrace has no thin slabs and relies more on the bedrock. Site 855-70, Feature C lies 312 degrees of TN at c. 12.00 m from Site 855-69. The site is located just east of a dump. Portable remains noted were a waterworn cobble, two marine shell, a waterworn coral, and three shotgun shells.

STATE NO.: 19294 PHRI TEMP. NO.:855-070
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Surrounded by undulating hills, ridges, and ravines. Located on side of ridge spur and hill.
VEGETATION: *Kiawe*, unknown grass.
CONDITION: Poor-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site complex consists of four features: terraces with adjoining wall (Features A and B), enclosure with adjoining c-shapes (Feature C), and circular enclosure (Feature D).

FEATURE A: Terraces w/adjoining wall
ADJACENT TERRAIN: Undulating hills, ravines, and ridges.
VEGETATION: *Kiawe*, unknown grass.
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m (E/W) by 4.00 m (N/S) by 0.73 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: This feature is composed of at least two terrace retaining walls with a wall extending along the eastern end of the terraces. The primary terrace is located below (downslope and south) of large bedrock outcrops at the point of the ridge spur. A single-width alignment is located on the level area below the bedrock outcrop and above the retaining wall. Between the bedrock outcrop and alignment, the ground surface slopes, while between the alignment and retaining wall, the ground surface is fairly level. The other terrace retaining wall is located south, and below the primary terrace. This is in poorer condition than the primary terrace. The wall extends from a bedrock outcrop southeast. The primary terrace is constructed with subangular pahoehoe cobbles and boulders ranging in size from c. 0.10 m (diameter/

length) and 0.60 m by 0.55 m by 0.20 m slabs piled two to three courses high. The second terrace was constructed with 10-45 cobbles and boulders piled two to three courses high. The wall extends SE from a bedrock outcrop to almost reaching Feature B. It was constructed with cobbles and boulders ranging in size from 0.10-0.40 m diameter/length and also incorporates bedrock. The southern half is nicely stacked to four courses high while the northern half is piled. A possible upright (almost conical) stone is located near the junction of the primary terrace and this wall. Midden scatter and paper shotgun shells are located to the north on top of the ridge spur. Portable remains were noted as waterworn cobbles and cobble fragments, shell and coral fragments. A small test revealed no subsurface deposit.

FEATURE B: Terraces w/adjoining wall
ADJACENT TERRAIN: Undulating hills, ravines, and ridges.
VEGETATION:
FUNCTION: Temporary habitation
DIMENSIONS: 16.75 m (W-E) by 5.00 m (N/S) by 0.79 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: At least two terrace retaining walls were constructed with subangular cobbles and boulders ranging in size from c. 0.10-0.40 m. The stones were piled to form the retaining walls. The area between the retaining walls is fairly level. A wall extends south from the eastern end of the highest terrace retaining wall. The lower retaining wall may have also joined this wall but *kiawe* trees are currently growing at this point. This feature is similar to Feature A (with the wall connecting to the terrace retaining walls). The feature is located between Features A and B, between two ridge spurs on the side of the ridge slope. Portable remains were noted as waterworn cobbles. A small test revealed no subsurface deposit.

FEATURE C: Enclosure w/adjoining C-shape
ADJACENT TERRAIN: 15-18 degree slope to south.
VEGETATION: *Kiawe* thicket, unknown grass and vines.
FUNCTION: Temporary habitation
DIMENSIONS: 5.50 m by 4.00 m by 0.84 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: A rectangular structure (lengthwise downslope) with two entrances on the long sides. The western wall (*makai*) acts as a terrace/retaining wall for the interior of the structure, as does the eastern wall (*mauka*) for the exterior, although there is a 5-8 degree slope to the west on the interior. The northern entrance opens onto an area partially enclosed by the west wall and a curved wall extending north and west from the NE corner of the structure. Both parts of the structure are made of haphazardly piled cobbles, and small and large boulders (up to c. 0.20 m by 0.60 m by 0.80 m) which are quite heavy and piled one to five layers high. Many rocks show trauma from unknown sources. This looks like a military battery station with the ammo storage in the enclosure. The two doorways have been terraced to form a level area to walk through. Rocks on the interior of the enclosure may form a room in the SE corner. The feature is located c. 150.00 m south of Road 10 (new Puako Rd.) c. 200.00-250.00 m west of the highway. Portable remains were noted as waterworn basalt pebbles, and plastic plant pot fragments. Deposit unknown; c. 0.10 m of soil in enclosure and C-shape.

FEATURE D: Circular enclosure
ADJACENT TERRAIN: Undulating hills, ravines, and ridges.
VEGETATION: *Kiawe*, unknown grass.
FUNCTION: Temporary habitation

DIMENSIONS: 4.75 m (N/S) by 3.50 m (E/W) by 0.66 m
CONDITION: Good
INTEGRITY: Altered
DESCRIPTION: Feature D is a circular enclosure constructed with piled subangular pahoehoe cobbles and boulders. The stones range in size from c. 0.10-0.50 m diameter/length. The stones are piled two to three courses high. The western half of the feature is more of a terrace than a wall (the stones are fairly level with the interior space, while the surrounding ground surface slopes down to the west). The eastern half of the feature is more of a wall. Even so, it is not much of a wall, because of the surrounding downslope. There is no stacking or careful construction. The possible entrance into the interior space is at the southern end and is c. 0.50-0.70 m wide. A waterworn cobble is located within this possible entryway. The shell fragments are located on the stones within the SE quad, outside the structure, also to the SE. Feature D is located south of water tanks, west of the dump, east of the highway. Feature D is c. 11.50 m due north (TN) from Site 69. Portable remains were noted as ecofacts; shell fragments include *Conidae* sp., and cowrie. A small test indicates no subsurface deposit.

STATE NO.: 19295 PHRI TEMP. NO.:855-073
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Undulating hills, basalt outcroppings and basalt rock scatterings.
VEGETATION: *Kiawe*, dry desert-like grassland.
CONDITION: Fair-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of five features: enclosure (Feature A), mound (Feature B), adjoining C-shapes (3) (Feature C), C-shape (below main feature, Feature D), and modified outcrop (Feature E). The site dimensions are c. 25.00 m at 310 degrees by 11.00 m.

FEATURE A: Enclosure
ADJACENT TERRAIN: Undulating hills.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 8.00 m (310 degrees) by 6.50 m by 0.20 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Basalt rocks forming enclosure on top of hill. The interior of the enclosure is flat; the exterior slopes downward in all directions. The rocks are not stacked, but roughly aligned. There are some disturbed sections. Feature C forms the east side of the enclosure. The feature is located in the central portion of the west parcel, a quarter mile west of the highway. Portable remains were noted as marine shell. A thin layer of silt deposit is present.

FEATURE B: Mound
ADJACENT TERRAIN: Undulating hills.
VEGETATION: *Kiawe*, grass.
FUNCTION: Military clearing piles
DIMENSIONS: 2.00 m by 2.00 m by 0.50 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Stacked basalt rocks, three courses high. A bedrock outcrop is in the center of the mound. This mound forms the west SW part of the enclosure (Feature A). The mound

is square shaped. It is located in the central portion of the west parcel, a quarter mile west of the highway. No portable remains were noted.

FEATURE C: Adjoining C-shapes
ADJACENT TERRAIN:
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 6.50 m (310 degrees) by 5.00 m by 0.85 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Three interconnected C-shapes form the east side of the enclosure (Feature A). One large C-shape is c. 5.00 m at 320 degrees. A smaller C-shape is located at the north end of the large C-shape. Half of it forms part of the enclosure; the other half extends to the interior of the enclosure. This C-shape is c. 3.00 m long. Both of these C-shapes are low and wide. There is another C-shape c. 3.00 m long at 350 degrees which is connected to the east side of the larger C-shape. It has a thin wall (one course thick) and is higher (two to four courses) than the other C-shapes. The feature is located in the central portion of the west parcel, a quarter mile west of the highway. Portable remains were noted as marine shell. A thin layer of silt deposit was present.

FEATURE D: C-shape
ADJACENT TERRAIN: Undulating hills, basalt outcrops, scattered basalt rock.
VEGETATION: *Kiawe*, dry grass.
FUNCTION: Military
DIMENSIONS: 2.90 m 2.64 m by 0.45 m
CONDITION: Fair
INTEGRITY: Indeterminate
DESCRIPTION: Subangular basalt rock stacked on basalt outcropping forming a half moon or "C" shape. Large basalt rocks are scattered within the enclosed area and below the feature extension. A bulldozer push wall is c. 6.00 m west. The highest stacking is two to three courses on the east end. A semi-arranged (circular) configuration of beer bottles has been placed within the upper center confines of the structure. There is a small marine shell scattering in the area surrounding the feature. A trowel test of +0.10 m of very soft silt would suggest Test Unit for further determination. The feature is located on the edge of a hill (west side) in the central project area c. 18.00 m downslope from the main feature 73 complex, c. two-thirds of a mile west of the main highway. No visible prehistoric remains were within the confines of the structure. Beer bottles, bullet, and plastic fragments were noted as portable remains. Deposit is absent per limited testing.

FEATURE E: Modified outcrop
ADJACENT TERRAIN: Undulating hills, basalt outcrops, scattered basalt rock.
VEGETATION: Dry desert grass.
FUNCTION: Possible agriculture
DIMENSIONS: 0.85 m by 0.80 m by 0.20 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Irregular stacked and piled subangular basalt rocks on small basalt outcrop. No visible terrain alterations could positively be associated with clearing. The feature is located c. 11.00 m at 298 degrees from the survey marker within Feature A of Site 855-73 on a downhill slope and c. 8.00 m at 39 degrees uphill from Feature D. This feature is located in the central project area a quarter mile from the main highway. No portable remains were noted.

STATE NO.: 19296 PHRI TEMP. NO.:855-074
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Gentle undulating hills.
VEGETATION: *Kiawe*, scrub grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site complex consists of two features: a C-shape (Feature A), and a wall segment (Feature B). The overall site dimensions are c. 12.00 m by 3.50 m.

FEATURE A: C-shape
ADJACENT TERRAIN: Gentle sloping hills.
VEGETATION: Scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: No construction technique is visible. The C-shape itself is not visible. There is a large (c. 7.00 m diameter) but sparse scatter of shell midden. It would appear that this feature is virtually obliterated. A small depression in the feature is probably the result of a bulldozer or an uprooted burned tree. The feature is located in the central part of the project area c. a quarter mile west of the highway. It is adjacent to Feature B, 180 degrees south of Site 855-73, Feature B at true north and c. 30.00 distant. Shell midden and waterworn cobbles were noted as portable remains.

FEATURE B: Wall segment
ADJACENT TERRAIN: Gently sloping hills.
VEGETATION: Scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.80 m by 0.75 m by 0.53 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Piled boulders in a roughly rectangular wall appear to have been knocked over. There are boulders scattered on the NW hill slope. Only in a few places do two courses of the wall remain. The feature is located in the central part of the project area c. a quarter mile west of the highway, adjacent to Feature C, 180 degrees south of Site 855-73, Feature B at true north and c. 30.00 m distant. Shell midden and waterworn cobbles were noted as portable remains.

STATE NO.: 19297 PHRI TEMP. NO.:855-075
SITE TYPE: Cairn
TOPOGRAPHY: Undulating hills, ravines, and ridges.
VEGETATION: Unknown grass, (dead) *kiawe* at c. 5.00 m to SW.
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 1.00 m (E/W) by 0.60 m (N/S) 0.32 m

DESCRIPTION: This cairn is really a circular concentration of subangular cobbles and boulders piled one to three courses high with an empty area in the center (c. 0.15-0.20 m diameter). The eastern side appears collapsed. The cairn is located in the center, eastern half of the western parcel. Portable remains were noted as a gourd (ID #4) recovered at c. 14.40 m at 122 degrees from the center of F.855-75 (offTN); no other artifacts. A small test reveals no subsurface deposit.

STATE NO.: 19298 PHRI TEMP. NO.:855-077
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Fairly flat, slight slope to the NW. Very rocky with low bedrock exposures.
VEGETATION:
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site complex consists of two features: an enclosure (Feature A), and an L-shape wall (Feature B). The overall site dimensions are c. 25.00 m (N/S) by 8.00 m.

FEATURE A: Enclosure
ADJACENT TERRAIN: Hilly, gentle sloping in all directions.
VEGETATION: *Klawe*, grass.
FUNCTION: Military
DIMENSIONS: 3.00 m (E/W) by 3.00 m (N/S) by 0.30 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: The enclosure has four sides but is rounded and built of subangular basalt cobbles and natural bedrock outcrop. A tree is in the SW corner, in the NW corner is bedrock, and the N and W portions are very collapsed. The enclosure is one to two courses high, two to four wide. It is located c. 22.00 m S of Feature A, atop a small hill. Portable remains are noted as shotgun shells, and empty cartridges.

FEATURE B: L-shape wall
ADJACENT TERRAIN: Hilly area; built atop flat portion with gentle slope north.
VEGETATION:
FUNCTION: Military
DIMENSIONS: 1.90 m by 1.60 m by 0.40 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: The wall is constructed of subangular basalt cobbles and boulders. The L-shape has a short axis coming off the north end of the long axis. The long axis is north to south, 190 degrees; the shorter one is east to west, 100 degrees, and three courses high with larger boulders around the corner area. Basalt shows bulldozer scars. The wall is crudely stacked two cobbles wide. The feature is located c. 22.00 north of Feature A. No portable remains were noted.

STATE NO.: 19299 PHRI TEMP. NO.:855-078
SITE TYPE: C-shape
TOPOGRAPHY: Atop hill sloping W/S/N.
VEGETATION: Grass, *Ilima*.

CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 2.00 m (310/130 degrees) by 0.96 m
DESCRIPTION: C-shape one to two courses high constructed of subangular basalt cobbles. Boulders show bulldozer scars. Very pushed looking, but back side clearly shows c-shape alignment. The site is located in the NE portion of the *makai* parcel. A few pieces of marine shell (probably brought in by bulldozers) are noted as portable remains.

STATE NO.: 19300 PHRI TEMP. NO.:855-080
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: On top of hill sloping W/NW.
VEGETATION: *Ilima*, grass, *Kiawe*.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Indeterminate
DESCRIPTION: This site consists of two mounds (Features A and B). The overall length of the site is c. 42.00 m.

FEATURE A: Mound
ADJACENT TERRAIN: Steep slope down to N/E upslope to S.
VEGETATION: *Ilima*, grass.
FUNCTION: Indeterminate
DIMENSIONS: 2.30 m (320 degrees) by 1.70 m by 0.70 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: The mound is oblong shaped, c. 2.30 m by 1.70 m. It is rather sloppily built of subangular basalt cobbles and boulders stacked two to four courses high. Cobbles show evidence of bulldozer scar. The mound is located c. 42.00 m N/NE of Feature B, downslope of Feature B, but still on top of the hill. Cable wire is noted as portable remains.

FEATURE B: Mound
ADJACENT TERRAIN: Decomposing bedrock cobbles, cement.
VEGETATION: *Ilima*, grass.
FUNCTION: Indeterminate
DIMENSIONS: 0.70 m by 0.60 m by 0.40 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: The mound is round in shape, two to three courses high and two to three wide also. It is built of subangular basalt cobbles, c. 0.10-0.30 m in diameter. Cobbles show evidence of bulldozing scars. It is located on top of hill c. 42.00 m S/SW of Feature A. No portable remains were noted.

STATE NO.: 19301 PHRI TEMP. NO.:855-081
SITE TYPE: Circular enclosure
TOPOGRAPHY: Hilly, built on west slope (down) of hill.
VEGETATION: *Klawe*, grass.

CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.90 m by 1.90 m
DESCRIPTION: Subangular basalt cobbles and boulders built in circular shape. A natural bedrock outcrop is incorporated into the eastern portion. The enclosure is built on the downslope of a hill (west) so the west side is built up higher to be even all around the top. Cobbles are stacked two to four courses high and range from c. 0.10-0.40 m in diameter. Cobbles also show bulldozing scars on them. The enclosure is located in the northeast portion of the *makai* parcel (by campgrounds). No portable remains were noted.

STATE NO.: 19302 PHRI TEMP. NO.:855-082
SITE TYPE: Mound
TOPOGRAPHY: Located at the bottom of a large hill (on west side) fairly flat bulldozed ground.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.90 m by 0.90 m
DESCRIPTION: The mound is rectangular, built of subangular basalt cobbles and boulders one course high with large (c. 0.40 m in diameter) boulders as the perimeter, and smaller (c. 0.05-0.20 m in diameter) rocks filling the center. The mound is built on bulldozed land and out of scarred rocks. Located in the NE portion of the *makai* parcel (by campground). No portable remains were noted.

STATE NO.: 19303 PHRI TEMP. NO.:855-088
SITE TYPE: Rubble concentration
TOPOGRAPHY: Rolling pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 4.20 m by 2.20 m
DESCRIPTION: Pahoehoe cobbles and gravels are aligned in a curved formation that may once have been a C-shape. Rocks are c. 0.30 m in length/diameter. The site is located c. 1.00 m SW quadrant, W of Queen Kaahumanu highway. No portable remains were noted. Unexcavated; a trowel poked in the soil at numerous points hits rock c. 0.10 mbs. The site has been considerably flattened by bulldozing.

STATE NO.: 19304 PHRI TEMP. NO.:855-089
SITE TYPE: C-shape
TOPOGRAPHY: Undulating hills, basalt outcrops.
VEGETATION: *Kiawe*, grass.
CONDITION: Good

INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 2.50 m by 2.50 m
DESCRIPTION: Stacked subangular basalt rock up to two courses high forms a semi-circular "C" shape. Rocks are moderately large. There is a soil deposit c. +0.10 m. The inside surface of the structure is flat; the soil deposit is softer and less gravely. A marine shell fragment concentration is c. 2.00 m uphill from the feature. The feature was trowel tested with no evidence of cultural remains encountered. The site is oriented at 268 degrees. The site is located in the southern central project area c. half mile east of Puako Road, at the west end of a ridge.

STATE NO.: 19305 PHRI TEMP. NO.:855-092
SITE TYPE: Modified outcrop
TOPOGRAPHY: Undulating hills, basalt outcrops, basalt rock scattering, semi-coastal, steep slope immediately NW of feature.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible ceremonial
DIMENSIONS: 3.50 m (E/W)
DESCRIPTION: Irregular stacked waterworn basalt rock and cobble on a basalt outcrop. Several large pieces of coral are incorporated in the stacking. There are also some smaller coral pieces in the area to the back of the outcrop (SE). The area SE of the outcrop appears to have been cleared. Several waterworn cobbles are also included in the modification. The feature is located on a ridgetop/edge overlooking the undulating plain below. The feature is located a quarter mile east of Puako Road, in the south central project area, on the ridge point (westward facing). Portable remains were noted as waterworn coral (six pieces), waterworn basalt cobbles (three), and marine shell.

STATE NO.: 19306 PHRI TEMP. NO.:855-093
SITE TYPE: Complex (7 Features)
TOPOGRAPHY: Undulating pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of seven features: enclosure (Feature A), wall (Feature B), cairn (Feature C), C-shape (Feature D), and terraces (Features E-G). The overall site dimensions are c. 50.00 m by are 30.00 m.

FEATURE A: Enclosure
ADJACENT TERRAIN: Located on a point of land with sloping sides to the west and south east.
VEGETATION: *Kiawe*, fountain grass.
FUNCTION: Temporary habitation
DIMENSIONS: 5.00 m by 6.50 m by 0.48 m

CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: This feature is a generally rectangular enclosure. The south wall and corners are medium to large, built of basalt boulders (c. 0.50 m by 0.25 m). The north, east, and west walls are slighily raised and consist of dirt and smaller cobbles (c. 0.25 m by 0.12 m). The interior is flat with soil and midden deposits. It is located c. 39.00 m at 74 degrees to Feature D (datum) from Feature A (datum). Midden is present inside and around the feature; coral is also present. One fragment of a grinding stone was mapped and collected. Soil is present.

FEATURE B: Wall
ADJACENT TERRAIN: Rolling pahoehoe bedrock outcrops, on a W-facing slope (Approx. 10 degree slope)
VEGETATION: Fountain grass
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Weathered basalt boulders, c. 0.05 m by 0.05 m to 0.25 m by 0.15 m piled one and two courses in a loose alignment downslope. The wall is in poor shape and appears to have a weak S-shape as opposed to a linear one. The wall is located at about the mid-point of the slope. The feature is located west of Queen Kaahumanu highway, in the SW portion of the project area. No portable remains were noted.

FEATURE C: Cairn
ADJACENT TERRAIN: Rolling pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION:
FUNCTION: Military
DIMENSIONS: 0.80 m by 0.50 m by 0.30 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles piled one to three courses high. Stones are c. 0.11-0.30 m length/diameter. The feature is located in the SW part of the project area, west of Queen Kaahumanu highway. Numerous marine shell fragments (mostly cowrie) were noted as portable remains. The feature is unexcavated; it sits on bedrock.

FEATURE D: C-shape
ADJACENT TERRAIN: Undulating pahoehoe outcrops on a W-facing slope. A drop off to a gully lies 8.00-16.00 m W, between Features A and D.
VEGETATION:
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m by 2.90 m by 0.43 m
CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high. The opening is to the west. Immediately south is gravel/cobble rubble, some of which forms a roughly circular shape one course high. Cobbles are up to c. 0.46 m length/diameter; most are c. 0.30 m. The feature is located west of Queen Kaahumanu highway, in the SW portion of the project area. Marine shell fragments were noted as portable remains. The feature is unexcavated; a trowel probed into the ground at numerous points hits rock at c. 0.10 mbs.

FEATURE E: Terrace
ADJACENT TERRAIN: On W side of a hill overlooking undulating pahoehoe outcrops.
VEGETATION: *Kiawe*, grass.
FUNCTION: Possible agriculture
DIMENSIONS: 10.50 m (326-146 degrees) by 1.20 m by 0.68 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Two terraces running roughly N-S, c. 2.30 m apart. The south terrace is an outcrop with small boulders and cobbles one to two courses high filling in gaps, to make it more level. The north terrace has cobbles stacked one to three courses high. Dabs and drippings of mortar are among the rocks, as well as between the two terraces. The feature is located on the west side of a hill overlooking undulating pahoehoe outcrops. One cowrie shell fragment (c. 6.50 m long), and a waterworn basalt fragment (both on the south terrace) were noted as portable remains. Unexcavated; a trowel probed into soil at numerous points was stopped by rock at c. 0.10 mbs.

FEATURE F: Terrace
ADJACENT TERRAIN: Rolling pahoehoe.
VEGETATION: *Kiawe*, fountain grass.
FUNCTION: Agriculture
DIMENSIONS: 3.50 m by 2.50 m by 0.32 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Feature F is a circular formation of weathered basalt boulders (c. 0.10 by 0.15 m, 0.25 by 0.15 m), arranged in a loose configuration. It is built on a slope to the east, and the east and south sides are built up, piled two courses high. The west side and north side are one course and appear to be rubble. Feature F is just east of and adjacent to Feature G. No portable remains were noted. A thin soil deposit is present.

FEATURE G: Terrace
ADJACENT TERRAIN: Rolling pahoehoe field.
VEGETATION: *Kiawe*, fountain grass.
FUNCTION: Agriculture
DIMENSIONS: 3.75 m by 3.25 m by 0.14 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A circular formation of weathered basalt boulders. The feature slopes east to Feature F. All other sides are even with the ground surface. The terrace is one course high. The boulders are in a loose configuration and the feature closely resembles Feature F. Feature G is just west of and adjacent to Feature F. No portable remains were noted.

STATE NO.: 19307 PHRI TEMP. NO.:855-096
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills, ravines, and ridges. Constructed on northern edge of level area before downslope.
VEGETATION: *Kiawe*, grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Possible military

DIMENSIONS: 2.50 m (E/W) by 0.65 m (N/S) by 0.32 m
DESCRIPTION: This wall was constructed with subangular pahoehoe cobbles (c. 0.15-0.30 m) and boulders piled one to three courses high. It was not well constructed, but the stones do appear placed, as compared to bulldozer push. The wall is located in the center (N-S) of the western parcel, between Road 10 and the highway. No portable remains were noted. A small test indicates no subsurface deposit.

STATE NO.: 19308 PHRI TEMP. NO.:855-098
SITE TYPE: Mound
TOPOGRAPHY: Undulating hills, ravines, and ridges. Site on N-facing slope.
VEGETATION: Grass, (dead) *kiawe* at c. 5.00 m west.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Possible military
DIMENSIONS: 1.50 m (E/W) by 1.10 m (N/S)
DESCRIPTION: This modified outcrop was constructed with weathered, subangular pahoehoe boulders (primarily) with a few cobbles. The stones were piled up to two courses high on a bedrock outcrop. The modified outcrop was originally called a mound, and was almost designated as bulldozer push, but some of the rocks appear placed. Even so the construction appears haphazard. Large boulders to the north (downhill) appear to be collapsed. The mound is located between Road 10 and the highway, in the center of the western parcel. No portable remains were noted.

STATE NO.: 19309 PHRI TEMP. NO.:855-100
SITE TYPE: Cairn
TOPOGRAPHY: Hilly, decomposing bedrock cobbles and gravel; bulldozer push and scars.
VEGETATION: *Ilima*, *kiawe*, grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.32 m by 0.60 m
DESCRIPTION: Subangular basalt cobbles five to six courses high. The cairn has a wide base c. 0.40 m and a narrow, one cobble top. The cairn is c. 0.59 m tall. Coming off the north portion is an arrow-shaped inverted V arranged on the ground surface out of small cobbles. Due north. No portable remains were noted.

STATE NO.: 19310 PHRI TEMP. NO.:855-101
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Gently sloping to the north and northwest; area has been bulldozed.
VEGETATION: Thick grass, large tree in center of feature.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Contemporary
DESCRIPTION: This site complex consists of two terraces (Features A and B). The overall site dimensions are c. 10.00 m by 6.00 m.

FEATURE A: Terrace
ADJACENT TERRAIN: Large unknown tree in center of feature.
VEGETATION: California grass.
FUNCTION: Park maintenance
DIMENSIONS: 3.40 m by 1.50 m by 0.50 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: C-shaped terrace around tree (to keep soil in) constructed of subangular basalt cobbles and boulders c. 0.10-0.40 m in diameter. It is one to three courses and fairly level all around. The SW/W portion is flush with the ground surface; the east portion is c. 0.50 m above ground surface, two courses thick (wide). The center portion is filled in with reddish/brown silty soil. The feature is located c. 6.00 m west (60 degrees) of Feature B on park grounds. No portable remains were noted.

FEATURE B: Terrace
ADJACENT TERRAIN: Gently sloping N.
VEGETATION: Grass.
FUNCTION: Park maintenance
DIMENSIONS: 3.00 m (90 degrees) by 0.70 m by 0.80 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Terrace retaining wall to keep soil in. The south portion is flush with the ground surface. It is built of small subangular basalt cobbles mostly c. 0.05-0.15 m in diameter. Natural bedrock is incorporated along the west portion. Cobbles are all scraped from bulldozed area. The feature is located c. 6.00 m east of Feature A (in park grounds), c. 12.00 m south of the road. No portable remains were noted.

STATE NO.: 19311 PHRI TEMP. NO.:855-102
SITE TYPE: Cairn
TOPOGRAPHY: Undulating with gentle slope from the E, steep slope to gulch bottom to the N and W.
VEGETATION: Sparse-moderate density of grass, 2 *kiawe* to the west and south of feature
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.00 m by 1.00 m by 0.50 m
DESCRIPTION: Roughly circular in overall shape. Subangular basalt cobbles, crudely stacked three courses high. Bedrock is incorporated into the feature construction. The cairn is located on the south side of a gully on the ridge top, across from (south) A-frames at Hapuna State Park. Cement pieces and spent cartridges were noted as portable remains. When this site was identified in 1990, there were two features; only Feature B (cairn) was relocated during the present field work.

STATE NO.: 19312 PHRI TEMP. NO.:855-103
SITE TYPE: C-shape
TOPOGRAPHY: Undulating surface of decomposing basalt and reddish brown soil.
VEGETATION: Grass, (dead) *kiawe* within 10.00 m of site.
CONDITION: Poor

INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 2.23 m (80/260 degrees) by 1.50 m by 0.30 m
DESCRIPTION: Seven basalt boulders (c. 0.20-0.30 m) form a base alignment with portable basalt cobbles (c. 0.15-0.20 m) used to form walls (only rubble piles now). Only remnants of the north wall, running 80/260 degrees, remain. It is likely the structure had a west wall, demolished by a bulldozer - only a pile of rubble remains. The north wall is speculated to be four to five courses and c. 0.60 m, based on amount of cobbles in rubble pile. It is likely that the opening of the structure faced south. The area within the C-shape is mostly level at this point. As there is ample evidence of bulldozing, i.e. busted cobbles, it cannot be ascertained if this area was level and clear for original use. The feature is located c. 150.00 m from Road 10; at 220 degrees is a large white residence. There were scattered marine shell fragments (mostly cowrie), and one waterworn basalt with an unusually smooth side (possible basalt abrader; flagged, but not collected at recording). TU-26 was placed c. 2.15 m at 170 degrees from this feature's datum. There was c. 0.05-0.07 m (0-0.05 mbs) of reddish brown silt-colluvial deposit with marine-derived ecofacts as well as decomposing bedrock.

STATE NO.: 19313 PHRI TEMP. NO.:855-106
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Undulating hills.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of five features: two C-shapes (Features A and D), adjoining C-shapes (Feature B), enclosure (Feature C), terrace (Feature E, not found), and a wall (Feature F). The overall site dimensions are c. 28.00 m at 260 degrees by 18.00 m.

FEATURE A: C-shape
ADJACENT TERRAIN: Basalt outcrops.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.65 m by 1.90 m by 0.55 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Stacked subangular basalt rock forming a "C" shape with a squarish shape c. 0.60 m sq. adjoining at the northeastern section of the wall. The interiors of both these structures slope slightly downhill and are relatively flat. Slumping along the upper north wall (off of basalt outcrop) has occurred. Both Feature A and C have their northern section walls stacked on basalt outcrop while the rest of the features appear to be surface stacked. Trowel testing within and around the feature area showed no cultural remains. Soil is relatively soft within the feature and more compact without (c. +0.10 m). The feature is oriented at 242 degrees. It is located in the central project area adjacent to the east wall of Feature "C". No portable remains were noted. Deposit is absent per trowel testing.

FEATURE B: Adjoining C-shapes
ADJACENT TERRAIN: Undulating hills.
VEGETATION:

FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m (8 degrees TN) by 3.30 m by 0.20 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Basalt rocks forming two connected c-shapes. The larger C-shape opens to the north. This C-shape is on a flat area. The south side is on the edge of a steep slope. A small C-shape which opens to the west is connected to the larger C-shape at the latter's NE end. The larger C-shape is built on an outcrop and also forms terrace. The feature is located in the central portion of the western parcel, a half mile west of the highway. No portable remains were noted.

FEATURE C: Enclosure
ADJACENT TERRAIN: Undulating hills, basalt outcrops.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.25 m by 1.85 m by 0.60 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Stacked subangular basalt rock in circular configuration. The largest amount of stacking is on the north side, two to three courses high. There was some slumping downhill from the north wall area. The south wall area is a scattered one course alignment. Some smaller rocks are scattered in the center. The center area is flat with slight downhill sloping, and it appears cleared. Trowel testing c. +0.10 m showed no cultural remains (tested several places within and without feature). The feature is oriented at 204 degrees. A small coral fragment is noted as portable remains (not collected).

FEATURE D: C-shape
ADJACENT TERRAIN: Undulating hills, basalt outcrops.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.25 m by 2.50 m by 0.45 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Stacked subangular basalt rock in semi-circular formation on a basalt outcrop. The feature is oriented at 190 degrees. The inner surface is basically flat, with a slight downhill slope. Some slumping from the north wall is present. Trowel testing within and without feature did not indicate any cultural evidence. Soil is semi-compact, c. +0.10 m of silt. The feature is oriented at 242 degrees. It is located in the central project area, c. 8.40 m, north at 46 degrees from Feature B of this site and c. 8.20 m at 68 degrees from Feature C. No portable remains were noted.

FEATURE F: Wall
ADJACENT TERRAIN: Undulating hills.
VEGETATION: *Kiawe*, grass.
FUNCTION: Agriculture
DIMENSIONS: 12.00 m (330 degrees) by 1.00 m by 0.40 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Wall alignment constructed of basalt rocks (one to two courses). Due to disturbance, the wall is not continuous. The wall is on a hillside with a very slight slope; it is possible that it also serves as a terrace. It is located in the central portion of the west parcel, a half mile west of the highway. No portable remains were noted.

STATE NO.: 19314 PHRI TEMP. NO.:855-107
SITE TYPE: Complex (6 Features)
TOPOGRAPHY: Small gently rolling hills; more or less a valley.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of: enclosure (Feature A, no feature form), L-shaped alignment (Features B and G), U-shape (Feature C, no feature form), and C-shapes (Features D-F, H), Feat. H has a feature form, but is not listed on the site form.

FEATURE B: L-shaped alignment
ADJACENT TERRAIN: Small, gently rolling hills.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 8.50 m by 7.00 m by 0.31 m
CONDITION: Fair-good
INTEGRITY: Altered
DESCRIPTION: An L-shaped alignment of single stones. Two uprights are c. 1.00 m apart on the east side. The uprights appear as a doorway. The structure begins c. 2.50 m south of Feature A and continues east c. 7.00 m where it turns north, continuing to the gully on the north. Boulders and cobbles are somewhat set into the ground. The feature is located in the central part of the project area, c. a half mile west of the highway. It is 182 degrees south of Site 855-106 at true north, c. 80.00 m distant, and c. 7.00 m 80 degrees of true north from Feature E (from east edge of Feature E to the two uprights). Shell midden, and waterworn cobbles were noted as portable remains. A surface scatter mound was out of the feature perimeter.

FEATURE D: C-shape
ADJACENT TERRAIN: Fairly level area with ridges 30-50 m N, W, S.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.50 m (N/S) by 2.75 m (E/W) by 0.24 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A C-shaped pile, two to three courses of angular basalt boulders (c. 0.25-0.35 m) and cobbles (c. 0.07-0.25 m) with a c. 1.25 m opening facing 300 degrees. Construction is random, i.e., not all of the large (c. 0.25+ m) boulders are used for base alignment; the southern half is piled two to three courses while the northern half is one to two courses, with intermittent one course areas in both halves. The interior is mostly level, with 50% covered with scattered cobbles. The southeast corner is stacked on a cement-covered basalt cobble; assuming disturbance, the feature was likely only two to three courses high. It is located north and upslope of a drainage (drainage runs between, and separates Site 855-107A-C from 107D-H). It is c. 150.00 m from Road 10; at a bearing of 230 degrees to the large white residence. A coral abrader (ID #6), and one waterworn basalt cobble were noted as portable remains. Reddish brown silty loam resulting from decomposing bedrock and colluvial deposit. Pencil probed revealed 0.05+ m.

FEATURE E: C-shape
ADJACENT TERRAIN: Mostly level, decomposing basalt terrain with ridges. N, W, S, 30.00-50.00 m. Drainage is c. 3.00 m south.

VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.15 m (N/S) by 2.65 m (E/W)
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A C-shaped, crudely stacked wall of basalt boulders (c. 0.25-0.50 m) and cobbles (c. 0.10-0.25 m) with a c. 1.40 m opening 310 degrees. The wall is stacked two to three courses high with intermittent one course areas. Construction is random, i.e. along east wall, smaller bulldozer-cracked cobbles are supporting larger boulders (c. 0.25 m). The interior is level, with a few basalt cobbles scattered. One slightly burnt *Kiawe* tree is located inside the structure, north end (see map). A large boulder in SW corner is big slab of concrete. The feature is located c. 4.00 m west of Feature D; c. 3.00 m from drainage. No portable remains were noted. There was c. 0.05+ m of reddish brown gravely silty loam.

FEATURE F: C-shape
ADJACENT TERRAIN: Level decomposing basalt/soil.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: A C-shaped structure of crudely stacked angular basalt cobbles and boulders, with a c. 1.25 m opening facing 260 degrees. About eight large (c. 0.30-0.40 m) angular basalt boulders are well grounded, and these form the base circular alignment. Portable angular cobbles c. 0.10-0.25 m are stacked two to three courses in the south portion, and the more deteriorated (disturbed) north and east sections are one to two courses. About 10 large cobbles are scattered in the interior of the structure - likely a collapsed wall (southwestern portion). It is located c. 1.00 m north of Feature E, c. 4.00 m west of Feature D, c. 150.00 m east of Road 10. A volcanic glass flake was noted as portable remains. A gravely reddish brown silty loam, resulting from decomposing bedrock and colluvial deposit is present. About 0.05+ m of deposit is inside the structure (determined by small finger probe).

FEATURE G: L-shape alignment
ADJACENT TERRAIN: Mostly level decomposing bedrock/soil.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.70 m (N/S) by 1.80 m (E/W) by 0.39 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Constructed on bedrock, a rounded L-shaped alignment with an opening c. 2.00 m 50 degrees. There are c. ten (c. 0.30-0.40 m) boulders, well grounded, that form a base alignment. There is crude stacking two to three courses along the west wall (a few appear to be scarred and popped by a bulldozer). The south wall is one to two courses high, i.e. one large cobble supported by well grounded base boulders. The feature is located c. 5.00 m NW of Feature D and c. 1.00 m north of Feature F. No portable remains were noted. About 0.05+ m of reddish brown gravely silt loam, colluvial, is present.

FEATURE H: C-shape
ADJACENT TERRAIN: Undulating pahoehoe outcrops on a W-facing slope.
VEGETATION:
FUNCTION: Temporary habitation

DIMENSIONS: 3.60 m by 1.70 m by 0.36 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high. The feature sits partly on a natural outcrop, to take advantage of its shape. Rocks are c. 0.15-0.30 m length/diameter. The feature is located in SW quadrant of project area, west of Queen Kaahumanu highway. No portable remains were noted. Unexcavated; a trowel poked into soil near the feature is stopped by rock c. 0.10 mbs.

STATE NO.: 19315 PHRI TEMP. NO.:855-109
SITE TYPE: Complex (8 Features)
TOPOGRAPHY:
VEGETATION: *Kiawe*, grass.
CONDITION: Good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of: cairns (Features A-H), and U-shape (Feature I, no feature form). The overall site dimensions are c. 16.00 m (E/W) by 13.00 m (N/S).

FEATURE A: Cairn
ADJACENT TERRAIN: Feat. A is on a flat rise with a gully to the N and S. A slope is immediately to the W. The land is flat to the east.
VEGETATION: *Kiawe*, grass.
FUNCTION: Possible post support
DIMENSIONS: 1.20 m (E-W) by 1.10 m (N-S) by 0.34 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Feature A is a low, one course, circular shaped cairn. It is built with boulders (c. 0.30 by 0.40 m to 0.20 by 0.15 m) placed in a circle with smaller cobbles (c. 0.10 by 0.15 m) piled two course high in the center. Rocks are tightly placed and the top of the feature is flat. The feature is located on the west edge of a finger knoll that runs west to east. There is some midden visible on the surface to the east.

FEATURE B: Cairn
ADJACENT TERRAIN: Feat. B is on the W edge of a finger knoll that runs W, E. There is a slope immediately to the west.
VEGETATION: *Kiawe*, grass.
FUNCTION: Possible post support
DIMENSIONS: 1.00 m (E-W) by 0.85 m (N-S) by 0.35 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: About nine basalt boulders are arranged in a circle. The boulders are c. 0.20 by 0.20 m. Smaller basalt cobbles are piled inside. The boulders outside form a raised ring. The cobbles inside form a flat surface. The feature is located on the west edge of a finger knoll running west to east. Midden is present on the surface to the east. Minimum midden present; mostly cowrie shell.

FEATURE C: Cairn
ADJACENT TERRAIN: Feat. C is on the SW corner of a knoll running W, E. A gully is adjacent to feat. to the S.

VEGETATION: *Kiawe*, grass.
FUNCTION: Possible post support/agriculture
DIMENSIONS: 1.70 m (E-W) by 1.10 m (N-S)
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Feature C is fairly rectangular in shape. It is constructed of c. 100+ small basalt cobbles (range: 0.05 by 0.05 m to 0.12 by 0.10 m) piled on top of each other. Minimum midden is present; mostly cowrie shell.

FEATURE D: Cairn
ADJACENT TERRAIN: Feat. D is located on the W-end of a knoll running W-E.
VEGETATION: *Kiawe*, grass.
FUNCTION: Possible post support/agriculture
DIMENSIONS: 0.90 m (N-S) by 0.80 m (W-E) by 0.38 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Feature D is a small, circular cairn with basalt boulders (c. 0.30 by 0.25 m) piled two to three courses high. It is in the middle of a finger knoll running west to east. There are gullies to the north and south sides. It is on a high spot midway between the gullies. It is also equidistant to the slope to the west. There is sparse midden scatter in all directions.

FEATURE E: Cairn
ADJACENT TERRAIN: Feat. E is on the N edge of a finger knoll that runs W-E.
VEGETATION: *Kiawe*, grass.
FUNCTION: Possible post support/agriculture
DIMENSIONS: 1.10 m (N-S) by 0.90 m (W-E) by 0.57 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Feature E is a small, circular cairn. It is built on the edge of a gully, (to the north). It is constructed of c. 15 basalt boulders (c. 0.30 by 0.20 m) piled two courses high. There is sparse midden scatter to the south, west, and east.

FEATURE F: Cairn
ADJACENT TERRAIN: Feat. F is on the edge of a gully which is located immediately to the north.
VEGETATION: *Kiawe*, grass.
FUNCTION: Possible post support/agriculture
DIMENSIONS: 0.53 m (N-S) by 0.50 m (W-E) by 0.27 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Feature F is a small, low cairn. It is constructed of c. 10 boulders and cobbles, the largest being c. 0.28 by 0.12 m. They are piled two courses high. Sparse midden scatter is present, as are several shotgun shells.

FEATURE G: Cairn
ADJACENT TERRAIN: Feat. G is on the edge of a gully, just north and adjacent to it.
VEGETATION: *Kiawe*, grass.
FUNCTION: Indeterminate
DIMENSIONS: 0.70 m (W-E) by 0.75 m (N-S) by 0.37 m
CONDITION: Fair-good
INTEGRITY: Unaltered

DESCRIPTION: Feature G is a small, low, circular pile of basalt cobbles (c. 0.10 by 0.10 m). They are tightly piled. Several shotgun shells are on the surface just south of the feature (Remington 16 GA).

FEATURE H: Cairn
ADJACENT TERRAIN: Feat. H is located just south of a gully running west to east.
VEGETATION: *Kiawe*, grass.
FUNCTION: Possible post support/agriculture
DIMENSIONS: 0.90 m (W-E) by 0.60 m (N-S) by 0.51 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Feature H is a low, one course circular shaped arrangement of c. nine basalt boulders. The boulders are c. 0.30 by 0.20 m. On the northwest side is one larger boulder (0.37 by 0.45 m) standing upright. (Note, this is in the direction of the sea). No portable remains were noted to be in the immediate area.

STATE NO.: 19316 PHRI TEMP. NO.:855-113
SITE TYPE: Circular enclosure
TOPOGRAPHY: Gently undulating hills.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Temporary habitation/hunting blind
DESCRIPTION: A circular enclosure of randomly piled pahoehoe boulders and cobbles partially incorporating a bedrock outcrop. Some very small pieces of coral are to the NE. A small scatter of shotgun shells lies to the east. The enclosure is located east of the dump. Coral, shotgun shells, and tin cans were noted as portable remains.

STATE NO.: 19317 PHRI TEMP. NO.:855-115
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: A steep slope and rolling hills.
VEGETATION: *Kiawe*, grass, vines.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of four features: adjoining C-shapes (Feature A), mound (Feature B), C-shape with adjoining wall (Feature C), and C-shape (Feature D).

FEATURE A: Adjoining C-shapes
ADJACENT TERRAIN: Rolling hills, but roughly leveled all around feature.
VEGETATION: *Kiawe*, grass, vines.
FUNCTION: Temporary habitation
DIMENSIONS: 7.25 m (30 degrees TN) by 2.50 m (120 degrees TN)
CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: Randomly piled cobbles and boulders (c. 0.20 by 0.30 by 0.50 m) in the shape of two C-shaped structures connected by a few cobbles. The eastern of the two appears to have

a cupboard (or gun placement) leading into the space between the two (see map). This feature was previously called an E-shape. It is located c. 42.80 m at 26 degrees TN to Feature B datum; c. 8.00 m at 340 degrees TN to Feature D. Two pieces of coral, and several shotgun shells were noted as portable remains. No important cultural remains were discovered.

FEATURE B: Mound
ADJACENT TERRAIN: Rolling hills, steep slope down to road embankment.
VEGETATION: *Kiawe*, grass, vines.
FUNCTION: Military clearing piles
DIMENSIONS: 3.00 m (54 degrees TN) by 2.50 m (324 degrees TN)
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Randomly piled cobbles and boulders (c. 0.20 by 0.20 by 0.50 m) on top of bedrock in the shape of a tear drop. The feature is located c. 20.00-25.00 m south of Road 10 (new Puako road at bend above dump). Marine shell (cowrie, and conus), and a c-ration can were noted as portable remains. A surface scattering was noted as a deposit.

FEATURE C: C-shape w/adjoining wall
ADJACENT TERRAIN: Rolling hills, steep slope down to road embankment.
VEGETATION: *Kiawe*, grass, vines.
FUNCTION: Temporary habitation/military
DIMENSIONS: 7.50 m (324 degrees TN) by 5.00 m (54 degrees TN)
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Randomly piled cobbles and small boulders (c. 0.10 by 0.20 by 0.40 m) piled on soil and bedrock in a C-shape with a destroyed wall extending to the NW. The end of the wall is c. 15.00 m south of Road 10 (new Puako road) at the bend above the dump. A C-ration can, and a scattering of marine shell (conus, and cowrie fragments) were noted as portable remains. Surface scattering was noted as deposit.

FEATURE D: C-shape
ADJACENT TERRAIN: Rolling hills, very gentle slope to the NW.
VEGETATION: *Kiawe*, grass, vines.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Small c-shaped structure of randomly piled cobbles and two small boulders (c. 0.20 by 0.20 by 0.30 m) piled on soil and bedrock outcrop open toward the water. The feature is located c. 8.00 m at 160 degrees TN to Feature A datum. No portable remains or cultural deposits were noted.

STATE NO.: 19318 PHRI TEMP. NO.:855-117
SITE TYPE: Midden scatter
TOPOGRAPHY: Very hilly-located on top of ridge and down southern slope including bulldozed land.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: Several large basalt subangular boulder piles along top of ridge. The rest of the area seems to be rubble, and the southern portion has a distinct bulldozer roadway. The site was destroyed by bulldozing. Cement (military) is scattered throughout the site, concentrated in the SE portion. The site is located in the central portion of the *makai* parcel between the highway and Road 10. A medium amount of seashell scatter is mostly in the southern half; sparse in the north portion. There is coral too, mostly along the south portion of the site (on the south slope). These portable remains were noted as being collected as ID #8. A deposit was noted as being present, appearing to be c. 0.06 m of shell mixture with associated ash (but may be of fire). The scatter seems to fade at c. 1.00 m from the bulldozer road (S) and then picks up again in the push, but that part is on the surface and does not continue subsurface. Most likely disturbed and carried there from bulldozer activity.

STATE NO.: 19319 PHRI TEMP. NO.:855-119
SITE TYPE: Modified outcrop
TOPOGRAPHY: Steep hill-ridge, built along top at north side.
VEGETATION: *Klawe*, grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: Subangular basalt cobbles stacked linearly (N) off a natural basalt bedrock outcrop (E/W). It is amorphous in shape, and is built partially on top of the hill and working downward N/NW. The feature is c. 3.00 m by 2.20 m. It is mostly one to two courses high. A bedrock slab along the south portion is c. 1.00+ m long and c. 0.50+ m wide. The feature is located in the north portion of the *makai* parcel c. 100.00 m east of Road 10. Three cowrie shells were noted as portable remains.

STATE NO.: 19320 PHRI TEMP. NO.:855-121
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Sloping W/NW. Steep hill to N of site. Hilly all over exposed decomposing bedrock (gravel and cobbles).
VEGETATION: *Klawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site complex consists of two features: a C-shape (Feature A) and modified outcrop (Feature B).

FEATURE A: C-shape
ADJACENT TERRAIN: Decomposing bedrock cobbles and gravel
VEGETATION: Grass
FUNCTION: Military
DIMENSIONS: 4.50 m (E-W) by 1.80 m (N-S) by 0.50 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: C-shape constructed of subangular basalt cobbles and boulders ranging from c. 0.10-0.40 m in diameter, also incorporating natural bedrock. It is one to three courses, with

the middle course the highest. In the center of the enclosed side is a flat piece of bedrock abutting the back wall on the ground surface. The feature is located in the northwest corner of the *makai* parcel. No portable remains were noted.

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Steep slope to the north, gentle slope from the SE. Much exposed bedrock.
VEGETATION: Moderate density of low dry grass, *Ilima*
FUNCTION: Military
DIMENSIONS: 2.80 m (E/W) by 1.30 m by 0.32
CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: The feature appears, overall, as a small, informal retaining wall, running parallel along the slope, oriented east/west. Most of the feature is a bedrock outcrop with a few small to medium subangular basalt cobbles placed off the east and west ends. The placed stones are one to two courses high and a single course wide. The feature is located c. 0.70 m west of Feature A. No portable remains were noted.

STATE NO.: 19321 PHRI TEMP. NO.:855-122
SITE TYPE: C-shape
TOPOGRAPHY: Slight slope to SW. All bulldozer push around decomposing bedrock; hilly.
VEGETATION: *Klawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.30 m (E-W) by 1.00 m (N-S)
DESCRIPTION: Small C-shape one to two courses high, constructed of subangular basalt cobbles and boulders incorporating a natural basalt bedrock. It is located in the *makai* portion-north central portion of the project area c. 100 feet north off Hapuna Beach road. No portable remains were noted.

STATE NO.: 19322 PHRI TEMP. NO.:855-123
SITE TYPE: Modified outcrop
TOPOGRAPHY: Sloping south and steeply down west to road.
VEGETATION: *Klawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 1.80 m (320 degrees) by 1.60 m
DESCRIPTION: Circular bedrock outcrop that is cracked along the SW portion and filled in with subangular basalt cobbles. The center is slightly depressed and naturally paved with decomposing bedrock gravel. It is located in the *makai* parcel, SW central, c. 20 feet east of Hapuna Beach road, c. 100.00+ m north of road to campground. No portable remains were noted.

STATE NO.: 19323 PHRI TEMP. NO.:855-125
SITE TYPE: Alignment

TOPOGRAPHY: Hilly, located on hill sloping west (down) and gently north.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 1.54 m (E/W, 320 degrees) by 0.57 m
DESCRIPTION: Subangular basalt cobbles and boulders aligned linearly (E/W) off natural bedrock. It is only one boulder wide (c. 0.57 m) and one to two courses high. It is built on a slope slanting west. It is located in the central north portion of the *makai* parcel, c. 20.00 m west of Road 10. No portable remains were noted.

STATE NO.: 19324 PHRI TEMP. NO.:855-126
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Sloping to the west, rock with exposed decomposing bedrock.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site complex consists of two walls (Features B and C). The previously identified Feature A is bulldozer track push.

FEATURE B: Wall
ADJACENT TERRAIN: Built on slope westward (down).
VEGETATION: *Kiawe*, grass.
FUNCTION: Military
DIMENSIONS: 1.10 m by 0.30 m by 0.29 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Wall segment N/S, constructed of subangular basalt cobbles one to two courses high with slight curve east toward the center of the wall. Maximum height is c. 0.29 m and maximum width is c. 0.30 m. It is c. 1.10 m long and located c. 5.00 m SE of Feature C, c. 35.00 m east of Road 10. Military bullet casings were noted as portable remains.

FEATURE C: Wall
ADJACENT TERRAIN: On downslope west.
VEGETATION: *Kiawe*, grass.
FUNCTION: Military
DIMENSIONS: 2.00 m by 0.35 m by 0.40 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Linear wall N/S, c. 2.00 m long, constructed of subangular basalt cobbles c. 0.20-0.40 m in diameter. It is c. 0.35 m wide (one course) and c. 0.40 m high (one to two courses). It is located c. 5.00 m NW of Feature B and c. 30.00 east of Road 10. Shrapnel, and 41 caliber bullet casings were noted as portable military remains.

STATE NO.: 19325 PHRI TEMP. NO.:855-127
SITE TYPE: Wall segment

TOPOGRAPHY: Gentle slope to the west, undulating surface with a lot of bulldozed disturbance.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind/military
DIMENSIONS: 1.24 m (NW/SE) by 0.53 m by 0.37 m
DESCRIPTION: Very small wall segment. Bedrock is incorporated into the feature. Subangular basalt cobbles are stacked two courses high and one to two courses wide. The area under and around the feature looks like it has been bulldozed, and cement fragments are throughout the area. The site is located in the north central portion of the *makai* parcel, c. 50.00 m east of Puako road (Road 10). No portable remains were noted.

STATE NO.: 19326 PHRI TEMP. NO.:855-136
SITE TYPE: C-shape
TOPOGRAPHY: Rolling hills.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site consists of a C-shaped structure (Feature B). All other previously identified features are either military or bulldozer push. The overall site dimensions are c. 3.50 m by 3.50 m.

FEATURE B: C-shape
ADJACENT TERRAIN: Rolling hills and weathered outcrops.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: The C-shape is randomly piled about two layers high in spots. The "C" is nearly closed on the west/*makai* side. The *makai* half has been overridden by bulldozer. Some portions of the back wall (east/*mauka*) only consist of bedrock. The feature is located in the south half of the *makai* section west of Route 10. Marine shell (cowrie) was noted as portable remains. Ecofacts were noted as being present on the surface.

STATE NO.: 19327 PHRI TEMP. NO.:855-140
SITE TYPE: Terrace
TOPOGRAPHY: Undulating low hills, ridges, and ravines.
VEGETATION: *Kiawe*, grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Temporary habitation/military/hunting blind
DIMENSIONS: 6.75 m (N/S) by 3.00 m (E/W)

DESCRIPTION: Site construction is problematic. The surrounding area (NE, east, south, and west) has obviously been bulldozed. The waste pile from this activity was pushed upslope, which is consistent with the rest of the project area. The only possible remains of prehistoric occupation (other than the ecofacts) are present at the northern edge of the waste pile. This area appears to be piled to form a low terrace, as opposed to mechanically piled. A large stone within this area has tentatively been identified as an upright. The terrace is located south of the dump, just west of the western boundary on top of a rise. Paper shotgun shells "Peters 12 H.V. made in U.S.A.", "Peters 12 Victor made in U.S.A.", unknown smaller shotgun shells, steel can lids "LW 08 1242", a can lid key (as used today for sardines), branch, other coral, cowrie, and other shell fragments were present. All of these were noted as being portable remains. Small tests reveal no subsurface deposit.

STATE NO.: 19328 PHRI TEMP. NO.:855-144
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Pahoehoe bedrock outcrops.
VEGETATION: *Klawe*, grass.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DESCRIPTION: This site complex consists of two features: a terrace (Feature A), and a modified outcrop (Feature C). Features B, D, E, F are outside of the project area. The overall site dimensions are c. 25.00 m at 264 degrees by 12.00 m.

FEATURE A: Terrace
ADJACENT TERRAIN: Pahoehoe bedrock outcrops on a W-facing slope.
VEGETATION: *Klawe*, grass.
FUNCTION: Agriculture
DIMENSIONS: 16.50 m (10-190 degrees) by 12.00 m by 0.60 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A series of four terraces extending down a west-facing slope. Pahoehoe cobbles and small boulders are stacked one to five courses high. No portable remains were noted.

FEATURE C: Modified outcrop
ADJACENT TERRAIN: Undulating bedrock outcrops on a W-facing slope.
VEGETATION: *Klawe*, grass.
FUNCTION: Agriculture
DIMENSIONS: 6.50 m (07-187 degrees) by 1.60 m by 1.80 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: A natural pahoehoe outcrop with cobbles and small boulders placed along it to make it more level at several places along its surface. Rocks are c. 0.25-0.66 m length/diameter. Most are c. 0.40 m, and stacked one course high. The feature is located at Hapuna, c. a quarter mile from the beach. Marine shell fragments were noted as surface remains. The feature is unexcavated; a trowel poked into soil around the feature is stopped by rock c. 0.05 mbs.

STATE NO.: 19329 PHRI TEMP. NO.:855-149
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Gently undulating hills, shallow ravine, eroded and bulldozed flat lands.
VEGETATION: *Klawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site consists of two C-shapes (Features A and B). The overall site dimensions are c. 6.25 m by 2.50 m.

FEATURE A: C-shape
ADJACENT TERRAIN: Gently undulating hills, shallow ravine, eroded, bulldozed flat lands.
VEGETATION: *Klawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.70 m by 2.30 m by 0.48 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Randomly piled boulders incorporating a bedrock outcrop. The shelter is set at the base of a small ridge on the southwest end. A shallow ravine lies on the northwest. Feature A lies next to Feature B to the NW. No portable remains were noted.

FEATURE B: C-shape
ADJACENT TERRAIN: Gently undulating hills, shallow ravine, eroded, bulldozed flat-lands.
VEGETATION: *Klawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS: 1.75 m by 2.45 m by 0.55 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Randomly piled boulders incorporating a bedrock outcrop. The shelter is set at the base of a small ridge on the southwest end. A shallow ravine lies on the NW. Feature B lies next to Feature A to the SW. No portable remains were noted.

STATE NO.: 19330 PHRI TEMP. NO.:855-154
SITE TYPE: Circular enclosure
TOPOGRAPHY: On small knoll. Hill to NE, sloping down S/SW/SE.
VEGETATION: *Klawe*, grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture/military
DIMENSIONS: 3.30 m (336 degrees) by 4.50 m (246 degrees)
DESCRIPTION: U-shaped enclosure constructed out of subangular basalt cobbles and boulders c. 0.10-0.35 m in diameter. It is one to five courses wide and one to two courses high. The opening is SW, with a few remnant cobbles scattered to make an almost remnant enclosure shape (although it is only one or two rocks that are all separated). There are no portable remains or signs of habitation. The center is mostly clear with a few rubbled or collapsed cobbles scattered inside. The enclosure is located c. 50.00 m west of Road 10, c. 40.00 m east of Site 175, in the central portion of the *makai* parcel.

STATE NO.: 19331 PHRI TEMP. NO.:855-155
SITE TYPE: Mound
TOPOGRAPHY: Hilly, east and west sloping.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 1.20 m by 1.26 m
DESCRIPTION: A small circular mound, rough in shape. It is constructed of subangular basalt cobbles ranging in size from c. 0.11 m to 0.35 m piled one to two courses high. It is located c. 35.00 m west of the gravel road, c. 5.00 m north of the dirt road that connects to gravel roads, c. 20.00 m 208 degrees from Feature 154. No portable remains were noted. A minimal soil deposit is present.

STATE NO.: 19332 PHRI TEMP. NO.:855-158
SITE TYPE: C-shape
TOPOGRAPHY: On the south side of a hill sloping S/SW.
VEGETATION: *Kiawe*, grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Possible military
DIMENSIONS: 2.60 m (307 degrees) by 1.30 m
DESCRIPTION: Loosely piled/stacked weathered basalt cobbles one to three rocks high. Rocks are c. 0.15-0.50 m in size. The feature is C-shaped and runs along the slope of the hill, with the interior facing uphill. No portable remains were noted.

STATE NO.: 19333 PHRI TEMP. NO.:855-160
SITE TYPE: Modified outcrop
TOPOGRAPHY: Rolling hills sloping to the west.
VEGETATION: *Kiawe*, grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 2.30 m by 1.10 m by 0.60 m
DESCRIPTION: Basalt outcrop with a few weathered, basalt rocks piled on top. Rocks are c. 0.20-0.45 m in size. The outcrop is right on the west edge of a small SE-NW running ridge. Located on top of a small ridge, west of Road 10. No portable remains were noted.

STATE NO.: 19334 PHRI TEMP. NO.:855-161
SITE TYPE: Modified outcrop
TOPOGRAPHY: NE sloping hilly terrain.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 4.40 m by 3.00 m
DESCRIPTION: Piled subangular basalt cobbles one to two courses high ranging in size from c. 0.14 m to 0.34 m. Piling is at the SW, NW, and NE corners. The feature is roughly square in shape and is mostly bedrock. Two marine shell fragments are next to the piling at the NE corner. A larger concentration also runs along the eastern portion of the feature. Located c. 75.00 m 220 degrees from Site 160, c. 15.00 m west of the gravel road. A c. 0.05 m soil deposit is on top of the feature.

STATE NO.: 19335 PHRI TEMP. NO.:855-165
SITE TYPE: U-shape
TOPOGRAPHY: Leveled (possibly mechanically) top of small knoll; decomposing bedrock.
VEGETATION: *Kiawe*, grass.
CONDITION: Fair-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 14.50 m (E/W) by 9.00 m
DESCRIPTION: Three low piled walls of c. 0.15-0.60 m basalt cobbles/boulders. The U-shape is oriented 270 degrees. The north wall (running 90/270 degrees) is one course high and two to three courses wide and mostly composed of larger boulders (c. 0.40+ m) and bedrock. The easternmost c. 2.00 m of wall has smaller portable cobbles (c. 0.30 m) crudely stacked one to two courses. The east wall, running 35/215 degrees, is the most intact. It is crudely piled two to four courses high, and four to five wide. Most cobbles used in construction are portable, i.e. c. 0.10-0.30 m. A c. 1.00 wide basalt slab rests on top of cobbles mid-wall. The south wall runs 100/208 degrees. The east half of the wall is mostly low, two to four courses of crudely piled portable cobbles. The west half of the wall is composed of a large boulder alignment with some scattered cobbles between a little piling. East of the east wall is a c. 4.00 m area of cobbles and boulders. It possibly could have been an associated feature or sources of construction material. A few segments appear placed (i.e., two courses high), but have no definable shape. Scattered marine shell was found in the interior of the U-shape as well on the south edge of the associated rubble. There is a c. 0.40 m gap at the SW corner; the gap is bordered by cobbles c. 1.00 m. It does not appear to be a collapsed corner; it is likely an interior opening.

The site is 100 degrees at 180 degrees from Hapuna State Park restrooms (nearest parking lot). Metal pipe, recent debris due to proximity to beach park and parking lot (i.e., 15.00 m) were noted as portable remains. Gravely (due to decomposing bedrock), yellowish brown silty loam was noted. Three trowel probes indicate a c. 0.07-0.10 m deposit in areas of concentrated marine shell, (i.e. SW, NE, and center).

STATE NO.: 19336 PHRI TEMP. NO.:855-168
SITE TYPE: C-shape
TOPOGRAPHY: Large gully with steep, sloping sides, running E-W.
VEGETATION: *Kiawe*, grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 3.40 m (220 degrees) by 2.25 m

DESCRIPTION: C-shape feature is constructed of weathered basalt cobbles c. 0.15-0.45 m in size. The rocks are piled one to three courses high. The feature is built along the natural contour of the gully and opens towards the gully (downslope). The feature is located west of Road 10, on the southern edge of a large E-W gully. No portable remains were noted.

STATE NO.: 19337 PIIRI TEMP. NO.:855-174
SITE TYPE: Complex (8 Features)
TOPOGRAPHY: Along long narrow ridge running E-W. Sloping N and S; hilly area.
VEGETATION: *Klawe*, grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of eight features: enclosure (Features A-C), C-shape (Features D-F, and H), and U-shape (Feature G). The overall site dimensions are c. 47.00 m by 15.00 m.

FEATURE A: Enclosure
ADJACENT TERRAIN: Built along ridge top running E-W.
VEGETATION: *Klawe*, grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 3.75 m (N/S) by 3.90 m (E/W) by 0.28 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Circular enclosure constructed of subangular basalt cobbles intermingled with natural basalt bedrock outcrop. The entire north portion is bedrock. The rest is one course high, with scattered spacing in between rocks. Rubble is around the entire feature, but the center is cleared. The feature was obviously a bulldozed, historic military structure. Three waterworns were on the feature surface. Width of the walls ranges from one to three courses. All rocks are above ground surface. The feature is located in the central portion of the *makai* parcel. The westernmost feature of the site is c. 20.00 m east of Feature Q, Site 213. Military debris is noted as portable remains.

FEATURE B: Enclosure
ADJACENT TERRAIN: Built along ridge top running E-W with gentle sloping S and N.
VEGETATION: *Klawe*, grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 2.80 m by 2.51 m by 0.32 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Circular enclosure constructed of subangular basalt cobbles and natural bedrock. It is one course high and one to three courses wide. Rubble is around the feature, but the center is mostly cleared. The south portion has cobbles stacked over a natural outcrop. Rocks have been busted up and there are random gaps in construction. The inside of the west portion has large holes where rocks have been removed, probably from bulldozing. The feature is located c. 13.00 m east of Feature A, c. 1.00 m west of Feature C, in the central portion of the *makai* parcel. Military debris is noted as portable remains.

FEATURE C: Enclosure
ADJACENT TERRAIN: Built along upslope (E) of long ridge (E to W), with steeper slopes N and S.

VEGETATION: *Klawe*, grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 3.00 m by 2.50 m by 0.48 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Oval; very disturbed and sketchy. It is constructed of subangular basalt cobbles and natural bedrock outcrop. Bedrock makes up most of north and east portion, with a few cobbles piled around and over it. The SW portion is very scattered, with not much of a perimeter distinguishable. The feature is one to two courses high and one to three wide (mostly from collapsing). It is located c. 1.00 m east of Feature C, c. 2.00 m west of Feature D, in the central portion of the *makai* parcel. Military debitage is noted as portable remains.

FEATURE D: C-shape
ADJACENT TERRAIN: Built along ridge top E to W with slopes N and S.
VEGETATION: *Klawe*, grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 2.70 m by 2.00 m by 0.60 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Subangular basalt cobbles and boulders c. 0.15-0.35 m in diameter, piled one to two courses high, and one to two wide. They are mostly piled on top of a natural bedrock outcrop. The south and east portions are mostly bedrock, with an opening out toward the west. The center is cleared, with crushed gravel. Rubble scatter is around the entire feature. The feature is located c. 2.00 m east of Feature C and touching the west portion of Feature E in the central portion of the *makai* parcel. Military debitage is noted as portable remains.

FEATURE E: C-shape
ADJACENT TERRAIN: Heavy concentration of subangular basalt cobbles in all directions.
VEGETATION: *Klawe*, grass.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Feature E is composed of subangular, small (c. 0.10 m) to medium (c. 0.20 m) rocks piled one to three courses high upon an existing bedrock outcrop. The center section is the highest; the sides being only one to two courses high. There is a great deal of decomposed basalt cobbles and pebbles in all directions and probable machine impact on the entire site. There is slumpage and rubble piles to the north and to the south. The feature is located in the central *mauka* portion. Feature E is c. 5.80 m from Feature D at 276 degrees. Feature E as well as Features A through D, and Features F and H are all atop a ridge of fairly flat basalt outcropping, running east to west and sloping to north and south. No trees are upon it. No portable remains were noted.

FEATURE F: C-shape
ADJACENT TERRAIN:
VEGETATION: Grass.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Poor-fair
INTEGRITY: Altered

DESCRIPTION: Loosely arranged (not piled or stacked) subangular basalt cobbles c. 7.25 m in diameter, possibly arranged in a C-shape. The feature appears to be more of a slight circular clearing causing a C-shape effect. The feature is located in the central *makai* portion. Feature F is c. 5.80 m from Feature E at 276 degrees. Feature F is c. 11.80 m from Feature H at 96 degrees. Feature F is located on a ridge of basalt outcropping that runs east to west and slopes on the north and south side. The ridge is quite level, and there are no trees on it. A small quantity of marine shell midden is noted as portable remains; c. 0.05+ m of silt and subangular pebbles are subsurface.

FEATURE G: U-shape
ADJACENT TERRAIN:
VEGETATION: *Kiawe*, grass.
FUNCTION: Indeterminate
DIMENSIONS:
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Loosely piled subangular small to large cobbles one to two courses high placed on the ground surface. The feature is shaped like a backward question mark. The body of the feature runs north to south c. 4.00 m, with an additional E/W curvature of c. 1.50 m, then to the west running N/W to S/E another c. 1.50 m. This creates a U-shape with a rather straight extension at the northern end. Located in the central *makai* portion. Feature G is south of the ridge at its base and on an almost level surface c. 2.00 m from probable cleared access. Metal fragments were noted as portable remains. Small metal fragments not identifiable on the surface.

FEATURE H: C-shape
ADJACENT TERRAIN: Heavy concentration of rubble that is subangular basalt cobbles displaced by decomposition and possible machine disturbance.
VEGETATION: *Kiawe*, grass.
FUNCTION: Temporary habitation/military
DIMENSIONS:
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Subangular basalt cobbles c. 0.10-0.25 m in diameter, piled, not stacked upon a natural basalt outcrop. The highest portion of this feature is at its southeastern side; this is a single cobble stone c. 0.30 m in diameter. Located in the central *makai* portion, Feature H is atop a ridge of basalt outcrop that runs east to west. The ridge is slanting on the north and south sides. There are no trees upon it. Metal spring mechanisms (probable military association), a plastic ruler (burnt, and fragmented), and a slight quantity of marine midden are all noted as portable remains. About 0.05+ m (trowel test) of subsurface silt ended on bedrock.

STATE NO.: 19338 **PHRI TEMP. NO.:**855-175
SITE TYPE: Complex (24 Features)
TOPOGRAPHY: Site is on top of a knoll with slight sloping on all sides.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple

DESCRIPTION: This site complex consists of a remnant enclosure with a modified outcrop (Feature A1), eighteen mounds (Features A2-A19), two modified outcrops (Features B and F), one C-shape (Feature D), one L-shape (Feature C), and one circular alignment (Feature E). The overall site dimensions are c. 44.00 m by 28.00 m.

FEATURE A1: Enclosure w/modified outcrop
ADJACENT TERRAIN: Sloping downward to the south and west. Hills and valleys.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 1.90 m (32 degrees) by 1.85 m by 0.40 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: The modified outcrop consists of protruding bedrock (c. 0.40 m above ground surface) with small, angular pahoehoe stones placed on and around the bedrock. These stones range in size from c. 0.10-0.30 m in diameter. The feature is one course high. The remnant is a rectangular enclosed alignment consisting of small angular, pahoehoe stones which are one course high. These stones range in size from 0.05-0.14 m in diameter. A stone is placed upright at the southwest corner. This sits c. 0.20 m tall.

FEATURE A2-A19: Mounds (18)
ADJACENT TERRAIN: Site is on top of knoll and area is sloping downward.
VEGETATION: *Kiawe* and grass.
FUNCTION: Military clearing piles
DIMENSIONS: 28.00 m by 24.00 m by 0.34 m
CONDITION: Good-Excellent
INTEGRITY: Unaltered
DESCRIPTION: Fourteen mounds that form a C-shape with the opening facing east. Mounds #2, #3, #18, and #19 are to the west of the "C-shape". The mounds are piled subangular basalt cobbles two to three courses high ranging in size from c. 0.09-0.34 m. In #12 and part of #11 the centers are not completely filled in. There is a concentration of marine shell near #13 and #14. The center is flat and contains only a few large (c. 0.15 m) cobbles. Mounds could possibly be clearing piles, especially #2, #3, #18, and #19. Mounds #4 and #17 appear to be deliberately placed in a C-shape. They are not just random piles. A jeep road is c. 13.00 m due east. An ecofact (marine shell) scatter is near mounds #13 and #14. Trowel tested - no cultural deposit.

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Terrain is sloping down to the south and west. Hills and valleys.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 4.00 m (360 degrees) by 2.60 m by 0.38 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Bedrock protruding from the ground surface anywhere from c. 0.38-0.46 m above. Small angular pahoehoe stones are placed around and on top of the bedrock. These stones range in size from c. 0.09-0.30 m in diameter. Ecofact scatter is found all around the feature. This feature is one to three courses high. Site 176 (Feature D) is c. 80.40 m at 241 degrees (TN). Site 209 (Feature A) is c. 80.10 m at 262 degrees (TN). The ocean is c. 200.00 m due west. Feature C of this site is c. 2.80 m at 88 degrees (TN). Telephone poles parallel to the secondary road are due east at c. 110.00 m.

FEATURE C: L-shape
ADJACENT TERRAIN: Terrain is sloping down to the south and west. Hills and valleys.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.50 m (270 degrees) by 3.00 m by 0.45 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Small to medium sized angular, pahoehoe stones arranged in an L-shape one to three courses high. The stones range from c. 0.05-0.25 m in diameter. These stones are not faced or stacked, but there is a definite order to how the stones are placed. Site 176 (Feature D) is c. 83.20 m at 235 degrees (TN). Site 209 (Feature A) is c. 82.90 m at 262 degrees (TN). The ocean is c. 200.00 m due west. Feature B of this site is c. 2.80 m at 268 degrees (TN). Telephone poles parallel to the secondary road are due east at c. 110.00 m.

FEATURE D: C-shape
ADJACENT TERRAIN: Undulating hills.
VEGETATION: *Kiawe* and grass.
FUNCTION: Possible agriculture
DIMENSIONS: 1.20 m (340 degrees TN) by 0.80 m by 0.22 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A small C-shape constructed of subangular basalt rocks, one to two courses high; average size is c. 0.10-0.15 m. The opening is to the west. Feature E is c. 1.50 m at 74 degrees and Feature A is c. 5.00 m at 10 degrees (TN). No portable remains or cultural deposits were observed on the surface of this feature.

FEATURE E: Circular alignment
ADJACENT TERRAIN: Undulating coastal hills.
VEGETATION: *Kiawe* and grass.
FUNCTION: Possible agriculture
DIMENSIONS: 0.75 m by 0.50 m by 0.15 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Small basalt (c. 0.15 m) rock shaped in a circular alignment on the surface soil. There is broken cowrie shell scatter (probably all fragments from same shell) southeast of the feature. The feature is oriented east at 74 degrees. This feature is located in the central inland project area c. 1/4 mile west of Highway #10 (Puako and Hapuna old road), and c. 1.50 m northeast of Feature D at 254 degrees.

FEATURE F: Modified outcrop
ADJACENT TERRAIN: Feature is on top of a knoll with slight sloping on all sides.
VEGETATION: *Kiawe* and grass.
FUNCTION: Indeterminate
DIMENSIONS: 1.30 m (83 degrees-273 degrees) by 0.60 m by 0.34 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Piled subangular basalt cobbles one to two courses high ranging in size from c. 0.10-0.33 m. Piling occurs on top of bedrock. Bedrock outcropping occurs to the east. This feature is located c. 30.00 m at 212 degrees from Feature A1 (mound) and c. 5.00 m west of a small dirt road that connects to a larger one.

STATE NO.: 19339 PHRI TEMP. NO.:855-176
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Steep sloping in all directions. Hills of pahoehoe bedrock on a west facing slope.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of two modified outcrops (Features B and D) and one enclosure (Feature E). The overall site dimensions are c. 50.00 m by 30.00 m (45 degrees).

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Steep sloping in all directions.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 6.75 m (76 degrees) by 6.00 m (296 degrees) by 0.70 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Ridge top has bedrock outcrops running east-west. Subangular basalt cobbles have been piled on and in between the outcrops, almost connecting them perpendicularly. At the northwest corner of one bedrock outcrop is an off shoot alignment one to two courses high and two to three courses wide. It angles northeast and slightly downhill, almost terrace-like. Except for the alignment, most of the feature looks like a cleared area for the survey spot. The rock jumble also has dirt and historic material all mixed up with it. The survey area is cleared flat. The rocks in that area are historic junk with one piece of coral. This feature is located on top of a steep ridge directly across the gravel road (north) c. 0.30 m from Feature E, c. 50.00 m east of Feature D, and in the central portion of the *mokal* parcel. A few marine shells, metal debris, one piece of coral, and other historic junk were on the surface of this feature.

FEATURE D: Modified outcrop
ADJACENT TERRAIN: Hills of pahoehoe bedrock on a west-facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Indeterminate
DIMENSIONS: 4.50 m by 4.00 m by 0.50 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Pahoehoe cobbles and small boulders placed one course high in a roughly square shape. A line of boulders is immediately east of the feature in a recent bulldozer push. Rocks forming the feature are c. 0.12-0.50 m length/diameter. The feature has been flattened and strewn about. The long axis runs at 280 degrees to 100 degrees. This feature is located in the west central portion of the project area, c. 1/8 mile from the coast. One piece of round coral, a modern beer bottle, and rusty metal cans were observed on the surface of this feature. A trowel was driven into soil and stopped by rock c. 0.10 mbs.

FEATURE E: Enclosure
ADJACENT TERRAIN: Bulldozer push from road, gently sloping south.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 4.80 m by 4.00 m

CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: A roughly circular, amorphously shaped mound-like feature. It is constructed out of subangular basalt cobbles and boulders mixed in with red brown silty soil. The east and south portions are one to three courses high and four to six courses wide. It is built up along a natural mound, incorporating bedrock. The east portion is only one course high and wide. The center is filled with rubble and soil also. There is no discernible clearing in the center as well as no clear feature boundaries in terms of clear feature dimensions and remanent shape. There is much rubble around the feature. The north portion has been impacted by bulldozer push. An old metal tag is on the feature from project 89-651 (Site T-5). This feature is located c. 4.00 m south of the gravel road off Road #10 (toward Beach 69), and in the central portion of the *makai* parcel. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19340 PHRI TEMP. NO.:855-178
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Undulating hills.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of a rectangular alignment (Feature A), two C-shapes (Features B and D), and two terraces (Features C and E). The overall site dimensions are c. 23.00 m (10 degrees) by 15.00 m.

FEATURE A: Rectangular alignment
ADJACENT TERRAIN: Undulating hills.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m by 6.00 m by 0.30 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A square shaped rock alignment. The south corners are squared off, and the northern corners are more rounded. There is no stacking. Most of the alignment is one rock thick (c. 0.15-0.25 m). This feature is located c. 3.00 m north of the bulldozer road and Feature B is c. 12.00 m at 10 degrees. Marine shells were observed on the surface of this feature. More than c. 0.10 m of fine silt and gravel were also noted.

FEATURE B: C-shape
ADJACENT TERRAIN: Undulating hills.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 6.00 m (348 degrees) by 2.50 m by 0.30 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: C-shape with short alignment at center which divides the feature into two halves. It is constructed of subangular basalt rocks which average c. 0.30-0.40 m in size. The feature has little height, and there little in the way of stacking. The opening of the C-shape is to the west. Feature C is c. 4.00 m at 360 degrees. No portable remains were noted on the surface of this feature. A trowel test indicated a thin layer of silt and gravel.

FEATURE C: Terrace
ADJACENT TERRAIN: SW facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 5.50 m by 5.50 m by 0.86 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles and small boulders stacked one to three courses high and piled to form a series of terraces extending down a southwest facing slope. Rocks are c. 0.15-0.40 m length/diameter. The feature was originally called a C-shape. This feature is located in the west central portion of the project area. One small coral fragment (c. 2.50 m by 0.03) was observed on the surface of this feature area. A trowel poked into soil inside the terrace was stopped by rock at c. 0.10 mbs.

FEATURE D: C-shape
ADJACENT TERRAIN: Hills of pahoehoe bedrock outcrops on a west-facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.65 m by 2.75 m by 0.35 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles piled/stacked one to three courses high. The long axis runs at 30 degrees-210 degrees. Rocks are c. 0.15-0.40 m long. Feature D is located in the west central portion of the project area, c. 1/8 mile east of the coast. No portable remains or cultural deposits were observed on the surface of this feature. A trowel was poked into the ground inside the feature and stopped by rock at c. 0.10 mbs.

FEATURE E: Terrace
ADJACENT TERRAIN: Pahoehoe outcrops on a west facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 7.00 m by 4.50 m by 1.28 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles and small boulders piled/stacked one to three courses high. The long axis runs at 75 degrees-255 degrees. The longest rocks are c. 0.50 m in length/diameter; most are c. 0.30 m. Two to four terraces are formed; it is difficult to determine because of the feature's poor condition. This feature may be associated with Feature B. Feature E is located on the west central portion of the project area, c. 1/8 mile east of the slope. No portable remains or cultural deposits were observed on the surface of this feature. A trowel was poked into soil and stopped by rock at c. 0.10 mbs.

STATE NO.: 19341 PHRI TEMP. NO.:855-179
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Hilly with many valleys and ridges.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Multiple

DESCRIPTION: This site complex consists of one enclosure (Feature A), one U-shape (Feature B), one mound (Feature C), and one remnant terrace (Feature E).

FEATURE A: Enclosure
ADJACENT TERRAIN: On south part of hill sloping down southward and gently up north.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 6.50 m by 4.50 m by 0.30 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Oval shaped enclosure constructed with long axis east-west. It is built of subangular basalt cobbles and boulders, sloppily and loosely piled one to two courses high and one to three courses wide. The north-northeast portion is used; the collapsing center is mostly cleared, with a few rubbles and cobbles. Construction style on top of ground surface and historic looking, hence photo and form only remapped. Feature A is located c. 19.00 m of Feature B, c. 12.00 m uphill, north of the dirt road off Road #10, in the central portion of the *makai* parcel.

FEATURE B: U-shape
ADJACENT TERRAIN: Flat area sloping slightly west.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 7.50 m by 7.50 m by 1.00 m
CONDITION: Fair-good
INTEGRITY: Altered
DESCRIPTION: Large U-shape feature constructed out of subangular basalt cobbles and boulders. The opening is west. The north and south walls are both very collapsed, two to six rocks wide, and one to three courses high, and very rubbled out. The highest wall (east) is piled three to six courses high. Very military style construction, on fire-affected rocks (maybe they came later). The center is cleared, and marine shell is present. Most rocks have bulldozer scars on them also. Not much prehistoric structure is left except maybe one shell if anything. This feature is located c. 19.00 m north of Feature A, c. 13.00 m east of Feature E, and in the central portion of the *mauka* parcel. A medium amount of marine shell is around the feature area. A small amount of cultural deposit is present.

FEATURE C: Mound
ADJACENT TERRAIN: Low undulating coastal hills.
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 1.00 m by 1.00 m by 0.12 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: One course of stacked basalt rock scattered except for semi-circular alignment on south and west sides. Stacking is on the surface, with some outcrop as foundation. The feature was photographed but not mapped due to apparent construction association with historic military activity in this area. The feature is oriented at 130 degrees. This feature is in the central inland project area c. 1.4 mile west of highway #10 (old Puako-Hapuna road) and c. 0.20 m south of Feature B at 190 degrees.

FEATURE E: Terrace
ADJACENT TERRAIN: Fairly flat with hills around it, gently sloping SW.
VEGETATION: *Klawe* and grass.

FUNCTION: Agriculture
DIMENSIONS: 4.00 m (250 degrees) by 4.00 m (160 degrees) by 0.15 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Very remnant terracing. The far alignments are in a square shape. They are one course high and two wide. There is much scattered rubble in and around the feature, but alignments are discernible. A few pieces of marine shell are around the feature area. This feature is c. 12.00 m west of Feature B and in the central portion of the *makai* parcel.

STATE NO.: 19342 PHRI TEMP. NO.:855-185
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Gently undulating hills. Sites are on top of a hill surrounded by a steep ravine.
VEGETATION: *Klawe* and grass.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site complex consists of one wall (Feature A) and one C-shape (Feature G). The overall site dimensions are c. 120.00 m by 50.00 m.

FEATURE A: Wall
ADJACENT TERRAIN: Gently undulating hills. Feature overlooks a steep ravine.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 9.30 m by 1.00 m by 1.22 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Randomly piled cobbles and boulders incorporating a bedrock outcrop at the top of a ravine. The feature curves slightly back from the ravine to the southeast forming a low, one to two course high wall of piled cobbles and boulders. Bedrock outcrops appear on all sides of this feature. There is a small shell scatter mostly on the west and south of the feature.

About 1.00 m west of the terrace are two large uprights next to a bedrock outcrop. A *klawe* tree is directly behind the upright. Another large boulder lies just to the southeast of the uprights and may have been part of it. The shape of this resembles an open ended square. From Feature A datum at c. 16.20 m west at 292 degrees a drilled piece of coral was found (ID #9) artifact was picked up. This feature is located in the southwest corner west of Road #10 c. 125 m. This feature is unexcavated.

FEATURE G: C-shape
ADJACENT TERRAIN: Gently undulating hills surrounded by a steep ravine.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.00 m by 1.80 m by 0.26 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Randomly piled cobbles and boulders incorporating a bedrock outcrop on the west end. There is a shell (cowrie) scatter on the south side. The feature is badly disturbed with rock scattered c. 5.00-8.00 m on the northwest and south. The feature lies on a relatively

flat spot on top of a hill. Bulldozer cuts surround it and it may have been disturbed in that manner. This feature is c. 7.50 m northwest at 180 degrees true north from Site 855-186. It is also located in the southwest corner of the project area and west of Road #10 at c. 125.00 m. This feature is unexcavated.

STATE NO.: 19343 PHRI TEMP. NO.:855-193
SITE TYPE: Wall
TOPOGRAPHY: Undulating lower coastal hills.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Fence line
DIMENSIONS: 45.00 m by 0.30 m
DESCRIPTION: Small subangular stacked basalt rock wall one to two courses high with intermittently spaced (c. 5.00 m apart) fence posts. Fence staples, fence post (weathered) and fence were found in association with the feature. The feature is oriented at 320 degrees. About 1.00 m breaks in the wall occur irregularly. Only historic cultural remains are associated with the feature. Surrounding soil is gravel and silt c. 0.05-0.07 m. Feature A that was associated with this wall was examined and redetermined to be a military field enclosure (also recent historic). This site is located c. 20.00 m west of the old Puako-Hapuna road in the southwest portion of the project area, in a downhill slope between two gullies c. 100.00 m from the north of the new Puako Beach road.

STATE NO.: 19344 Other: YG-44 PHRI TEMP. NO.:855-209
SITE TYPE: Enclosure w/adjoining C-shape
TOPOGRAPHY: Undulating.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation/military
DIMENSIONS: 4.00 m by 3.25 m
DESCRIPTION: Subangular small boulders placed on existing basalt bedrock outcrop c. 0.10-0.20 m. Subangular cobbles are used as fill. The evidence of military use is shell casings and machinery-scarred rocks. This feature is mainly a modified outcrop. The outcrop is atop a ridge at its highest elevation and runs east-west. It has a natural opening of c. 0.70 m in length and c. 0.30 m in width. Several large subangular boulders (c. 0.55 m diameter) were placed three courses high on the north side. Large subangular basalt rocks were placed on the west end and cobbles were placed in between as filling, creating an oval enclosure with a cupboard space.

The southeastern end of this oval-shaped opening curves and continues c. 2.00 m to the south and then curves c. 3.00 m to the west, creating a C-shape. This continuation is composed of subangular cobbles and small boulders being piled one to two courses. There is no facing. There is a substantial rubble of small boulders to the north and east, suggesting there was more construction than now exists. There are scarred rocks (possible machinery impact). Overall view suggests an enclosure and adjoining C-shape.

This site is located in the central *makai* portion of the project area. Cowrie shell fragments, several waterworn small cobbles and two bullet shell casings were observed on the surface of

this feature area. Also there was a moderate midden concentration within the C-shape area. A trowel test within the oval-shaped area revealed c. 0.10 m of loamy silt and subangular basalt pebbles and a trowel test within the C-shape area (south end) revealed loamy silt and subangular basalt pebbles.

STATE NO.: 19345 PHRI TEMP. NO.:855-212
SITE TYPE: Complex (14 Features)
TOPOGRAPHY: Hills of pahoehoe bedrock on a W-facing slope.
VEGETATION: Dry knee-high brown grass and *kiawe* shrubs.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of two circular walls (Features B, D), two enclosures (Features C, E), three terraces (Features F, M, N), one modified outcrop (Feature G), three mounds (Features H, J, K), one alignment (Feature L), one C-shape (Feature O), and one remnant terrace (Feature P). The overall site dimensions are c. 52.0 by 37.0 m with the long axis 80 to 260 degrees.

FEATURE B: Circular wall
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and knee high brown grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.60 m by 2.90 m by 0.36 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles piled in a C-shape. The wall opens to S, toward Feature D c. 1.00 m away. The long axis runs 250 to 70 degrees. Cobbles are 0.12 to 0.30 m length/diameter. The feature is located in the W central part of the project area, c. 1/8 mile from the coast. No portable remains were detected. The deposit was unexcavated. A trowel poked into the soil inside the feature is stopped by rock less than 0.10 mbs.

FEATURE C: Enclosure
ADJACENT TERRAIN: Terrain is sloping down to the north and west. Hills and valleys.
VEGETATION: Grass and sparse *kiawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 3.60 m (46 degrees) by 3.20 m by 0.44 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Medium-sized angular pahoehoe stones are placed in a circle to form an enclosure. The stones range in size from c. 0.10 to 0.62 m in diameter. The stones are not faced, aligned, or stacked. They just appear to be piled and placed. There are four stones placed in a pile in the center of the enclosure c. 0.50 by 0.40 m. The enclosure itself is one to two courses high. Also, one upright stone is found in the NW corner, standing c. 0.39 m high and c. 0.25 m wide. Feature E is c. 3.40 m at 238 degrees (TN). Feature D is c. 2.70 m at 300 degrees (TN). Feature K is c. 17.00 m at 90 degrees (TN). A fire occurred three weeks ago and burned an area c. 20.00 m at 312 degrees. The ocean is c. 200.00 m due west. After a trowel test, no cultural material was found. No portable remains were observed.

FEATURE D: Circular wall
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: Knee high dry grass and *klawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 3.20 m by 2.50 m by 0.44 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Rough pahoehoe cobbles and small boulders piled and stacked one to two courses high. Rocks are c. 0.12 to 0.50 m length/diameter. The long axis is oriented 20 to 200 degrees. The feature is located in the central part of the project area, 1/8 mile from shore. One marine shell fragment was noted. The deposit was unexcavated. A trowel was poked into soil and stopped by rock less than 0.10 mbs.

FEATURE E: Enclosure
ADJACENT TERRAIN: Terrain is sloping down to the north and west. Hills and valleys.
VEGETATION: Small grass and sparse *klawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 3.80 m (298 degrees) by 3.60 m by 0.56 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Small to medium sized angular, pahoehoe stones arranged in an oval to form an enclosure. One stone is (L by W by H) c. 0.76 by 0.31 by 0.56 m and the other stones range from c. 0.10 to 0.30 m in diameter. Outside of the northern wall is a 0.09 by 0.06 by 0.03 m waterworn coral fragment. This was not collected. This feature is on the north side of a large knoll. The enclosure itself is two to three courses high. The stones are not stacked, aligned, or faced and appear to have been piled and placed. Feature C is c. 40.00 m at 58 degrees (TN). Feature D is c. 2.00 m at 340 degrees (TN). Feature K is c. 20.00 m at 104 degrees (TN). A fire occurred three weeks ago and burned an area c. 50.00 m at 324 degrees. The ocean is c. 200.00 m due west. A waterworn coral fragment is noted in surface remains. Trowel tested - no cultural material found.

FEATURE F: Terrace
ADJACENT TERRAIN: North sloping terrain down into a small hilly valley.
VEGETATION: Small sage-like brown grasses.
FUNCTION: Agriculture
DIMENSIONS: 4.00 m by 2.20 m by 0.37 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Piled subangular basalt cobbles one course high ranging in size from c. 0.07 to 0.30 m. The center is fairly flat and contains small (less than 0.05 m) rocks with few larger than 0.15 m. It is oval in shape, with the south wall flatter than the north. The south wall is mostly bedrock outcropping with a few cobbles against it. This feature's north wall is shared by Feature M. This feature is oriented at 101 degrees. There appears to be a few (cm) of soil and decomposing bedrock with no surface remains noted.

FEATURE G: Modified outcrop
ADJACENT TERRAIN: Sloping south and west.
VEGETATION: *Klawe* and desert grass.
FUNCTION: Possible agriculture
DIMENSIONS: 4.70 m by 1.00 m by 0.60 m

CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: (2) modified outcrops constructed of subangular basalt cobbles and boulders from c. 0.10 to 0.35 m in diameter. They are piled two to three courses high on a bedrock outcrop in linear alignments (2), forming wall-like features. They are fairly collapsed, with rubble all around them. Stacking is on a bedrock surface. The feature is located on the west end of the ridge on the south side, c. 6.00 m of Feature G in the central portion of the *makai* parcel. Historic remains consist of glass, one piece of marine shell, and grenade fragments.

FEATURE H: Mound
ADJACENT TERRAIN: Located at E end of ridge sloping S, N, E.
VEGETATION: Desert-like grass and *klawe*.
FUNCTION: Possible military
DIMENSIONS: 1.20 m by 1.80 m by 0.46 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Amorphous shape, very loosely and sloppily piled subangular basalt cobbles and boulders (ranging from c. 0.10 to 0.35 m in diameter), one to two curses high in the center. The mound is built against bedrock on the side of a small hill. Rocks are scarred and there is rubble around the feature. Bullet casings, historic debris (glass, metal stove), and a few marine shells were noted in the surface remains. No surface deposit was noted.

FEATURE J: Mound
ADJACENT TERRAIN: On N slope of E to W ridge.
VEGETATION: Desert grass.
FUNCTION: Indeterminate
DIMENSIONS: 0.60 m by 0.80 m by 0.38 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Small mound of subangular basalt cobbles (c. 0.20 to 0.30 m in diameter), one to three courses high (all surface rocks). It is loosely piled with no apparent shape built on the side of a hill. It is located c. 6.00 m N/NW of Feature H, c. 8.00 m N/NE of Feature K in the central portion of the *makai* parcel. No surface remains or surface deposit was noted.

FEATURE K: Mound
ADJACENT TERRAIN: On top of ridge running E to W, sloping N to S.
VEGETATION: Desert grass.
FUNCTION: Indeterminate
DIMENSIONS: 1.50 m by 1.40 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Amorphous shape; built of subangular basalt cobbles and boulders (c. 0.10 to 0.30 m in diameter) loosely piled on the ground surface. It is mostly one course, with some two coursed in the center. There is much scattered rubble around feature as well as bulldozer tracks and gravel on the ground surface. A few rocks are split also. There is a possible alignment from the center of the feature out to the east, one course by one course ending by bedrock. The mound is located c. 10.00 m W of Feature H, c. 6.00 m E of Feature G in the central portion of the *makai* parcel. No surface remains or surface deposits were noted.

FEATURE L: Alignment
ADJACENT TERRAIN: Lots of calcified rock partially water affected from stream bed (?)

VEGETATION: Desert grass and *kiawe*.
FUNCTION: Military
DIMENSIONS: 10.70 m by 0.75 m by 0.41 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Linear wall alignment constructed of subangular basalt cobbles and boulders (c. 0.05 to 0.50 m in diameter). Many large boulders are placed in spaces where bedrock is not. Much bedrock was used in construction. There is scattered rubble on either side. The feature is one to two courses high as well as one to two courses wide. It is constructed on a berm of pushed up dirt and rubble concentration. The bedrock that the feature is constructed on is naturally waterworn (but the feature over it is not; it was built later). The feature is located in the saddle between two ridges, c. 3.00 m E of Feature N, 8.00 m NW of Feature P in the central portion of the *makai* parcel. Metal fragments and military debris and one waterworn cobble were noted in surface remains, with no surface deposit noted.

FEATURE M: Terrace
ADJACENT TERRAIN: North-sloping terrain down into a small hilly valley.
VEGETATION: Small, sage-like brown grasses and sparse *kiawe*.
FUNCTION: Agriculture
DIMENSIONS: 4.30 m by 2.30 m by 0.30 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Piled subangular basalt cobbles one course high ranging in size from c. 0.08 to 0.31 m. The center is fairly flat and contains small (less than 0.05 m) rocks. It is virtually void of any sizable rocks. It is circular in shape with the south wall flatter than the north. The south wall is shared by Feature F. This feature is located c. 4.40 m west of Feature N (terrace). Feature F's terrace is just south and upslope. No surface remains were noted but there appears to be a few centimeters of soil and decomposing bedrock.

FEATURE N: Terrace
ADJACENT TERRAIN: North-sloping terrain down into a small hilly valley.
VEGETATION: Brown short sage-like grasses.
FUNCTION: Agriculture
DIMENSIONS: 4.50 m by 4.40 m by 0.38 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Piled subangular basalt cobbles one course high ranging in size from c. 0.07 to 0.35 m. The feature is circular in shape, with the center relatively flat and void of large rocks. It does contain a high number of small (less than 0.05 m) rocks. The south wall is mostly bedrock outcropping with a few cobbles against it. The N, W portion is also mostly bedrock with some cobbles also pushed up against it. The feature is located c. 6.70 m west of Feature L's alignment. No surface remains were noted but there appears to be a few centimeters of soil and decomposing bedrock.

FEATURE O: C-shape
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: No vegetation.
FUNCTION: Agriculture
DIMENSIONS: 3.30 m by 2.70 m by 0.53 m
CONDITION: Fair
INTEGRITY: Unaltered

DESCRIPTION: Subangular pahoehoe cobbles and small boulders piled one to two courses high to form a C-shape. A natural outcrop forms part of the structure. The long axis is at 100 to 280 degrees. The feature is located in the west central part of the project area, one-eighth mile east of the shore. Surface remains consist of one broken waterworn cobble measuring c. 0.10 by 0.12 by 0.04 m, and several rough coral fragments, the largest measuring c. 0.11 by 0.09 by 0.05 m.

FEATURE P: Terrace
ADJACENT TERRAIN: Built on NW slope.
VEGETATION: *Kiawe* and desert grass.
FUNCTION: Possible agriculture/military
DIMENSIONS: 14.00 m by 2.50 m by 0.56 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Remnant terracing constructed of subangular basalt cobbles and boulders built against and with natural bedrock outcropping. It is stacked and piled on a slope up to a bedrock lip with the upper surface flat ground. There is scatter throughout all terraces. They range from one to five courses, all along the same bedrock outcrop. Many rocks have fallen down to the bedrock lip as well as off it to the bottom of the hill. Historic and military debris is all around the feature. It is located on the NW slope of ridge c. 5.00 m west of Feature J in the central portion of the *makai* parcel. Surface remains consist of military debitage - grenade fragments, glass and metal fragments. No subsurface cultural deposits were noted.

STATE NO.: 19346 PHRI TEMP. NO.:855-213
SITE TYPE: Complex (12 Features)
TOPOGRAPHY: Hilly; on top of long E-W narrow ridge, partially burned.
VEGETATION: Burned *kiawe* and desert grass (unburned).
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of a remnant U-shape (Feature A), five C-shapes (Features B, D, E, O, Q), one cairn (Feature C), one enclosure (Feature G), one remnant C-shape (Feature L), one mound (Feature M), one remnant enclosure (Feature N), and a wall (Feature P).

FEATURE A: U-shape
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Randomly piled boulders and cobbles one to two courses high. The NE side is built on a fourteen degree slope which gradually levels off in the interior towards the SE. The east part of the feature may have been the entryway. The west side is also open. The alteration of this feature is probably due to military exercises since there are hand grenade fragments in and around it. There are a few pieces of marine shell scattered within and without the feature. Bedrock is incorporated into the NE side construction. A small (c. 0.50 by 0.50 m) cupboard is located in the SW of the feature. Feature U is c. 20.00 m S at 177 degrees of TN from Feature

B. It is located on the extreme west central part of the project area at *makai*. No subsurface cultural deposit noted.

FEATURE B: C-shape
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and knee-high grass.
FUNCTION: Military
DIMENSIONS: 5.20 m by 3.50 m by 0.45 m
CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles are stacked one to three courses high. The feature lies partly on a bedrock outcrop. Rocks are c. 0.15 to 0.45 m length/diameter. The long axis is 280 to 100 degrees. It is located in the central part of the project area, one-fourth mile east of Wailea Bay. Queen Kaahumanu highway is a half mile SE. Subsurface deposit was unexcavated. A trowel driven into the ground at numerous points was stopped by rock at less than 0.10 m. No surface remains were noted.

FEATURE C: Cairn
ADJACENT TERRAIN: Slanting down to the north and slanting up to the south.
VEGETATION: No vegetation.
FUNCTION: Military
DIMENSIONS: 1.40 m by 1.20 m by 0.87 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Feature C is located on the downslope of a ridge immediately below a white sand concentration associated with military and/or firefighting activities. There are many subangular basalt cobbles that are rubbled, either from natural bedrock erosion or military activities. There is evidence of burnt grass and fire-affected rocks. Rusted metal packaging strips are below the cairn. It is built using an existing bedrock outcrop as part of the cairn (south end). The cairn is constructed of subangular basalt cobbles well stacked six to eight courses high. The cairn is more oval than circular at its base. The cobbles are c. 0.10 to 0.30 m in diameter. The cairn is located in the central *makai* portion of the project area. It is at c. 15.60 m from Feature L at 47 degrees, c. 11.80 m from Feature G at 286 degrees, and c. 12.40 m from Feature E at 236 degrees. All are datum to datum. Subsurface trowel test c. 3.4 m of sand and c. 3.40 m of silt below burned surface at c. 0.08 m. No surface remains or cultural evidence was noted.

FEATURE D: C-shape
ADJACENT TERRAIN:
VEGETATION: Burned and unburned desert-like grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 3.50 m by 2.75 m by 0.30 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Remnant C-shape constructed of subangular basalt cobbles (c. 0.10 to 0.40 m in diameter). It incorporates natural bedrock, one to two courses high as well as wide, with many gaps in construction. Rubble is in the center and around the feature. It is located c. 3.0 m south of Feature E, c. 18.00 m east of Feature M in the central portion of the *makai* parcel on top of a narrow ridge. Surface remains consist of one waterworn basalt cobble, shrapnel, one piece of marine shell. No surface deposit was noted.

FEATURE E: C-shape
ADJACENT TERRAIN:
VEGETATION: Burnt and unburned desert-like grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 5.25 m by 3.25 m by 0.47 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Very roughly constructed C-shape of subangular basalt cobbles and boulders ranging from c. 0.10 to 0.40 m in diameter. Natural bedrock incorporated into the feature makes up most of the north portion. It is very collapsed and one to two courses high as well as one to two in width. The opening is toward the south portion of the feature, and the center is scattered with rubble. The feature is located on top of a ridge c. 3.00 m N of Feature D, and c. 18.00 m E of Feature M in the central portion of the *makai* parcel. Small amounts of marine shell, shrapnel and a large sand pile are c. 6.00 m east. No surface deposit was noted.

FEATURE G: Enclosure
ADJACENT TERRAIN: Undulating subangular basalt gravel pebbles and cobbles.
VEGETATION: Burnt/unburned grass and *kiawe*.
FUNCTION: Military
DIMENSIONS: 4.10 m by 2.90 m by 0.37 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Feature G is constructed with subangular basalt cobbles c. 0.15 to 0.40 m in diameter. The cobbles are roughly stacked from one to three courses high. There is no visible facing. The overall structure is more oval than circular (tear drop), exhibiting slumpage on the eastern end, which is the narrower end. The white sand pile appears to be from sandbags placed by the military, as there are remnants of bags still present within the sand area deposit. The feature is located in the central *makai* portion of the project area. Feature G is c. 13.75 m to Feature L at 358 degrees. To the west c. 1.00 m are two burnt uprooted *kiawe* trees. Further west c. 2.00 m is the beginning of a sand deposit concentration. There is also a concentration of basalt cobbles that may have been a construction pile. No cultural deposit was within the feature (surface). Subsurface trowel test +0.10 m. Loamy silt, grass roots and subangular pebbles. No surface remains were noted.

FEATURE L: C-shape
ADJACENT TERRAIN: Undulating subangular basalt gravel, pebbles and small to large subangular basalt cobbles.
VEGETATION: *Kiawe*, grass.
FUNCTION: Military
DIMENSIONS: 3.30 m by 1.60 m by 0.40 m
CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: Small (c. 0.10 to 0.30 m) subangular basalt cobbles are piled irregularly one to two courses high, beginning at the northern end and aligning with natural bedrock loosely piled SE. The remaining portions south and southwest are slumped. The feature is located in the central *makai* portion of the project area. Feature L is c. 13.75 m from Feature G at 178 degrees. Feature C is c. 15.60 m at 227 degrees from Feature L. Surface remains consist of hand grenade container metal covers, an unexploded bullet shell, and hand grenade pull clips, which are located between Feature L and Feature G. A (-10) trowel test shows subangular gravel and pebbles ending on bedrock. Fire-affected rocks, grass and *kiawe* trees are c. 20.00 m to the dirt road.

FEATURE M: Mound
ADJACENT TERRAIN:
VEGETATION: *Kiawe* bush and desert-like grass.
FUNCTION: Military
DIMENSIONS: 1.00 m by 1.25 m by 0.36 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Subangular basalt cobbles (c. 0.30 m in diameter) piled three-two-one style in a triangular cone shape. The mound is very rough, sloppy, and very recently built on the surface. It is built over bulldozed ground. It is located on top of a ridge in the central portion of the *makai* parcel c. 18.00 m west of Features D and E. No surface remains or deposit was noted.

FEATURE N: Enclosure
ADJACENT TERRAIN: Shoreline rolling hills; recent brush fire.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Military
DIMENSIONS:
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A randomly piled one to two course high remnant circular enclosure of boulders and cobbles. The feature sits on top of a 24 degree slope right at the edge. There are rocks scattered throughout feature and on the slope, which is SW of the enclosure. There is no midden in or outside of the enclosure. Alteration of the feature is probably by the military because of grenade fragments within and without the feature. The feature is 214 degrees SW at c. 14.00 m of TN from Feature A. It is located in the extreme west central portion of the project area at *makai*. Grenade fragments and an M-16 bullet shell were noted as surface remains. No surface deposit was noted.

FEATURE O: C-shape
ADJACENT TERRAIN: Gentle slope north
VEGETATION: Burnt desert grass
FUNCTION: Temporary habitation/military
DIMENSIONS: 2.80 m by 3.00 m by 0.45 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: C-shape constructed of subangular basalt cobbles and boulders ranging from c. 0.10 to 0.40 m in diameter. It is stacked and piled one to three courses high as well as wide. Scatter is throughout the entire feature. The east wall is touching the west portion of Feature P. The opening is in the S portion. The feature is located in the area c. 8.00 m E of Feature Q; attached to Feature P in between (2) ridges E/W. Surface remains consists of military debris, while no surface deposit was noted.

FEATURE P: Wall
ADJACENT TERRAIN: Gently sloping north. Possible trail in south area.
VEGETATION: Burned *Kiawe* and desert grass.
FUNCTION: Indeterminate
DIMENSIONS: 5.75 m by 2.00 m by 0.37 m
CONDITION: Fair
INTEGRITY: Unaltered

DESCRIPTION: Linear alignment of subangular basalt cobbles mostly one course high, possibly two at times. It is one to three courses wide and also incorporates natural bedrock. It is directly in between and connects Features Q and O. Scattering of rubble is on both sides of the wall. The wall runs east to west. It is located directly in between Features O and Q in between two ridges on top. No surface remains or surface deposits were noted.

FEATURE Q: C-shape
ADJACENT TERRAIN: Flat ground with gentle slope north.
VEGETATION: Burnt *kiawe* and desert-like grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.25 m by 2.50 m by 0.31 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A C-shape constructed of subangular basalt cobbles. It is one to three courses high as well as wide. The opening is to the south. Construction includes natural bedrock. The feature is very remnant, with scattered rubble all around and in the center also. The feature is located directly next to (E of) Feature P; in the central portion of the *makai* parcel in between two ridges. No surface remains or surface deposit was noted.

STATE NO.: 19347 PHRI TEMP. NO.:855-214
SITE TYPE: Complex (15 Features)
TOPOGRAPHY: Undulating low hills, ridges, and ravines.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair-good
INTEGRITY: Altered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of a C-shape w/adjoining wall (Feature A), U-shape (Feature B), terrace (Feature C), seven C-shapes (Features D, I, J, K, L, M, Q), wall (Feature E), cairn (Feature G), two enclosures (Features N, O), and an L-shape (Feature P).

FEATURE A: C-shape w/adjoining wall
ADJACENT TERRAIN: Terrain is sloping downward to the west. Hills and valleys.
VEGETATION: Small grasses and sparse *kiawe*. Two mid-sized trees are c. 0.10 m east of feature.
FUNCTION: Temporary habitation
DIMENSIONS: 10.80 m (305 degrees) by 4.70 m by 0.27 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Medium to large sized angular pahoehoe stones arranged into a C-shape wall, and a clearing pile. The wall is c. 5.00 m long (305 degrees TN) and c. 1.20 m wide. It is one course high and consists of stones ranging in size from c. 0.09 to 0.78 m in diameter. This wall is linear, running NW-SE. Then it joins the C-shape at the SE corner of the C-shape. The C-shape is one to two courses high and the opening faces south. The stones range from c. 0.13 to 0.49 m in diameter. The walls are c. 1.18 m wide. It appears that the smaller stones are in the NW wall and as it bends to the south, the stones are larger. This is c. 4.20 m (305 degrees) long and c. 2.80 m wide. Then, c. 0.50 m west of the C-shape, is a small clearing pile. This is c. 1.60 m (214 degrees TN) long and c. 1.30 m wide. The stones range from c. 0.09 to 0.38 m in diameter. The shape is oval. There is no facing or any real alignment of features. The wall is nicely made and appears to turn into a small paving before it runs into the C-shape. Features

J, L, and M are c. 43.00 m at 305 degrees (TN). This feature is in the area of a fire that occurred here three weeks ago. A gulch is c. 20.00 m at 234 degrees (TN). The feature was trowel tested and no cultural deposit or surface remains were noted.

FEATURE B: U-shape
ADJACENT TERRAIN: Terrain is sloping down to gulch and west. Hills and valleys.
VEGETATION: Small grass and sparse *kiawe*. A small *kiawe* tree is c. 2.50 m west of feature.
FUNCTION: Temporary habitation
DIMENSIONS: 4.20 m by 2.20 m by 0.24 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Medium sized angular, pahoehoe stones arranged in a boxed C-shape, one to two courses high. The stones range from c. 0.10 to 0.50 m in diameter. The opening faces SSW. The walls are c. 0.80 m wide. The north wall contains smaller basalt stones that increase in size going south. There is no facing, but there is an alignment of all sides of the wall which makes up the boxed C-shape. It appears as if effort was made constructing this feature. Feature A is c. 12.00 m at 125 degrees (TN). Features J, L, M are c. 21.00 m at 305 degrees (TN). The gulch and the burnt area from the fire that occurred three weeks ago are c. 15.00 m at 224 degrees (TN). The feature was trowel tested and no cultural deposit or surface remains noted.

FEATURE C: Terrace
ADJACENT TERRAIN:
VEGETATION: Unknown grass.
FUNCTION: Possible agriculture
DIMENSIONS: 2.00 m by 0.75 m (N/S wall width) by 0.34 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Originally (1990) this feature was identified as a C-shape. After clearing, it was assigned a terrace designation. The feature was constructed with subangular pahoehoe cobbles and boulders (0.10 to 0.35 m diameter/length) piled two to three courses high in a semicircular pattern (hence the original C-shape designation) following the natural contour. Cobbles and boulders are located within the interior of the terrace, filling it and making it level with the upslope ground surface. The closed end of the terrace faces north, overlooking a low ravine. A small test indicates no subsurface deposit or surface remains present.

FEATURE D: C-shape
ADJACENT TERRAIN: Terrain is sloping downward to the north and west. Hills and valleys.
VEGETATION: Small grass and dense *kiawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 4.50 m by 4.30 m by 0.26 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Small to medium sized angular, pahoehoe stones are arranged in a C-shape, one to three courses high. Smaller stones make up the southern wall and are larger as the wall extends north. The wall is c. 0.70 m in width. The stones range in size from c. 0.05 to 0.30 m in diameter. The opening faces due west. The north wall is aligned and stacked into place. There is some piling of stones on top. As this curves to the south, both the aligning and the stacking turns into a piling of stones. There is no more neatness or careful building. Also, outcropping is shown through the C-shape. Feature C is c. 9.00 m at 330 degrees (TN). Feature E is c. 6.80 m at 304 degrees. Feature A is 120 degrees at c. 9.00 m. Feature M is c.

10.00 m at 146 degrees. A jeep road is c. 20.00 m directly west. Ecofacts (marine shell) are is found on the surface around this feature. One cowry shell has a hole poked through the side of it. Trowel tested-no cultural deposit.

FEATURE E: Wall
ADJACENT TERRAIN: Undulating low hills, ridges, and ravines.
VEGETATION: Unknown scrub grass, *kiawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 4.00 m by 1.00 m by 0.53 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Small to medium angular pahoehoe boulders, piled one to three courses high, forming a low wall running east to west. It is located between the coast and the old Puako road within the north half of the project area. It is oriented at 308 degrees. No surface remains or subsurface deposit noted.

FEATURE G: Cairn
ADJACENT TERRAIN:
VEGETATION: Grass.
FUNCTION: Marker
DIMENSIONS: 0.85 m (NE/SW) by 0.55 m (SE/NW) by 0.45 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This small cairn was constructed with subangular pahoehoe cobbles-boulders (0.15 to 0.40 m diameter/length) piled up to three courses high on bedrock. The stones were piled to form a small mound. Surface remains consist of one marine shell fragment adjacent, one cowrie shell at 3.00 m to NW. Small test indicates no subsurface deposit.

FEATURE I: C-shape
ADJACENT TERRAIN: Terrain is sloping north and west downward. Hills and valleys.
VEGETATION: Small grasses and sparse *kiawe*. Several *kiawe* trees running west-east just north of feature.
FUNCTION: Temporary habitation
DIMENSIONS: 8.60 m by 6.00 m by 0.54 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This feature is built on the north side of a small knoll ,to the top of it. This feature could also be described as a terrace, as the stones are built into the ground and piled up. Medium-large angular, pahoehoe stones are arranged in a C-shape, one to two courses high. The opening faces SSW. The larger stones are pushed into the ground, at the north side of knoll, making it appear as a terrace. Then medium-sized rocks are placed on top of the larger rocks. There is no facing or stacking. A large *kiawe* tree is touching the NE wall; most of the tree is covering the south half (1/2) of feature. Feature K is c. 13.45 m at 143 degrees (TN). Feature M is c. 6.35 m at 207 degrees (TN). A fire occurred three weeks ago and burnt an area c. 60.00 m at 234 degrees. No surface remains noted. Trowel tested but no cultural deposit noted.

FEATURE J: C-shape
ADJACENT TERRAIN: Terrain is sloping downward to the west. Small hills and valleys.
VEGETATION: Small grass and sparse *kiawe*.
FUNCTION: Temporary habitation

DIMENSIONS: 1.90 m (80 degrees) by 1.40 m by 0.30 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Medium sized pahoehoe angular stones arranged in a C-shape and two to three courses high. The stones range from c. 0.07 to 0.34 m in diameter. The opening of C-shape faces NW. There is a small waterworn basalt nugget just to the west of feature. Did not collect. The wall itself ranges from c. 0.50 to 1.05 m wide. No facing or alignment. It appears as if the stones were piled into a C-shape, hurriedly. Feature L is c. 1.20 m at 80 degrees (TN). Feature A is c. 43.00 m at 125 degrees (TN). A medium sized *kiawe* tree is c. 7.00 m at 80 degrees (TN). A fire occurred three weeks ago and burnt an area c. 50.00 m at 180 degrees (TN). Surface remains consist of waterworn basalt stone (c. 0.07 by 0.07 by 0.04 m). Trowel tested and no cultural material.

FEATURE K: C-shape
ADJACENT TERRAIN: Terrain is sloping down to the S, W, and N. On a small knoll. Hills and valleys.
VEGETATION: Small grass and sparse *kiawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 2.50 m (305 degrees) by 2.00 m by 0.21 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Medium-sized angular pahoehoe stones arranged in a C-shape, one to two courses high. The opening faces west and the walls are c. 0.80 m wide. The stones range in size from 0.08 to 0.27 m in diameter. There is no facing or alignment. The rocks appear to have just been piled in a C-shape, hurriedly. Feature I is c. 3.90 m at 326 degrees (TN). Feature B is c. 5.00 m at 153 degrees (TN). The gulch/burnt area is c. 30.00 m at 228 degrees. Features J, L, M are c. 10.00 m at 286 degrees. A large *kiawe* tree is c. 5.00 m north of feature. No surface remains noted. Trowel tested and no cultural deposit noted.

FEATURE L: C-shape
ADJACENT TERRAIN: Terrain is sloping downward to the west. Hills and valleys.
VEGETATION: Sparse *kiawe* and small grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.00 m (125 degrees) by 2.10 m by 0.40 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Medium-sized pahoehoe angular stones arranged in a C-shape and two to three courses high. The stones range from c. 0.12 to 0.33 m in diameter. The opening of C-shape faces SSW. The north wall of feature is the same wall used for Feature M. The wall itself is c. 0.90 m wide. No alignment or facing to the feature. It appears that the stones were piled into a C-shape, hurriedly. Feature J is c. 1.20 m at 260 degrees (TN). Feature A is c. 43.00 m at 125 degrees (TN). A medium-sized *kiawe* tree is c. 5.00 m at 80 degrees (TN). A fire occurred three weeks ago and burnt an area c. 50.00 m at 180 degrees (TN). Feature M is constructed with this feature on the north wall. No surface remains noted. Trowel tested and no cultural deposit noted.

FEATURE M: C-shape
ADJACENT TERRAIN: Terrain is sloping downward to the west. Hills and valleys.
VEGETATION: Small grass and sparse *kiawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 3.00 m (20 degrees) by 1.90 m by 0.31 m

CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Medium-sized angular pahoehoe stones arranged in a C-shape, one to two courses high. The stones range from c. 0.10 to 0.31 m in diameter. The opening of the C-shape faces west. The south wall also is the same wall used for Feature L's northern wall. The wall itself is c. 0.80 m wide. No facing or alignment to this feature. It appears that the stones were piled into a C-shape, hurriedly. Feature J is c. 1.30 m at 200 degrees (TN). Feature A is c. 44.00 m at 125 degrees (TN). A medium sized *kiawe* tree is c. 5.00 m at 80 degrees (TN). A fire occurred three weeks ago and burnt an area c. 53.00 m at 180 degrees (TN). Feature L is constructed with this feature on the south wall. No surface remains noted. Trowel tested and no cultural deposit noted.

FEATURE N: Enclosure
ADJACENT TERRAIN:
VEGETATION: Surface grass, and *kiawe*.
FUNCTION: Temporary habitation
DIMENSIONS: 3.00 m (340 degrees) by 2.00 m by 0.24 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Rounded rectangular, crudely piled angular basalt cobbles and boulders. East wall (c. 3.00 [340 degrees] by 1.20 by 0.24 m) consists of portable basalt cobbles (c. 0.15 to 0.25 m), piled one to two courses. South "wall" is an alignment (c. 2.00 by 0.20 by 0.18 m) of mostly loose cobbles, with two to three well grounded cobbles making up the west. The SW corner is "rounded" 90 degrees and stacked two courses with well grounded base stones. West wall roughly parallels east wall and measures (c. 3.00 by 0.50 by 0.27 m). It consists of seven to eight well grounded basalt boulders (c. 0.25 to 0.30 m) with approximately twenty portable (c. 0.15 to 0.20 m) cobbles scattered; no stacking or piling except in SW corner. North wall is (2.00 by 0.40 by 0.30 m) and has one well grounded basalt boulder and a single course of portable cobbles, approximately twenty in number. There are gaps in structure: at the NE corner (east wall northernmost c. 0.50 m) and c. 0.20 m mid west wall. The NE corner gap is a possible entrance. This feature is located on the westernmost "knoll" of site complex 1245 on south downslope c. 1.00 m NW of Feature O; c. 2.00 m SW of Feature P; c. 30.00 m at 250 degrees from feature. Surface remains consist of historic debris (rusted can lids); marine shell fragments (cowry, *opihi*). Given the number of portable cobbles in association, it is possible that: east wall was once three to five courses; west wall two to three courses. Likely that larger cobbles of south wall could have been utilized to construct enclosure Feature O. Cultural deposits noted as greater than 0.08 m of yellowish brown gravely silt (small probe in SW corner). Nothing indicates modifications due to historic-recent use. (i.e. weathering is same on most cobbles). No historic construction; materials present though presence of debris suggests historic/recent use of original structure.

FEATURE O: Enclosure
ADJACENT TERRAIN: Undulating terrain, subangular gravel, pebbles, and cobbles.
VEGETATION: Several *kiawe*, moderate scrub grass; not a burnt area.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Feature is constructed of subangular basalt cobbles c. 15.25 m in diameter; lesser cobbles c. 0.30 to 0.40 m in diameter. These are piled not stacked one to two courses high. Some rocks show scarring. The northern portion retains the shaping best; however it has been

disturbed and exhibits slumpage. There is a small *kiawe* that may have contributed to the disturbance shown on the south end. The entire enclosure has rubble within and without. Due to military and recreational activities and close proximity to a dirt road, there is a possibility the feature has been impacted by machinery. This feature is located central *makai* portion. Surface remains consist of rusted metal cover "container M 87". No visible midden noted. Surface metal cover artifact. Subsurface +10 silt and subangular pebbles noted.

FEATURE P: L-shape
ADJACENT TERRAIN:
VEGETATION: Surface grasses, *kiawe* scattered.
FUNCTION: Temporary habitation
DIMENSIONS: 3.40 m (10/190 degrees) by 4.00 m (100/280 degrees) by 0.38 m
CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: Two low, one to two course cobble piled walls meet at a rounded right angle. East wall runs 10/190 degrees, is c. 3.40 by 0.60 by 0.24 m. Two large boulders (c. 0.30 m +) are at N and S points with c. 0.15 to 0.25 m cobbles in between. North wall running 100/280 degrees measures c. 4.00 by 0.70 by 0.38 m. North wall is crudely piled three to four cobbles high with cobbles c. 0.15 to 0.25 m from the west end of north wall. A rubble pile (c. 2.00 by 0.50 by 0.20 m) one course high and two wide, appears to parallel east wall. At 2.00 m this pile/loose alignment makes a right 90 degree turn east c. 1.20 m ending in middle of level interior associated with feature. Rubble pile is possibly bulldozer push or possibly could be post-original structural modifications. Interior is slightly sloping one to two degrees with decomposing bedrock gravel and a few scattered cobbles. This feature is located on westernmost knoll of Site 214, on top of knoll c. 30.00 m at 90 degrees to Features L, M. Surface remains consist of marine shell fragments. Subsurface deposits consist of c. 0.05 to 0.10 m of a yellowish-brown silty loam. A rubble L-shaped addition on west end of feature shows a different construction. Cobbles are not as grounded; suggests post-original disturbance/construction-type of disturbance is possibly mechanical (bulldozer). A function cannot be determined due to a lack of material remains.

FEATURE Q: C-shape
ADJACENT TERRAIN:
VEGETATION: Surface grasses common, *kiawe* scattered.
FUNCTION: Temporary habitation
DIMENSIONS: 2.00 m (135/315 degrees) by 2.50 m (45/225 degrees) by 0.26 m
CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: Low, two to three courses, piled semicircular wall opening 310 degrees. Constructed on exposed bedrock-NE corner and SW corner segments. There is crude stacking on west half (1/2) as opposed to crude piling on the east half (1/2). Loose alignment of cobbles appears to connect to ends of the C-shape. These are scarred and are likely displaced from original position by bulldozer. Interior has many loose cobbles and slopes gently (one to two degrees) to NW. Likely that east section has collapsed into feature. This feature is located on the westernmost knoll of Site 214; down the NE slope, slightly to west c. 30.00 m at 93 degrees to Features L, M. No surface remains noted. Subsurface deposit, c. 0.05 to 0.10 m of a yellow-brown silty loam. No material culture to suggest modifications. Condition is very deteriorated; integrity is indeterminate.

STATE NO.: 19348 **PHRI TEMP. NO.:**855-215
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of two terraces (Features A, B), and a wall (Feature C). The overall site dimensions are c. 20.00 m by 10.00 m.

FEATURE A: Terrace
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 3.00 m (64 degrees) by 3.50 (334 degrees) m by 0.43 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A loose rubble of pahoehoe boulders in a rough C-shape. Only the east side retains one to two courses. Most of the boulders are strewn about on the west side. Feature is located at the top of a small hill. It is c. 5.00 m at 289 degrees E at (TN) from Feature C. It appears to be more like a blown-up military C-shape. This feature is located in the extreme west central project area at *makai*. Surface remains consists of grenade fragments, bullet shells. No surface deposit is noted.

FEATURE B: Terrace
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation/military
DIMENSIONS: 3.00 m (64 degrees) by 3.00 m (334 degrees) by 0.28 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A loose rubble of pahoehoe boulders and cobbles. It appears to be two courses high, c. 0.25 m long on the south side. There also appears to be a single course high, right angle of stones turning to the NW. Feature lies near the top of a small hill. Feature B is c. 10.00 m south at 335 degrees (TN) from Feature C. This feature is located in the extreme west central project area at *makai*. Surface remains consist of grenade fragments, bullet shells. No surface deposit noted.

FEATURE C: Wall
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Hunting blind
DIMENSIONS: 2.50 m (64 degrees) by 1.25 m (334 degrees) by 0.42 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Randomly piled one to two courses slightly curved wall of pahoehoe boulders. Wall runs east/west with the inner curve on the north. Feature sits on top of a hill next to a large *kiawe* tree. Site 217 Feature A is c. 100.00 m NE at 40 degrees TN from this feature. There is no marine shell midden around the feature. There are, however, hand grenade fragments. The tag says wall but it is obviously a hunters blind. This feature is located in the extreme west central project area at *makai*. No surface deposit noted.

STATE NO.: 19349 Other: YG-15 PHRI TEMP. NO.:855-217
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
CONDITION: Good
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of an enclosure (Feature A), two cairns (Features B, C), and a modified outcrop (Feature D). The overall site dimensions are c. 20.00 m by 8.00 m.

FEATURE A: Enclosure
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.50 m (76 degrees) by 3.30 m (346 degrees) by 0.73 m
CONDITION: Good
INTEGRITY: Altered
DESCRIPTION: A square, three to five course high, enclosure of stacked pahoehoe boulders. Larger boulders are on the bottom all the way around. Facing is evident on all sides with only a portion of the south wall being bedrock. There are historic metal fragments in and around the feature. One *opihi* shell is inside. Recent use of structure is seen by two water bottles, and *pakalolo* plant-sand pots in a cage. A small *kiawe* tree is growing in the center of the enclosure. The feature sits on the NW of a 22 degree slope. Feature A is c. 7.00 m at 73 degrees TN from Feature B. NE corner is collapsed. This feature is located in the extreme west central project area at *makai*. No surface deposit noted.

FEATURE B: Cairn
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Post support
DIMENSIONS: 1.10 m (346 degrees) by 1.40 m (76 degrees) by 0.94 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Randomly piled pahoehoe boulders on a bedrock outcrop forming a cairn, roughly square in shape. Cairn was used to hold up a fence post. Feature B is 253 degrees TN at c. 7.00 m from Feature A. This feature sits directly atop a 22 degree slope. Historic trash is scattered around feature. Feature C, c. 3.00 m to the N, is the same type of structure. This feature is located in the extreme west central project area at *makai*. Surface remains consist of 1950 to 68 "7up" can, sardine tin, cigarette pack. Feature would have to be torn apart to test surface deposit.

FEATURE C: Cairn
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Post support
DIMENSIONS: 2.00 m (76 degrees) by 2.00 m (346 degrees) by 0.81 m
CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: Randomly piled pahoehoe boulders on a bedrock outcrop forming a cairn which was used to hold a fence post. Post is still visible. The cairn appears to have been partially

pulled apart. Feature C is c. 3.00 m at 314 degrees TN from Feature B. Feature C sits directly atop a 22 degree slope. This feature is located in the extreme west central project area at *makai*. Surface remains consist of fence post, cigarette pack, sardine tin, radio wire antenna. Would have to tear it apart to test.

FEATURE D: Modified outcrop
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Agriculture
DIMENSIONS: 2.00 m (346 degrees) by 0.70 m (76 degrees) by 0.46 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Randomly piled pahoehoe boulders utilizing a bedrock outcrop. On and around the feature a grenade fragment, a spent and splattered bullet, and a bottle cap. Feature C is c. 4.00 m at 219 degrees TN from Feature D. This feature is located in the extreme west central project area at *makai*. No surface deposit noted.

STATE NO.: 19350 PHRI TEMP. NO.:855-221
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Shoreline, rolling hills.
VEGETATION: Kiawe and scrub grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of two U-shapes (Features A, B). The overall site dimensions are c. 150.00 m by 2.50 m. Features themselves are c. 3.50 by 2.00 m.

FEATURE A: U-shape
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Hunting blind/military
DIMENSIONS: 3.75 m (78 degrees) by 3.50 m (168 degrees) by 0.68 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Stacked pahoehoe boulders three to four courses high set in a U-shape. Feature lies at the bottom of a ravine c. 20.00 m NE of Site 855-222. The open end of the feature faces NW. Within the feature, the soil has been excavated to form a low relatively leveled area. Stacking of the boulders is singular in width. The majority of boulders are quite large. The end of the NW wall at the opening has collapsed. The feature was covered by high thick grass, branches and is surrounded by *kiawe* trees. This feature is located in the extreme west central project area at *makai*. The surface remains consist of one small butchered pig bone, historic trash - paper and plastic. No surface deposit noted.

FEATURE B: U-shape
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Military-agriculture
DIMENSIONS: 3.50 m (104 degrees) by 2.75 m (140 degrees) by 0.70 m

CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This feature is nearly the same as Feature A which is c. 150.00 m SE of Feature B. The S wall is singular width, with stacking two to three courses high, of pahoehoe boulders. The wall is randomly piled against the embankment three to four courses high. The NNW wall is one to two courses stacked and is slightly disturbed. The open end faces NW and is clear of stone. There is a great deal of historic trash in and around the feature. It was once probably military but now has the paraphernalia of pot growing. A pumpkin ball was found outside of and at the SE corner. Feature lies at the bottom of a ravine. The inside of feature has been dug out and leveled. Tall thick grass and branches cover it and it is surrounded by *kiawe* trees. This feature is located in the extreme west central project area at *makai*. Surface remains consist of cut gas can, Styrofoam cooler, paper, plastic, tarpaulin remains. No surface deposit noted.

STATE NO.: 19351 Other: YG-12 PHRI TEMP. NO.:855-222
SITE TYPE: Midden scatter
TOPOGRAPHY: Shoreline, rolling hills.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 40.00 m by 50.00 m
DESCRIPTION: Site has been destroyed by bulldozing. A midden scatter is evident on the east side of the site. Feature D may be the remains of a structure that was here, accounting for the midden. Some of this midden was collected. The bulldozer was probably military, since the push pile is old. There are also C-ration cans and shrapnel scattered about. Features A, B, and C have been destroyed by more recent bulldozing. A new dirt road goes through where they were. Features D and E were probably the same or connected somehow. These two features are on the east side of the site on a bedrock outcrop. There is a large scatter of midden around this area. A trail, Site 1245-314, runs along the NE of this site down to the beach area where it is obliterated by a road. Bulldozers have wiped out all features. This feature is located in the extreme west central project area at *makai*. The soil is noted as thin sandy silt.

STATE NO.: 19352 PHRI TEMP. NO.:855-223
SITE TYPE: C-shapes (5 Features)
TOPOGRAPHY: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass (recent brush fire).
CONDITION: Fair-good
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 38.00 m by 12.00 m
DESCRIPTION: Site 223 is distinctly military. Feature D is a bulldozed C-shape with grenade fragments in and around it. Features A, B, C, E are also C-shapes with grenade fragments and land mines in and around them. To the NE of Feature B (c. 0.20 m) is an L-shaped wall that looks five years old or less. The interior has been cleared of rock. The wall is two courses high. These C-shapes should be considered as part of Site 224 since they are all on the same ridge and for the same purpose. This feature is located in the extreme west central portion at *makai*. Surface

remains consist of grenade fragments, land mines, beer bottles, bicycle pump, one marine shell, pop cans. No surface deposit noted.

STATE NO.: 19353 Other: YG-18 A-C PHRI TEMP. NO.:855-224
SITE TYPE: C-shapes (5 Features)
TOPOGRAPHY: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass (recent brush fire).
CONDITION: Fair-good
INTEGRITY: Altered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS:
DESCRIPTION: Randomly stacked pahoehoe boulders in a rough C-shape. All features (A-E) are uniform in design with the NE wall higher than the rest. Some dirt is thrown up around the bases. Grenade and other explosive fragments are visible within and without features. Features are set atop a ridge overlooking a dirt road. These features are located in the extreme west central project area at *makai*. Surface remains consist of marine shell, grenade fragments, beer bottles, pot bags, one Bic lighter, beach mat remains. No surface deposit noted.

STATE NO.: 19354 PHRI TEMP. NO.:855-226
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Rolling pahoehoe outcrops. Site is atop an outcrop overlooking a cove to south.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of a U-shape (Feature A), a terrace (Feature B), and a modified outcrop (Feature C). The overall site dimensions are c. 9.50 m by 7.30 m.

FEATURE A: U-shape
ADJACENT TERRAIN: A pahoehoe bedrock hill overlooking a small cove to immediate south.
VEGETATION: *Kiawe* and knee-high dry grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.90 m by 3.70 m by 0.60 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles piled one to three courses high to form a U-shape. Cobbles are c. 0.10 to 0.25 m length/diameter. Entrance faces W and is c. 1.60 m wide. The ends are hooked inward, so the entrance is narrower than it would otherwise be. Interior is c. 2.60 by 2.60 m. Long axis 290 to 110 degrees. This feature is located NW quad of project area, c. 50.00 m E of shore. Surface remains consist of many marine shell fragments (cowry, *Nerita* sp.). Unexcavated; rocky soil. A trowel probed into center of feature hits rock at less than 0.10 mbs.

FEATURE B: Terrace
ADJACENT TERRAIN: Sits on a pahoehoe bedrock hill overlooking a small cove to the south.

VEGETATION: *Kiawe* and knee-high brown grass.
FUNCTION: Agriculture
DIMENSIONS: 3.80 m by 3.00 m by 0.50 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A terraced outcrop with pahoehoe cobbles stacked one to two courses high along NE and E sides. Steepest part of it faces NE. Lies immediately E of Feature A's U-shape. A foot path c. 0.50 m wide running roughly E-W is immediately N of Features A and B and separates them from Feature C. Rocks are c. 0.15 to 0.30 m length/diameter with rock c. 0.50 m on NE side. Long axis is 260 to 80 degrees. This feature is located on NW quad of project area, c. 50.00 m from beach. Surface remains consist of one green New Zealand beer bottle (label intact), numerous marine shell fragments. Surface deposits unexcavated. A trowel poked into soil is stopped by rock at less than 0.05 mbs.

FEATURE C: Modified outcrop
ADJACENT TERRAIN: Sits on a pahoehoe hill overlooking a cove to the south.
VEGETATION: *Kiawe* and dry brown grass.
FUNCTION: Agriculture
DIMENSIONS: 6.80 m by 2.00 m by 0.35 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked one to two courses high, on the edge of a NE-facing hill. Cobbles are c. 0.15 to 0.30 m length/diameter. It is separated from Features A and B by a foot path c. 0.50 m wide, which runs roughly E-W. Long axis is 260 to 80 degrees. This feature is located on NW quad of project area, c. 50.00 m from shore. Surface remains consist of numerous small marine shell fragments. Surface deposit unexcavated. Sits on bedrock.

STATE NO.: 19355 PHRI TEMP. NO.:855-234
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Rolling pahoehoe with a series of finger knolls pointing toward the sea. Heavy erosion and bulldozer piles.
VEGETATION: *Kiawe*.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: This site consists of a cairn (Feature A), and a C-shape (Feature B). The overall site dimensions measure c. 10.70 m E to W by 3.00 m N to S.

FEATURE A: Cairn
ADJACENT TERRAIN: In a burned area
VEGETATION: Burnt *Kiawe* and some recent grass growth.
FUNCTION: Military
DIMENSIONS: 1.00 m by 1.00 m by 0.52 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Approximately seven cobbles measuring c. 0.15 by 0.20 placed on an outcrop with one boulder measuring c. 0.20 by 0.20 m on top. Piled one to two courses high. This feature is located c. 7.00 m due west of Feature B, downslope and on a west sloping hillside west of Road #10. Surface remains consist of wood stake among rocks (burned by brush fire).

FEATURE B: C-shape
ADJACENT TERRAIN: In a burned area.
VEGETATION: Burned *Kiawe* and some recent grass growth.
FUNCTION: Military
DIMENSIONS: 3.90 m by 3.00 m by 0.33 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: C-shape constructed on a flat area on the end of a knoll on the *makai* side. It is built upon a natural outcrop with boulders measuring c. 0.30 to 0.15 m. Stacked one to two courses high and one to three rocks wide. The boulders are stacked two courses high on the *makai* side (west). The loose rocks measure c. 0.10 to 0.40 m in size. Concrete is present on rocks on the south side. This feature is located c. 7.00 m due east of Feature A (rock cairn), upslope and on a west sloping hillside, west of Road #10. Surface remains consist of rolled-up barbed wire just E/NE of the feature c. 2.00 m away. No surface deposit noted.

STATE NO.: 19356 PHRI TEMP. NO.:855-236
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Rolling hills, shoreline.
VEGETATION: *Kiawe* and scrub grass.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site consists of a modified outcrop (Feature B), and a terrace (Feature F). The overall site dimensions are c. 6.00 m (230 degrees) by 3.75 m.

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.75 m (350 degrees) by 0.50 m (80 degrees) by 0.43 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Randomly piled pahoehoe boulders incorporating a bedrock outcrop on the NW. Feature is set on a hilltop with a slope of 2 degrees next to a very shallow ravine on the SE. A small scatter of marine shell is within and without feature. Two pieces of waterworn coral are also present. Feature is 230 degrees at 1.50 m (1 1/2 m) TN from Feature F. This feature is located in the extreme west central project area at *makai*. Surface remains consist of marine shell, waterworn coral, grenade fragments. No surface deposit noted.

FEATURE F: Terrace
ADJACENT TERRAIN: Shoreline, rolling hills.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.00 m (0 degrees) by 1.50 m (90 degrees) by 0.29 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Randomly piled boulders and cobbles two to three courses high in some places, feature is set on a hilltop with a slope of 2 degrees next to a very shallow ravine on the

SE. A bedrock outcrop is visible c. 1.00 m to the west. Some marine shell are scattered within and without feature. Feature F lies 50 degrees at 1.50 m (1 1/2 m) of TN from Feature B. This feature is located in the extreme west central project area at *makai*. Surface remains consist of grenade fragments. No surface deposit noted.

STATE NO.: 19357 PHRI TEMP. NO.:855-237
SITE TYPE: Terrace
TOPOGRAPHY: Undulating hills.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 5.50 m (345 degrees) by 0.50 m
DESCRIPTION: Straight wall alignment constructed of basalt rocks, c. 0.35 m at its highest and one to two courses. On slope which declines to west. This feature is located c. 10.00 m from sea cliff. No surface remains or surface deposits noted. Gravel and fine silt present, in a thin layer.

STATE NO.: 19358 PHRI TEMP. NO.:855-241
SITE TYPE: Terrace
TOPOGRAPHY: Leveled areas with small knolls, hills, and valleys. Abuts dirt access road; leveled areas to the north and west of feature.
VEGETATION: Burnt *kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 6.50 m (N-S) by 2.50 m (E-W)
DESCRIPTION: Feature is constructed of small, medium, and large subangular basalt cobbles. Longer portion of "L" runs south to north with an extension of c. 2.00 m at the northern end running east to west. The cobbles are loosely stacked one to two courses in height upon loose sandy silty soil. The eastern side of the terrace has a more compact soil that appears graded. South of the terrace beyond the dirt road are more scattered similar semi-aligned rocks. This is a cleared area; undetermined function due to recreational, military and firefighting activities; the feature has been impacted. This feature is located in the central west *makai* portion of the project area. Feature A is c. 20.00 m to Feature B at 180 degrees. Features B through D were destroyed by recent activities (i.e. firefighting, recreation, bulldozing, military, etc.). Surface remains consist of two metal tools without handles; one is a hoe and the other a plaster trowel. No marine ecofact on surface; trowel tested subsurface +10 cm; sandy silt. The soil is of a red/brown silt with gravel.

STATE NO.: 19359 PHRI TEMP. NO.:855-242
SITE TYPE: C-shape
TOPOGRAPHY: A level area surrounded by rolling pahoehoe outcrops on a west facing slope.
VEGETATION: Burnt *kiawe* and short brown grass.
CONDITION: Fair
INTEGRITY: Unaltered

PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 3.70 m by 2.10 m (270 degrees)
DESCRIPTION: Pahoehoe cobbles stacked, piled one to three courses high. Rocks are c. 0.15 to 0.40 m length/diameter. Long axis 340/160 degrees; maximum height measures c. 0.55 m. This site is located in the west central part of project area. No surface remains noted; a trowel tested into several points around feature was stopped by rock less than 0.10 mbs. Soil consists of red/brown silt with gravel.

STATE NO.: 19360 PHRI TEMP. NO.:855-248
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Shoreline, rolling pahoehoe outcrops.
VEGETATION: *Kiawe* and scrub grass.
CONDITION: Poor-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of two modified outcrops (Features A, D), (2) alignments (Feature B), a mound (Feature C), and remnant terrace (Feature E).

FEATURE A: Modified outcrop
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS: 7.00 m (96 degrees) by 2.70 m (6 degrees) by 0.36 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A rectangular clear area with eight rocks stacked nicely on bedrock in the NE corner. The feature runs east/west. Bedrock forms the entire north side. There is no midden in the feature and only one *opihi* shell outside of it. The feature sits on the west end of a long cow hill. Feature B is c. 26.00 m at 96 degrees of TN from Feature A. This feature is located on the extreme west central project area at *makai*. Small test on west end of feature revealed nothing.

FEATURE B: Alignment
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Temporary habitation
DIMENSIONS: 3.00 m (96 degrees) by 3.00 m (6 degrees) by 0.60 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Randomly piled pahoehoe boulders set in a linear fashion and parallel to each other with bedrock incorporated into the structure. The alignment runs east/west and is open in those directions. One *opihi* shell is the only portable remain. The structure has been altered by bulldozing mostly on the south and west sides. For this reason it is unknown as to what this feature was originally. This feature is located in the extreme west central portion at *makai*. A small test in the middle of the feature showed nothing.

FEATURE C: Mound
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a west facing slope.

VEGETATION: *Kiawe* and brown grass.
FUNCTION: Agriculture
DIMENSIONS: 5.50 m by 4.50 m by 0.65 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A low mound of pahoehoe cobbles and small boulders one to three courses high. Two terraces of pahoehoe cobbles one to two courses high. One abuts the mound and projects west, the other is north and downslope of the first, on an outcrop. Stacking on the terraces is very rough. East terrace is c. 2.00 to 2.50 m long. Long axis 250 to 70 degrees and 215 to 35 degrees. Mound is oriented 347 to 167 degrees. This feature is located on NW quad of project area, c. 100.00 m E of coast. No surface remains or surface deposits noted.

FEATURE D: Modified outcrop
ADJACENT TERRAIN: Rolling hills on top of small rise.
VEGETATION: Burnt grass.
FUNCTION: Temporary habitation
DIMENSIONS: 5.50 m (100 degrees TN) by 3.00 m (190 degrees TN) by 0.30 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Several large cobbles of weathered pahoehoe placed sparsely on a pahoehoe outcrop in the form of a terrace, but with nothing to hold back. To the south, a small area has been cleared. A small concentration of a calcium deposit (formerly called mortar by other crew members) is in the eastern section of the cleared area. This feature is located on western central part of the *makai* section. No surface remains or surface deposits noted.

FEATURE E: Terrace
ADJACENT TERRAIN: Rolling hills on top of a small rise.
VEGETATION: No vegetation.
FUNCTION: Agriculture
DIMENSIONS: 3.00 m (190 degrees TN) by 2.50 m (100 degrees TN) by 0.08 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Two alignments of large and small cobbles. One alignment has a corner at the SW, the other alignment has only seven to eight rocks remaining. Most rocks have been submerged in the soil slightly. This feature is located on central western part of the *makai* section. Surface remains noted consist of one cowry shell; no surface deposit noted.

STATE NO.: 19361 PHRI TEMP. NO.:855-250
SITE TYPE: Complex (5 Features)
TOPOGRAPHY: Slightly hilly on downslope (E) of small ridge (Site 248).
VEGETATION: Burnt *kiawe* and desert grass.
CONDITION:
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site consists of an enclosure (Feature A) and alignments (4) (Feature B). The overall site dimensions measure c. 10.00 m by 3.00 m.

FEATURE A: Enclosure
ADJACENT TERRAIN: Slight downward slant on N, E, and S sides of Feature A to the west. A short downward slant then a strong rise to the west to Feature 248-C, which is located on a ridge.
VEGETATION: No vegetation.
FUNCTION: Temporary habitation
DIMENSIONS:
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Small subangular basalt boulders and small and large cobbles, all between c. 0.10 to 0.50 m in diameter, piled one to two courses high with no visible facing. There is evidence of disturbance and slumpage on the western side where there are some scarred rocks. Firefighting activity (7-4-92) has affected this feature; the base seems to be mostly intact. Due to its location, it is possible military activity has also disturbed this feature. This feature is located on the coastal plain; Feature A is c. 24.10 at 307 degrees to Feature 248-C. No surface remains noted and no cultural evidence. Subsurface, small pebbles and heavy grass roots to +0.10 m (trowel tested).

FEATURE B: Alignment (4)
ADJACENT TERRAIN:
VEGETATION: Burnt *kiawe*, desert grass, and mushrooms.
FUNCTION: Temporary habitation
DIMENSIONS: 1.80 m by 0.90 m by 0.35 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Four linear alignments constructed of subangular basalt cobbles and boulders ranging from c. 0.10 to 0.40 m in diameter piled and stacked one to three courses high and one to four courses wide. The southern two are parallel to each other NW/SE while the northern two are staggered and running E/W. They all have bulldozer scars on the rocks and have probably been altered historically also. There is much surrounding remnant rubble and no signs of marine shell or coral present. This feature is located on the west central portion of *makai* parcel (closer to the water than highway) c. 20.00 m SE of Feature 248-C, c. 2.00 m N of Feature A. No surface remains or surface deposits noted.

STATE NO.: 19362 PHRI TEMP. NO.:855-251
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Undulating hills and small knolls. Bulldozed road c. 20.00 m NW of site.
VEGETATION: Burnt *kiawe* and dry grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consist of an enclosure (Feature A), two terraces (Features B, C), and a wall remnant (Feature D). The overall site dimensions measure c. 14.00 m by 7.00 m.

FEATURE A: Enclosure
ADJACENT TERRAIN:
VEGETATION: Burnt *kiawe* and grass.
FUNCTION: Temporary habitation

DIMENSIONS: 4.50 m by 3.74 m by 0.40 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Small subangular basalt boulders c. 0.25 to 0.40 m in diameter and small to large subangular basalt cobbles c. 0.10 to 0.20 m in diameter. The feature has been impacted upon and shows slumpage on all sides, most square on the northern end. The surrounding area of this feature and site has a heavy concentration of scattered subangular basalt cobbles and subangular basalt boulders c. 10.40 m in diameter. Military, recreational and firefighting activities have impacted this site and make it difficult to accurately assess. This feature is located on central west of the *makai* portion, slightly elevated on three sides (N, W, S). Feature A is c. 2.98 m to Site 251 Feature B at 128 degrees. This site is c. 30.00 m to a well traveled dirt road, west and north of site. No surface remains noted and a subsurface trowel test found silt; no cultural evidence.

FEATURE B: Terrace
ADJACENT TERRAIN: South slope of ridge.
VEGETATION: Burnt *kiawe* and desert grass.
FUNCTION: Agriculture
DIMENSIONS: 2.50 m by 1.75 m by 0.41 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Subangular basalt cobbles and boulders arranged linearly on ground surface. One to two courses high and two to three courses wide. Crudely piled and bulldozer affected. Sparse marine shell around. This feature is located c. 1.00 m SE of Feature A, c. 1.00 m S of Feature C, in central west portion of *makai* parcel. No surface remains or surface deposits noted.

FEATURE C: Terrace
ADJACENT TERRAIN:
VEGETATION: Burnt *kiawe*, desert grass.
FUNCTION: Agriculture
DIMENSIONS: 2.60 m by 0.50 m
CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: Linear alignment of subangular basalt cobbles and boulders built onto and on top of ground surface. Very remnant, one course high and one to three wide with some varying scatter. Constructed using natural bedrock also. Most base cobbles are partially below ground surface. This feature is located c. 1.00 m E of Feature A, c. 1.00 m N of Feature B, on SW portion of small ridge in central west portion of *makai* parcel. One waterworn basalt cobble noted. No surface deposit noted.

FEATURE D: Wall
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: Burnt *kiawe* and knee-high brown grass.
FUNCTION: Agriculture
DIMENSIONS: 2.30 m by 0.70 m by 0.50 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high. Rock rubble extending west from it suggests it was once much longer. Sits halfway along a low, short ridge running roughly E to W. This feature is located on the central west part of project area c. 200.00 m east

of shore. No surface remains noted. Surface deposit not excavated; a trowel stuck into the ground at several points around feature hits rock c. 0.05 to 0.12 mbs.

STATE NO.: 19363 PHRI TEMP. NO.:855-253
SITE TYPE: Terrace
TOPOGRAPHY: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and knee-high brown grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 7.50+ m by 0.70 m
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high to form a low terrace. Runs into a natural outcrop at west end. West end is difficult to evaluate due to heavy brush and logs. Long axis runs 50 to 230 degrees, maximum height c. 0.35 m. On terrace, soil is greater than 0.13 m (trowel blade length) deep. Below terrace, a trowel probe hits rock at less than 0.05 mbs. This feature is located immediately next to Wailea Bay, in central project area. Two aluminum soft drink cans noted as surface remains; surface deposit has not been excavated.

STATE NO.: 19364 PHRI TEMP. NO.:855-254
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Fairly level area above waterworn basalt beach.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE:
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of a lined trail (Feature A) and a mound (Feature B) which have been completely destroyed by recent activity, a paved terrace remnant (Feature C), and a modern hearth (Feature D). The overall site dimensions measure c. 2.40 m by 1.60 m.

FEATURE C: Paved terrace
ADJACENT TERRAIN: Relatively level N and W. Sharp drop off to water c. 10.00 m to south c. 12.00 m to west.
VEGETATION:
FUNCTION: Temporary habitation
DIMENSIONS: 2.40 m (170 degrees TN) by 1.60 m (80 degrees) by 0.20 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Roughly piled waterworn and non-waterworn basalt cobbles and small boulders in a rough "L" shape one to three layers high on the east and south side of an area of *'ili'ili* (waterworn basalt pebbles) and coral paving. The paved area is roughly leveled. This feature is located on land above and north of Wailea Bay. Surface remains noted consist of oyster, conus, cowry shell fragments, urchin spine, waterworn and non-waterworn coral, and hundreds of waterworn basalt pebbles. Surface deposit is present mostly on surface, but paving continues for c. 0.05 to 0.10 m depth.

FEATURE D: Hearth
ADJACENT TERRAIN: Undulating low hills and ravines to E. Ocean is to the west.

VEGETATION: *Kiawe* and grass.
FUNCTION: Recreation
DIMENSIONS: 0.80 m (90 to 180 degrees) by 0.75 m (TN) by 0.08 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Approximately twelve waterworn basalt cobbles were piled to form a modern hearth. The cobbles range in size from c. 0.15 by 0.15 m to 0.11 by 0.38 m. There are arranged in a circular pattern up to two courses high. This feature was constructed 8/1-2/92. The reason it has been documented, is to illustrate current land use patterns, as requested by D. Graves. This feature is located on calcium deposit and bedrock outcrop overlooking small cove. Surface remains noted consist of a cast iron hibachi box located c. 1.70 m to the south of hearth, two wooden pallets are located immediately to the east. Surface deposit noted as present; toilet paper within hearth, ergo, not tested.

STATE NO.: 19365 PHRI TEMP. NO.:855-255
SITE TYPE: Complex (13 Features)
TOPOGRAPHY: Located on edge of cliff-flat area gently sloping eastward outside of site.
VEGETATION: *Kiawe* and desert grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Habitation
DESCRIPTION: This site consists of an enclosure (Feature A), two wall segments (Features B, C), three mounds (Features D, E, G), two terraces (Features F, J), three alignments (Features H, I, L), a paved area (Feature O), and a wall (Feature M). The overall site dimensions measure c. 32.00 m by 29.75 m.

FEATURE A: Enclosure
ADJACENT TERRAIN: Fairly flat ground.
VEGETATION: *Kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 10.50 m by 8.00 m by 0.75 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Almost circular (horseshoe shaped) alignment of subangular basalt cobbles and boulders stacked and piled one to four courses high. North portion is the open part, with small breaks in the SW and SE corners. Feature E (mound) is located in the center of the feature. Much of east wall is push from bulldozer, and cut and burned trees disturb/collapse E and W walls. Feature M (man-bulldozer pile) is located at north opening of feature. Waterworn coral cobbles located all over feature and inside and around too. Marine shell scattered throughout feature also.

FEATURE B: Wall segment
ADJACENT TERRAIN: Flat ground.
VEGETATION: Burnt *kiawe* and grass.
FUNCTION: Indeterminate
DIMENSIONS: 2.70 m by 0.90 m by 0.52 m
CONDITION: Fair
INTEGRITY: Altered

DESCRIPTION: N/S linear alignment with slight western hook at bottom (S) end. Subangular basalt cobbles and boulders ranging from c. 0.10 to 0.40 m in diameter. Coral pieces on and throughout feature. Feature is one to three courses high and c. 2.70 m long with the hook sticking out c. 0.90 m W. Small amounts of marine shell around feature. Features oriented at 230 degrees. Trowel test c. 0.10+ m; silt with cobbles and some coral rock. This feature is located c. 3.00 m S/SE of southern portion of Feature A and c. 0.70 m NW of Feature C. Surface remains consist of marine shell/coral with surface deposits noted as present.

FEATURE C: Wall segment
ADJACENT TERRAIN: Flat ground; coastal cliff plateau.
VEGETATION: *Kiawe* and desert grass.
FUNCTION: Indeterminate
DIMENSIONS: 4.00 m by 1.50 m by 0.45 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Linear alignment running NE to SW. Oriented at 242 degrees. Large basalt rocks stacked on surface. Coral rock and marine shell incorporated in feature. SW end terminates in circular basalt ring. Some waterworn cobbles also on feature. Trowel test yielded c. 0.10+ m soft silt but with cobble intrusion; coral rock also within test confines. This feature is located c. 0.75 m SE of Feature B, c. 1.50 m NE of Feature D and c. 8.00 m W of bulldozer road. Surface deposit noted as present per trowel test.

FEATURE D: Mound
ADJACENT TERRAIN: Coastal cliff plateau.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 1.50 m by 1.00 m by 0.35 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Oval shaped mound of stacked basalt rock, (two to three courses high) with coral rock included in construction. Oriented at 198 degrees. Trowel test +0.10 m; loose silt but fire intruded; ending on bedrock. Waterworn basalt cobbles also present in construction. This feature is located c. 1.50 (1 1/2) m south (170 degrees) from end of Feature C. Surface deposit noted as absent per trowel test.

FEATURE E: Terrace
ADJACENT TERRAIN: Coastal cliff plateau.
VEGETATION: *Kiawe*.
FUNCTION: Possible burial
DIMENSIONS: 3.00 m by 3.00 m by 0.59 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Large semi-squarish shaped mound of stacked basalt rock with coral rock and waterworn cobble included in construction. Feature is oriented at 198 degrees to Feature A. There is a circular area at east end (c. 0.60 m round) where rocks appear to have been removed. Trowel test c. 0.04 to 0.10 m; loose silt on top of cobble bedding, coral rock present. This feature extends west into center of Feature A. Surface remains noted as marine shell. Surface deposit noted as present per trowel test.

FEATURE F: Terrace
ADJACENT TERRAIN: Coastal cliff plateau.

VEGETATION: *Kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 6.50 m (380 degrees) by 3.50 m by 1.00 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Stacked basalt rock, c. 0.20 to 0.40 m in size. Rocks are faced on east side of bedrock and earthen berm. Berm slopes to west c. 3.00 m until it comes to aa which forms shoreline. Rocks are stacked on top of berm on north end. There is also a rock wall on north and at right angle extending to east which has little or no stacking. This feature located c. 20.00 m east of shoreline; c. 9.00 m west of Feature L. Trowel test indicated loose silt with cultural remains included. Surface remains consist of marine shell with no surface deposit present.

FEATURE G: Modified outcrop
ADJACENT TERRAIN: Coastal cliff plateau; heavily fire-affected area.
VEGETATION: *Kiawe.*
FUNCTION: Habitation
DIMENSIONS: 2.50 m by 0.50 m by 0.68 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Stacked basalt rock (one course) on basalt outcropping. Waterworn basalt and coral rock included in construction. Oriented at 308 degrees. Area east of mound heavily fire-affected; soil deposit appears to be pushed ash from fire on bedrock. This feature located c. 5.00 m north of Feature F on downhill slope toward lava flow beach. Surface remains: marine shell, with surface deposit noted as absent.

FEATURE H: Alignment
ADJACENT TERRAIN: Coastal cliff plateau.
VEGETATION: *Kiawe* and grass.
FUNCTION: Transportation
DIMENSIONS: 7.50 m (270 degrees TN) by 0.20 m by 0.10 m
CONDITION: Good
INTEGRITY: Altered
DESCRIPTION: Snake-like alignment of rocks, no stacking, only one course thick. Lines south side of path. Trowel test indicated semi-compact silt loam with cultural remains present (marine shell and coral). This feature is located c. 0.50 m south of Feature I, c. 3.00 m north of Feature L. Surface deposit noted as present.

FEATURE I: Alignment
ADJACENT TERRAIN: Coastal cliff plateau.
VEGETATION: *Kiawe* and grass.
FUNCTION: Transportation
DIMENSIONS: 7.00 m (295 degrees) by 0.30 m by 0.20 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Lined basalt rocks on north side of path. No stacking. Path widens on west end. Alignment is not straight. This feature is located c. 0.50 m north of Feature H. Surface remains consist of marine shell. No surface deposit present.

FEATURE J: Terrace
ADJACENT TERRAIN: Adjacent to the beach. Exposed bedrock. There is a gentle slope to the northwest.

VEGETATION: *Kiawe.*
FUNCTION: Habitation
DIMENSIONS: 7.00 m (NW/SE) by 5.50 m by 0.70 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: This feature is roughly rectangular in overall shape and appears to have a paved surface. It is oriented NW and SE. The northeast boundary consists of a bedrock outcrop standing c. 0.70 m above surrounding surface. Feature consists of subround, subangular, waterworn coral and waterworn basalt cobbles. Size of these are small to medium from c. 0.10 to 0.40 m in diameter, stacked and placed one to three courses high. The NW boundary is very similar to the NE boundary with the exception of a large *kiawe* tree that has recently fallen across the center NW boundary and caused a collapse. The south and southwest boundary has been delineated by a rubble concentration. The paved flat area extends to this rubble. The southeast cannot be defined. The surface of the terrace is relatively flat and consists of small *'ili'ili* and angular gravel; both coral and basalt. On the terraces' surface, there are displaced cobbles, burnt wood, and branches. Feature is located circa c. 10.00 m east of the coastal vegetation line. Features H and I are located circa c. 3.00 to 5.00 m south of the terrace. Feature K is located circa c. 10.00 m to the north. Ecofacts consist of fishbone and a wide variety of marine shell. There is a great deal of charcoal which appears to be from the recent. There is a high probability of a habitational deposit of at least 0.10 m+ in thickness over the entire surface of the terrace.

FEATURE K: Trail segment
ADJACENT TERRAIN: Small surrounding knolls, coastal cliff plateau.
VEGETATION: Burnt *kiawe.*
FUNCTION: Transportation
DIMENSIONS: 12.00 m by 0.20 m by 0.23 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Linear stacked basalt rock (one to two courses) lining obvious path down to coast. Line loses integrity at NW end and ends abruptly on east end with large basalt boulder. Overall construction sizes deviate from cobble to larger basalt rock +0.40 m. Coral rock fragments are scattered about path at NW end. Feature oriented at 334 degrees. Trowel test indicated rather compact silty loam under surface ash deposit (c. 0.01 to 0.05 m). No cultural remains noted. This feature is located c. 10.00 m east of Feature J on slight NW downhill slope toward coast.

FEATURE M: Mound
ADJACENT TERRAIN: Coastal cliff plateau.
VEGETATION: *Kiawe.*
FUNCTION: Possible burial
DIMENSIONS: 2.50 m by 2.50 m by 0.70 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Irregular, loosely stacked basalt rock with burnt *kiawe* tree stump uprooted and pushed into center of mound. Coral rock and waterworn basalt incorporated in construction. Feature oriented at 198 degrees. "L" shaped in overall appearance. Remnant facing along interior portion of feature. Storm wash build up along the exterior of feature. This feature is located c. 1.00 m north of Feature E. Surface remains consist of marine shell, broken bottles, soda cans. Surface deposit noted as disturbed.

FEATURE O: Terrace
ADJACENT TERRAIN: Coastal cliff plateau.
VEGETATION: *Kiawe*
FUNCTION: Habitation
DIMENSIONS: 14.00 m by 9.50 m by surface
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Large area paved with small basalt waterworn cobbles. Relatively flat except for disturbed areas. A few larger basalt cobbles (waterworn) are present in outer parameters. A terrace wall (Feature N) is located on west end of feature. Feature abuts the west end of Feature A. Paving appears to be fairly uniform in distribution (except in disturbed areas). Lengthwise orientation from east to west at 290 degrees. Major disturbance occurs in close center area where a pit half-filled with burnt *kiawe* trees and slumped basalt rock (from Feature A) has been dug out. Trowel test indicated a cultural midden c. 0.07 to 0.10 m below surface; however, damage from fire and historic disturbance is very evident. Located immediately south of Feature A to coast cliff wall. Surface remains consist of marine shell, coral, waterworn cobble.

STATE NO.: 19366 Other: YG-59 PHRI TEMP. NO.:855-256
SITE TYPE: Complex (28 Features)
TOPOGRAPHY: Coastal cliff plateau small rolling hills.
VEGETATION: *Kiawe* and dry grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of four enclosures (Features A, D, I, U), two walls (Feature B), one wall remnant (Feature C), one mound (Feature F), two C-shapes (Features E, V), one circular alignment (Feature G), two trails (Features H, X), one D-shaped alignment (Feature J), one semi circular alignment (Feature K), four terraces (Features L, M, R, W), one cairn (Feature N), remnant enclosure (Feature O), two circular enclosure (Features P, Q), one midden concentration (Feature T), four cleared areas (Features Y, Z, AA, BB), and a hearth (Feature CC).

FEATURE A: Enclosure
ADJACENT TERRAIN: Slight slope west toward water
VEGETATION: Burnt *Kiawe* and desert grass
FUNCTION: Habitation
DIMENSIONS: 3.80 m (N/S) by 5.30 m (E/W) by 0.50 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Roughly square shape enclosure, constructed of subangular basalt cobbles and boulders ranging from c. 0.10 to 0.40 m in diameter. Coral, marine shell, and waterworn basalt throughout feature also. Natural bedrock incorporated in construction also. Eastern wall is the most defined alignment one to three courses wide and one to two high. The south wall is still distinguishable with more rubble in SE portion. The west wall seems to meld or have collapsed into the east wall of Feature O and the north wall is very sketchy and almost totally wiped out except for a few base line rocks. The center is partially clean with some rubble scatter throughout. This feature is located on east (poss. touching) Feature O, c. 1.00 m north of Feature P. No surface deposit noted.

FEATURE B: Wall
ADJACENT TERRAIN: Gently sloping west toward water; fairly level ground
VEGETATION: *Kiawe* and desert grass
FUNCTION: Habitation
DIMENSIONS: 5.50 m by 2.00 m by 0.54 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Subangular basalt cobbles and waterworn basalt cobbles and coral stacked and aligned in a line. One to three courses high and three to seven wide (from collapsing) north portion curves east and seems to join with terrace (Feature M). Disturbed from cobbles washing up on shore and collapsing from tree falling on it. South portion much wider than north portion from wash and collapsing. (five courses to two). This feature located c. 3.00 m west of Feature N, M; c. 10.00+ m west of water-abutting the waterworn beach. Surface remains consist of coral and marine shell. Surface deposit noted as present.

FEATURE C: Wall remnant
ADJACENT TERRAIN: Undulating surface slightly sloping to the west. Exposed bedrock immediately adjacent to the feature. There is a large partially uprooted *kiawe* between Features C and B.
VEGETATION: Large *kiawe* and sparse grass
FUNCTION: Habitation
DIMENSIONS: 2.80 m (E/W) by 1.40 m (N/S) by 0.46 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Feature C is a linear wall remnant consisting mainly of waterworn basalt and coral cobbles c. 0.05 to 0.15 m in size. Most of these cobbles are from midpoint to eastern end of remnant. There are approx. twelve 0.30 to 0.50 m cobbles on the northern side, which are aligned and faced giving the feature not a mound designation. The cobbles have been placed upon existing bedrock and sand. On the north side the large cobbles were well stacked two courses high. The south and southeast side has totally collapsed and consequently lacks signs of formal construction as compared to the north and northwest side. The eastern end has been very recently collapsed due to a burnt tree impacting it. All of the basalt and coral cobbles are fire effected. The feature averages c. 0.70 m wide in actual construction. Feature is located c. 2.00 m Feature M coastal storm line. Feature is located c. 1.00 m. Seaward of Feature R and c. 5.00 m south of Feature B. Surface remains consist of whole cowry shells, branch coral. Surface deposit noted as absent.

FEATURE D: Enclosure
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 3.00 (12 degrees) m by 2.00 (130 degrees) m by 0.58 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A small randomly piled pahoehoe boulders in a U-shape which incorporates bedrock into the construction. Structure is open on the east side. Waterworn coral, cobbles and marine shell are evident within and without the structure. Feature D is located c. 30.00 m east of the ocean and c. 9.00 m NE at 226 degrees of TN from Feature E. This feature is located extreme west central at *makai*. Surface deposit noted as absent with surface scatter.

FEATURE E: C-shape
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and scrub grass
FUNCTION: Habitation
DIMENSIONS: 4.00 (318 degrees) m by 2.50 m (48 degrees) by 0.80 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: Randomly piled pahoehoe boulders on a bedrock tongue along the shoreline. Structure is an altered C-shape piled three to four boulders high on the NW side while the south side is only partially visible. Within the structure is waterworn coral and cobbles due to close proximity of the ocean. Alteration is high and boulders are strewn about. This structure lies c. 25.00 m east of the ocean. There are two recent historic bottles within the structure. This feature is located extreme west central at *makai*. Historic bottles and marine shell were also located within the feature. The nature of deposit notes c. 0.15 m of coral and shell.

FEATURE F: Mound
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and scrub grass
FUNCTION: Possible ceremonial
DIMENSIONS: 2.00 m (318 degrees) by 1.50 m (48 degrees) by 0.56 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: A randomly stacked somewhat square shaped mound of large pahoehoe boulders. The mound may have been faced but that is conjecture since it has been altered. Waterworn coral, branch coral, marine shell, and waterworn cobbles are interspersed throughout structure. Feature appears to be at least three courses high. boulders have fallen on the east and west sides. Feature G is c. 0.60 m NW of this feature. A coral lined path leads into the feature from the NE. This feature is located on extreme west central at *makai*. Would have to tear mound apart to test it.

FEATURE G: Circular alignment
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and scrub grass
FUNCTION: Habitation
DIMENSIONS: 2.50 m (71 degrees) by 2.00 m (336 degrees) by 0.22 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: A circular alignment of pahoehoe boulders and cobbles. The north side is randomly piled and the rest is single course. An alignment of coral follows along the north and northeast sides leading to Feature F. A trail goes along the north. The north side is c. 0.18 m high. This feature is located on extreme west central at *makai*. Surface remains consist of one waterworn coral, one Volkswagen mirror, one tuna fish can (ID #11). Surface deposit noted as absent.

FEATURE H: Trail
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and scrub grass
FUNCTION: Transportation
DIMENSIONS: 7.00 m (122 degrees) by 0.75 m (20 degrees) by 0.07 m
CONDITION: Excellent
INTEGRITY: Unaltered

DESCRIPTION: A coral lined dirt trail running east to west. Width is c. 0.65 m. Trail connects into a complex of Features J, L, I, F, G, K. This feature is located on extreme west central at *makai*.

FEATURE I: Enclosure
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and scrub grass
FUNCTION: Habitation
DIMENSIONS: 2.50 m (24 degrees) by 1.50 m (114 degrees) by 0.35 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A rectangular enclosure of pahoehoe boulders one to two courses in some places. Coral is interspersed throughout the structure. Some of the coral on top is probably recent. Bedrock is incorporated into the structure on the west and SW sides. The NE side is open. This feature lies next to a N/S trail on its' west side. Feature D is SE at c. 2.00 m and Feature L is SW at c. 2.00 m. This enclosure looks recent and could be a wind shield for fire or sleeping. This feature is located on extreme west central at *makai*. Surface remains consist of waterworn coral, cobbles, marine shell, and bottle glass. Surface deposit notes beer bottle glass and Rolaids pack.

FEATURE J: D-shape alignment
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and grass
FUNCTION: Possible ceremonial
DIMENSIONS: 5.00 m (125 degrees) by 2.00 m (26 degrees) by 0.26 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A single course of pahoehoe boulders, cobbles, and coral roughly forming a D-shape. The north side is slightly curved whereas the curvature of the south side is more pronounced. At the inside apex of the curve is a small (c. 0.10 by 0.20 m) group of waterworn cobbles. This feature lies at a cross road of trails: N to S, E to W and NE trails. A semi-circular alignment within the trails lies c. 1.00 m S of this feature. Feature is c. 35.00 m east of the ocean and to the extreme west central at *makai*. Surface remains consist of waterworn coral, cobbles, marine shell. Surface deposit not excavated; if this is a shrine; there is no testing.

FEATURE K: Semi-circular alignment
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and scrub grass
FUNCTION: Trail marker
DIMENSIONS: 2.00 m (117 degrees) by 0.50 m (27 degrees) by 0.08 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A semi circular alignment of waterworn coral spaced c. 0.15 to 0.20 m apart. This feature causes the E/W trail to arc around Feature J. This feature is between Features G and J. Feature could be part of Feature F-H trail. This feature is located on extreme west central at *makai*. Surface remains consist of waterworn coral (ID #11). Surface deposit noted as absent.

FEATURE L: Terrace
ADJACENT TERRAIN: Shoreline
VEGETATION: *Kiawe* and scrub grass
FUNCTION: Habitation

DIMENSIONS: 3.00 m (8 degrees) by 1.50 m (98 degrees) by 0.18 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A loosely piled linear arrangement of small pahoehoe boulders and cobbles. *'Ili'ili* stones are scattered on the east side of stones and across a N/S path to the north. The boulders and cobbles are c. 0.50 m wide and one to two courses high. Feature L lies c. 2.50 m (2 1/2 m) W of F-D and c. 15.00 m E of the ocean. There is a trail on the north and SE edge. This feature is located on extreme west central at *makai*. Surface remains consist of waterworn coral, cobbles, marine shell, and *'ili'ili* stones. Surface deposit notes that paving extends for c. 0.05 m. This feature looks more like an old trail edge than a terrace.

FEATURE M: Terrace
ADJACENT TERRAIN: Down hill slope of small knoll
VEGETATION: *Kiawe* and dry grass
FUNCTION: Habitation
DIMENSIONS: 5.00 m by 3.00 m by 0.50 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Basalt rock, cobble, waterworn and coral wall stacked two courses high in semi-circular arrangement. Surface is flat behind wall and has basalt cobble and beach sand paving. Terrace abuts basalt outcropping along eastern portion. A cairn (Feature N) is positioned at the SE corner of wall, historic disturbance is particularly noticeable in this section (trash). Trowel test indicated that gravely beach sand deposit was consistent for c. +0.10 m. Feature was highly fire affected. This feature is located c. 10.00 m east of coast. Approx. 4.00 m north of feature and adjacent to Feature N. Surface remains consist of historic tin cans, shoes, bottles, brick fragments, no prehistoric cultural remains were noted. Per trowel testing, surface deposit noted as absent.

FEATURE N: Cairn
ADJACENT TERRAIN: Gentle slope W toward water.
VEGETATION: *Kiawe* and burned and unburned desert grass
FUNCTION: Marker
DIMENSIONS: 1.00 m (NE/SW) by 1.30 m (NW/SE) by 0.92 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Cone shape cairn constructed on old collapsed terrace (post-dates terrace). Sub-angular and waterworn basalt cobbles and boulders c. 0.15 to 0.35 m in diameter. Coral and natural bedrock. Incorporated in construction of feature. NE side is fairly straight while SW side slopes at a great angle. Large waterworn coral boulders all around feature and marine shells too. This feature is located c. 8.00 m N/NW of Feature Q, c. 30.00 m E of water, c. 3.00 m E of Feature B. Surface deposit noted as present.

FEATURE O: Enclosure
ADJACENT TERRAIN: Slight western slope to water
VEGETATION: Burned *Kiawe* and desert grass
FUNCTION: Habitation
DIMENSIONS: 5.00 m (344 degrees) by 4.35 m by 0.70 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Roughly circular enclosure constructed of subangular basalt boulders and cobbles ranging from c. 0.10 to 0.40 m in diameter. Also incorporating natural bedrock along

western portion. East and S walls still approximately three to four courses high while the rest of the feature is rubbled out to about one course high. The center is clear of rocks. Waterworn coral is located throughout all feature walls. Small amount of marine shell around feature also. South wall, two to four wide and E wall four to six wide with a lot of rubble incorporated. Feature located c. 30.00 m N of Feature K site 855-255. SE portion of site, c. 50.00 m E of water. Surface deposit notes present.

FEATURE P: Circular enclosure
ADJACENT TERRAIN: Slight western slope to water
VEGETATION: *Kiawe* and grass
FUNCTION: Habitation
DIMENSIONS: 2.30 m (N/S) by 2.80 m (E/W) by 0.55 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Circular shape enclosure constructed of subangular basalt cobbles and boulders ranging from c. 0.10 to 0.40 m in diameter. One to three courses high and one to three courses wide except for W portion which is very rubbled out and approx. five to seven wide. Center of feature has a few rocks throughout. Coral is incorporated throughout entire feature. Alignment in N portion seems most intact. Small amount of marine shell around feature also. This feature is located c. 0.75 m SE of Feature O. Surface deposit noted as present.

FEATURE Q: Circular enclosure
ADJACENT TERRAIN:
VEGETATION: *Kiawe* and desert grass
FUNCTION: Hearth
DIMENSIONS: 1.35 m by 1.35 m by 0.44 m
CONDITION: Good
INTEGRITY: Altered
DESCRIPTION: Subangular basalt cobbles and boulders ranging from c. 0.10 to 0.50 m in diameter. Small circular enclosure stacked one to three courses high. Rubble scatter outside of feature but not interfering with construction. Natural bedrock incorporated in construction of feature. Center of pit is cleared and depressed. Inside surface is approximately c. 0.10 m lower than outside ground surface. This feature is located c. 40.00 m E of coastline, c. 12.00 m SW of Feature O. Surface remains consist of coral and a small amount of marine shell. The nature of deposit noted as absent (unless found during further testing).

FEATURE R: Terrace
ADJACENT TERRAIN: Flat area above and below feature; Gentle slope toward the sea
VEGETATION: *Kiawe* and grass
FUNCTION: Habitation
DIMENSIONS: 5.00 m by 3.50 m by 0.40 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: This feature is oriented south to north with an alignment of five small boulders c. 1.00 m in length that connects to northern end of feature. The feature consists of basalt and coral cobbles placed above, below and upon existing bedrock. The majority of these cobbles are on SW corner. The feature is roughly rectangular. All of the cobbles are fire effected (7-4-92). Overall length S/N is c. 5.00 m. There is one large coral head c. 0.45 m in diameter at the SW corner where the five aligned small boulders connect to the north end of feature, and there are one to two course stacking running from the boulders to the NE corner. The

southwestern corner is a paved area c. 2.00 m S/N c. 1.20 m E/W (subfeature). The eastern boundary is not discernible, surrounded by rubble and fallen trees. One large *kiawe* tree uprooted seaward and inland of feature located c. 3.00 m to either tree. Feature R may at one time have been connected to Feature C it is not possible to confirm this now. Feature R is located c. 6.00 m from coastal storm line. It is located c. 1.00 m from Feature C and c. 3.00 m from Feature B, and c. 2.00 m from Feature N. Surface remains consist of branch coral, coral heads, marine shell, two pennies, tin can. A likely chance of cultural deposit below flat surface of terrace as well as the SW corner.

FEATURE T: Midden concentration
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and brown grass.
FUNCTION: Habitation
DIMENSIONS: 5.50 m by 2.50 m by 0.30 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: A scatter of numerous marine shells (mostly cowry) on reddish-brown, ashy silt. Sits atop a hill just E of Feature C, and extends down to N of C, in direction of apparent rainwash. A group of pahoehoe cobbles one course high with several pieces of coral is immediately S. Rocks are c. 0.10 to 0.30 m length/diameter. Long axis runs 80 to 260 degrees. Feature is located on NW quad of project area, atop a W-facing hill less than 20.00 m from shore. A trowel probed into soil is stopped by rock at less than 0.05 mbs. Unexcavated.

FEATURE U: Enclosure
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Habitation
DIMENSIONS: 1.50 m (38 degrees) by 3.25 m (128 degrees) by 0.11 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: A single course rectangular enclosure of pahoehoe boulders and cobbles. This structure is incorporated into Feature H (trail) on the north. There is no midden or waterworns inside. Part of the path that leads to Feature F is located along the west side of Feature U but is not part of it. Rubble is spread throughout the interior but it doesn't appear as paving. The feature is in poor shape and many of the rocks may have been removed for other structures. This feature is located on extreme west central portion at *makai*. (ID #11)

FEATURE V: C-shape
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and scrub grass.
FUNCTION: Military
DIMENSIONS: 4.00 m (7 degrees) by 1.40 m (105 degrees) by 0.35 m
CONDITION: Poor-fair
INTEGRITY:
DESCRIPTION: A C-shaped structure of randomly piled pahoehoe boulders and cobbles one to two courses high. There is a lot of dirt thrown in with the rocks. Tin can fragments and bullet shells are located in and around the feature. Marine shell and waterworn coral is scattered on the outside of it. The structure faces east with the open side on the west. Feature H (trail) runs close by on the north. It sits on the edge of a bench and a small shallow ravine is located on its south edge. Located on extreme west central portion at *makai* section. Surface deposit noted as absent.

FEATURE W: Terrace
ADJACENT TERRAIN: This feature is situated on fairly flat ground.
VEGETATION: Fountain grass.
FUNCTION: Agriculture
DIMENSIONS: 13.50 m (N/S) by 10.50 m (E/W) by 0.32 m
CONDITION: Poor
INTEGRITY: Altered
DESCRIPTION: This feature is an amorphous (very slightly rectangular) three-tiered terrace with three cleared areas (bare soil areas-devoid of stones). This feature comprises weathered aa and pahoehoe (c. 0.03 to 0.35 m in length/diameter). Feature X, a trail, forms the N to SWS boundary of this feature. The cleared areas are located in the eastern corner, the southern corner, as well as a cleared area (approximately centrally located in the feature). The rough average size of the construction material is c. 0.15 m in length/diameter. The feature is piled (maximum) three courses high with the majority being one to two courses high. These "tiers" are constructed roughly cross-slope (NW/SE). This feature is located c. 28.10 m, 263 degrees to Feature H datum from datum at Feature W. Surface remains consist of waterworn coral, fragmented non-waterworn coral, waterworn basalt, 242 caliber bullet casings, and one small battery (AA). The nature of the deposit is unknown at this time.

FEATURE X: Trail
ADJACENT TERRAIN: This feature is situated on fairly level terrain.
VEGETATION: Grass, *kiawe* nearby.
FUNCTION: Transportation
DIMENSIONS: 23.50 m (NE/SW) by 0.60 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: This is a serpentine trail feature connecting to and coming off the main prehistoric trail which undulates through the coastal portion of the project area. This branch trail heads roughly SW toward the ocean (c. 45.00 m away). This trail forms the N to WSW boundary of the three tiered terrace feature (W). This feature is intermittently lined with weathered aa and pahoehoe c. 0.05 to 0.30 in length/diameter. This lining is piled one to two courses high. The "floor" surface of the trail is a silty brown soil, with smaller basalt gravel components littering the ground. This feature is immediately to the N to WSW of Feature W. Surface remains consist of waterworn and fragmented coral scatter, and one waterworn basalt cobble. The surface deposit is unknown at this time.

FEATURE Y: Cleared area
ADJACENT TERRAIN: This feature is set on fairly level ground (slight slope to the north).
VEGETATION: No vegetation.
FUNCTION: Agriculture
DIMENSIONS: 4.50 m (NE/SW) by 3.50 m (NW/SE) by 0.41 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: This feature is roughly spherical in shape, with a small raised build-up of stone to the NE. The feature is itself raised and lined with weathered aa and pahoehoe cobbles and small boulders c. 0.05 to 0.35 m length/diameter. A flat rocky soil lies within the lining of this feature, and is raised above the surrounding soil deposit. The lining is piled one to three courses high. This feature is roughly 8.00 m to the N from Feature W. No surface remains encountered on this feature. Surface deposit is unknown at this time.

FEATURE Z: Cleared area
ADJACENT TERRAIN: This feature is set in rolling flat terrain (c. 45 m from littoral zone).
VEGETATION: Lantana and grass.
FUNCTION: Agriculture
DIMENSIONS: 3.50 m (NNE/SSW) by 3.00 m (ESE/WNW) by 0.33 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: This feature is a roughly circular in plan view, and is constructed of piled, weathered aa and pahoehoe cobbles and small boulders c. 0.05 to 0.70 m length/diameter. The WNW portion of this feature is a narrow linear projecting (low) basalt outcrop and is modified by one course of stone. This comprises one to three courses. This has been constructed by removing the basalt material and piling it around this rougher circular area. A narrow opening in this enclosure-like cleared area exists in the ENE portion of this feature. This feature is located c. 18.00 m, NW from Feature W. Surface remains consist of modern trash (sardine can) WSW of this feature. Very shallow natural soil (silty loam) in the interior of this feature. Surface deposit noted as absent.

FEATURE AA: Cleared area
ADJACENT TERRAIN: This feature is situated on fairly level ground, with a slope (15-20 degrees) to the NW.
VEGETATION: Lantana and grass.
FUNCTION: Agriculture
DIMENSIONS: 6.80 m (E/W) by 6.40 m (N/S) by 0.30 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: This feature is roughly circular in plan view and is constructed of piled, weathered, aa and pahoehoe cobbles to small boulders. It comprises one to three courses and lines a slightly raised soil surface in the interior of this structure. The interior soil is a very rocky matrix of small *'ili'ili*-like basalt gravel. This feature is c. 1.00 m NW of Feature Z, and is c. 21.00 m WNW of Feature W. Surface remains consisting of modern trash (cans, etc.) lie on the southern corner-like portion of this structure. Three coral scatters are within the interior of this structure, as well as a single waterworn coral cobble. In addition, a waterworn cobble is in the interior of this feature. A natural gravel and loam soil deposit lies in the interior of this feature. A poss. cultural deposit is unknown at this time due to lack of subsurface testing.

FEATURE BB: Cleared area
ADJACENT TERRAIN: This feature is situated on fairly level terrain, with a very slight slope to the W.
VEGETATION:
FUNCTION: Agriculture
DIMENSIONS: 3.70 m (E/W) by 3.50 m (N/S) by 0.24 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: This is a semi-circular, slightly raised cleared area composed of weathered aa and pahoehoe (lg.) cobbles c. 0.05 to 0.30 m in length/diameter. This basalt material is placed generally one course high. It is possible this is two courses subsurface, but due to lack of subsurface testing, this is undetermined. The opening of this semi-circle is in the SE portion of this low structure. Trail site runs N/S to the immediate NE from this feature. This feature is roughly 145.00 m to the north from Feature W (datum to datum). No portable remains were noted at this feature. A thin soil deposit is in the interior of this feature.

FEATURE CC: Hearth
ADJACENT TERRAIN: Low undulating hills and ravines.
VEGETATION: *Kiawe* and grass.
FUNCTION: Recreation
DIMENSIONS: 1.40 m (220 degrees) by 1.10 m (310 degrees) by 0.27 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Subangular and waterworn basalt cobbles piled to two courses high in a squarish pattern to form a hearth. The hearth is located at edge of waterworn coral and waterworn basalt cobble portion of beach (to west of feature) and the black sand beach portion to east. This modern hearth was documented to illustrate modern land use patterns, as instructed by D. Graves. The lumber was apparently a seat. Located underneath uprooted *Kiawe* tree on eastern edge of waterworn coral, waterworn cobbles and black sand beach. (1.68 degrees/7.60 m to datum 256 Feature C) Surface remains consist of lumber on eastern edge; waterworn coral fragments litter area and feature, coconut husk on western feature edge. Paper towel, aluminum foil within feature interior. Surface deposit: ash c. 0.05 m deep.

STATE NO.: 19367 PHRI TEMP. NO.:855-257
SITE TYPE: Complex (12 Features)
TOPOGRAPHY: Low undulating hills and ravines on the coast. Site located on top and sides of ridges.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE:
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of two mounds (Features A, B), three U-shapes (Features D, E, F), two walls (Features G, L), two terrace remnants (Features H, M), one paved area (Feature J), one modified outcrop (Feature K), and a terrace (Feature O).

FEATURE A: Mound
ADJACENT TERRAIN: Burn area, extensively disturbed, fire affected.
VEGETATION: *Kiawe* and burnt grass.
FUNCTION: Indeterminate
DIMENSIONS: 1.00 m (N/S) by 0.80 m (E/W) by 0.35 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Subangular fire-affected large cobbles and small boulders stacked one to three courses, c. 0.20 to 0.50 m in diameter, stacked on surface. Located c. 13.20 m to Feature G at 300 degrees. No surface remains or deposit visible. Trowel test indicated +10 depth is silt. No cultural evidence.

FEATURE B: Mound
ADJACENT TERRAIN: Burn area, vegetation burned, trees uprooted by firefighting equipment and pushed to within c. 30 m of the water's edge.
VEGETATION:
FUNCTION: Indeterminate
DIMENSIONS: 1.50 m (N/S) by 1.15 m (E/W) by 0.50 m
CONDITION: Good
INTEGRITY: Altered

DESCRIPTION: Subangular basalt piled one to three courses (c. 20.00 m to 0.60 m in diameter) stacked on surface. Feature B is c. 7.70 m from Feature F at 300 degrees on a coastal plateau. Surface remains consist of metal fragments and glass. Surface deposit noted as present with portable historical surface artifacts. Subsurface trowel test shows +10 to be silt. No cultural evidence.

FEATURE D: U-shape
ADJACENT TERRAIN: Feature D is elevated and south of coastal lava flow. It is north of slightly higher terrain.
VEGETATION: *Kiawe* and crop grass.
FUNCTION: Habitation
DIMENSIONS: 6.10 m (W/E) by 5.50 m (N/S) by 0.80 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Feature D is constructed of waterworn small basalt boulders, small subangular basalt boulders and small waterworn basalt cobbles. Stacked four to five courses. The rocks are c. 0.20 to 0.40 m in diameter with smaller sized rocks under and within the larger stacking. There are waterworn pebbles and coral atop the feature; these are probably deposited environmentally. There is slumpage almost completely around the feature with the exception of a small area on the eastern wall c. 1.00 m wide by 70.00 m in height. In the center of the feature is a small paved area of waterworn gravel and pebbles (0.05 m depth) surrounded by waterworn boulders c. 50.00 m in diameter. Above the northern midsection are three medium *kiawe* tree trunks, that possibly dislocated some rocks, now evident to the north of these trees as rubble. There is one *kiawe* tree coming up through the eastern side; however, the outside of this portion shows least slumpage. Feature D has been fire-affected (7-4-92), as well as by recreational activities. Feature D is c. 3.20 m seaward of Feature O at 76 degrees and is within c. 1.00 m of the vegetation line. A metal pot cover has been noted in surface remains. Surface deposit is noted as absent; storm deposit. Trowel test +0.10 m in center area; small pebbles and marine midden.

FEATURE E: U-shape
ADJACENT TERRAIN: Low undulating hills and ravines; entire area burned.
VEGETATION: *Kiawe* and fountain grass.
FUNCTION: Habitation
DIMENSIONS: 2.75 m (N/S) by 2.00 m (E/W) by 0.65 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Feature E, a U-shape, was constructed with a mixture of pahoehoe subangular cobbles and boulders, and waterworn cobbles and boulders. The stones range in size from c. 0.10 to 0.60 m diameter/length, and are stacked two to three courses high. The U opens to the east with the closed end facing the ocean. The interior appears to be eroded. The interior contains midden/"eco-facts", a mixture of coral and marine shells. Located at coast/shore at central part of project area. Surface remains consist of modern bottle glass, burned green plastic, midden (shell and coral mix), coral, including branch, on feature structure. Surface deposit noted as absent. Within interior, the midden appears to be surface, but a small test indicated a matrix high in organic content. Ergo, a test should be placed to test this feature.

FEATURE F: U-shape
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Habitation

DIMENSIONS: 7.90 m by 6.50 m by 0.65 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Boulder to gravel-size pahoehoe, piled with soil to form a U-shape, opening faces south. Long axis oriented 187 to 367 degrees. Rocks range from c. 0.60 m to small pebble-size. This feature located on NW quad of project area, c. 10.00 m east of shore. Surface remains consist of a base of a white ceramic Anchor Hocking fireproof coffee mug, large faunal bone (cow?), one rusty bottle cap, c. 0.5 gal. glass bottle with paper label still attached. Nature of deposit is unexcavated. A trowel probed into soil hits rock at less than 0.10 mbs. No cultural deposit detected.

FEATURE G: Wall
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 5.40 m by 1.10 m by 0.26 m (10 to 190 degrees)
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles and small boulders and coral cobbles piled one to two courses high. The wall starts parallel to the shore and arcs west toward the shore. A footpath running roughly north to south cuts through the wall. The wall section west of the path is indistinct, though it appears to follow the edge of a round rise of ground. Rocks are c. 0.12 to 0.60 m length/diameter; most are less than or equal to 0.30 m. A large amount of rounded coral lies mostly between the footpath and east wall section. Section east of footpath is all included in length, under feature dimensions. Located on NW quad of project area, c. 15.00 m east of shore. Surface remains consist of one rusty metal can, one rusty umbrella frame. Surface deposit is unexcavated.

FEATURE H: Terrace
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 2.50 m by 1.40 m by 0.46 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe boulders and cobbles stacked one to two courses high in a rough alignment. Long axis is 60 to 240 degrees. Rocks vary from c. 0.20 to 0.74 m in length/diameter; most are less than or equal to 0.25 m. Ground surface to the east is slightly higher than west. A low C-shape (no feature designation) lies c. 0.50 m to NE. Located on NW quad of project area, c. 10.00 m east of shore. Surface remains consist of metal spatula, glass tube c. 7.70 by 0.09 m in diameter, brown broken beer bottle (no deposit, no return, 12 oz.), aluminum Lipton iced tea can. Surface deposit is unexcavated. A trowel probed into the red silty soil is stopped by rock at 0.12 mbs. No cultural deposit detected.

FEATURE J: Paved area
ADJACENT TERRAIN: Basalt pebbles, cobbles, small boulders; exposed basalt bedrock.
VEGETATION: Grass
FUNCTION: Habitation
DIMENSIONS: 6.65 m by 3.20 m by 0.24 m
CONDITION: Poor-fair
INTEGRITY: Altered

DESCRIPTION: Feature J is approximately centered on ridge spur/plateau. The paved area consists mainly of basalt gravel, basalt pebbles, and small fingers of coral. The feature has been heavily disturbed and appears to have been a larger area at one time. Feature J is located 220 degrees south and c. 20.00 m to Site 855-256 Feature I. Approx. 1.00 m west of feature is depression of uprooted tree (no tree) and a displaced pile of soil. Approx. 1.00 m east is a pile of construction type large boulders; all of the rocks are fire-affected. Surface remains consist of historic rusted tin lid, marine shell and small fragments of coral, shark tooth (Art #12), and metal belt buckle "1984" (Art #13). Subsurface trowel test +0.10 m; silt and pebbles (not waterworn).

FEATURE K: Modified outcrop
ADJACENT TERRAIN:
VEGETATION: *Kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 3.90 m (NE/SW) by 3.30 m (W/E) by 1.02 m
CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: Feature K is situated below a basalt outcropping c. 0.60 to 0.70 m in height. Below this outcropping, is an area of gentle slope c. 1.00 m to 1.50 m; below this slope is another outcropping upon which begins Feature K. Approximately 15 large subangular basalt cobbles were placed and stacked on this outcrop. The extant portion of this terrace probably adjoined the NW section of Feature L. The firefighting tree push most likely separated the two. The decline of this feature is nearly vertical for a drop of c. 1.65 m to a final outcrop ending in the ocean. Feature K is c. 5.50 m north of Feature L at 180 degrees. Marine shell and coral noted in surface remains. Subsurface trowel test +10 in depth; silty soil and small pebbles and marine shell.

FEATURE L: Wall
ADJACENT TERRAIN:
VEGETATION: *Kiawe* and crop grass.
FUNCTION: Habitation
DIMENSIONS: 2.35 m (E/W) by 1.75 m (N/S) by 0.41 m
CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: Feature L is composed of subangular and subrounded basalt small boulders c. 0.30 to 0.50 m and cobbles c. 0.10 to 0.30 m. Stacked three to four courses high on a basalt outcropping cliff. The wall has been altered by a large *kiawe* tree growing behind it, and the tree trunk has displaced rocks, causing a heavy slumpage to the west. This is due to recent firefighting activity (7-4-92). Above the wall is a great deal of marine midden and a gentle sloping to the east, suggesting a possible terrace area. Behind the *kiawe* tree to the east is a large mound of large basalt cobbles (c. 0.20 to 0.30 m) that appear to have been pushed historically. Feature L is located c. 4.70 m west of Feature M at 110 degrees. Marine shell and coral noted in surface remains. Subsurface trowel test +0.10 m in depth. Silty loam terminating on a small rocky deposit.

FEATURE M: Terrace
ADJACENT TERRAIN:
VEGETATION: Burnt *kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 4.70 m (N/S) by 2.55 m (E/W) by 0.30 m
CONDITION: Poor-fair

INTEGRITY: Altered
DESCRIPTION: Subangular basalt large cobbles intermittent with existing bedrock; one course high alignment c. 2.00 m north to south, with a J-shaped extension of c. 0.70 m top portion E/W, c. 1.00 m stem portion NE/SW, and 1.00 m bottom portion SE/NW. This extension ends on gentle slope to the south. Feature M has been historically disturbed. Apparently pushed, fire-affected rocks have caused severe displacement. Feature M is c. 4.70 m at 290 degrees east of Feature L. Feature is 1.00 m south of substantial rubble pile. Trowel test indicated +0.10 m silty soil with underlying ash and marine midden. Coral and marine shell noted in surface remains.

FEATURE O: Terrace
ADJACENT TERRAIN:
VEGETATION: *Kiawe* and grass.
FUNCTION: Indeterminate
DIMENSIONS: 3.10 m (NE/SW) by 0.90 m (N/S) by 0.44 m
CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: Subangular basalt cobbles (c. 0.10 to 0.40 m in diameter) possibly stacked one to three courses high. Below the feature there are areas to the east and to the west that are piles of slumpage and rubble stones, suggesting that this feature may be "natural breakage of bedrock". The shape of this feature is somewhat curved and irregular due to recreational and firefighting activities. It is not possible to determine definite function. The natural shape of this bedrock outcrop when breaking away would give an appearance of terracing. Feature O is c. 3.20 m at 2.56 degrees to Feature D at c. 9.00 m above coastal vegetation line. Feature O is located on a natural rounded and elevated bedrock outcropping. No surface remains and surface deposit observed. Subsurface trowel test, +0.10 m of silty soil, no cultural evidence.

STATE NO.: 19368 PHRI TEMP. NO.:855-258
SITE TYPE: Complex (9 Features)
TOPOGRAPHY:
VEGETATION:
CONDITION: Poor-excellent
INTEGRITY:
PROBABLE AGE:
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site consists of four terraces (Features C (3), E), three hearths (Features D, M, N), and two paved areas (Features G, L)

FEATURE C: Terrace (3)
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 8.50 m by 6.50 m by 0.45 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles and small boulders stacked one to two courses high. Rocks are c. 0.15 to 0.50 m length/diameter, average is c. 0.30 m. The highest terrace is c. 3.00 by 2.50 m, long axis is 214 to 34 degrees. It forms a corner which abuts the second terrace, which has same long axis orientation. This terrace is c. 2.50 by 1.00 m, and in poor shape. Third and lowest terrace is roughly parallel to first two, and c. 2.00 m north of them. It is in good

condition. Long axis 260 to 80 degrees. Surface soil is red silt. A trowel driven into it goes easily to its full blade length (c. 0.13 m) BS at several points behind each terrace. Feature located on NW quad of project area, c. 20.00 m east of a small cove. No surface remains or surface deposit noted.

FEATURE D: Hearth
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and grass.
FUNCTION: Recreation
DIMENSIONS: 1.50 m (358 degrees) by 1.20 m (94 degrees) by 0.47 m (90 degrees to ground surface)
CONDITION: Excellent
INTEGRITY: Unaltered
DESCRIPTION: A squarish, randomly stacked, four course-high historic fire pit. This was originally marked as a cairn. The top is covered with waterworn boulders (probably taken from Feature G) and the rest of the structure is of pahoehoe boulders. An old metal chair, tin can, glass and concrete are adjacent to this feature. Located on extreme west central portion at *makai*. Ash and metal noted in surface deposit.

FEATURE E: Terrace
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 3.00 m (60 degrees) by 2.00 m (210 degrees) by 0.23 m (90 degrees perpendicular to earth surface)
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A low, stacked, one to two course terrace of pahoehoe boulders. Waterworn coral and cobbles and boulders are scattered on and around it. The ground behind (west) the terrace is at a slightly higher elevation than the east. This feature is c. 11.00 m at 92 degrees of TN from Feature G. Located on the extreme west central portion at *makai*. Surface deposit noted as absent, with surface scatter.

FEATURE G: Paved area
ADJACENT TERRAIN: Shoreline.
VEGETATION: *Kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 6.30 m (94 degrees) by 4.70 m (4 degrees)
CONDITION: Poor-fair
INTEGRITY: Altered
DESCRIPTION: A flat, paved area of waterworn coral and pebbles. Surrounding the circular area are waterworn boulders at irregularly spaced intervals. There are also some partially buried pahoehoe boulders. It appears as though there may have been a structure here, albeit a low one, but most of the stones have been removed to make campfire windbreaks. Other damage was sustained in the brush fire. Two *puka* beads (ID # 16 and 17) were found within the feature. Located on the extreme west central portion at *makai*. Waterworn coral, cobbles, boulders, marine shell, tire iron, and lead sinker (ID #17) noted in surface remains. Paving extends to 0.07 m.

FEATURE L: Paved area
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a W-facing slope.

VEGETATION: Burned *kiawe* and grass.
FUNCTION: Habitation
DIMENSIONS: 3.00 m by 1.80 m (Long axis = 307 to 127 degrees)
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A roughly oval-shaped area of ground with a covering of small pieces of coral and round gray pahoehoe. The largest pebbles are c. 0.05 m long; most are much smaller. Surrounding ground surface is reddish-brown silt with pebbles and cobbles. A trowel poked into the ground in and around feature is stopped by rock less than 0.05 mbs. Located on NW quad of project area, c. 30.00 m east of a small cove. One fragment of a slab of concrete c. 0.40 by 0.35 by 0.08 m thick with several nails in it. Located c. 1.50 m east of Feature L. Surface deposit noted as unexcavated.

FEATURE M: Hearth
ADJACENT TERRAIN: Low undulating hills and ravines.
VEGETATION: *Kiawe* and grass.
FUNCTION: Recreation
DIMENSIONS: 1.60 m (E-W) by 1.25 m (N-S) by 0.47 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Subangular pahoehoe cobbles and boulders and waterworn cobbles piled two courses high in a circular modern hearth adjacent to semi-circular bulldozer waste pile. The stones range in size from c. 0.10 by 0.20 m to 0.35 by 0.40 m. The highest section of hearth is the eastern section. Interior space is c. 0.55 to 0.80 m diameter/length. This hearth was documented to illustrate modern land use patterns, as instructed by D. Graves. Located on level bluff overlooking ocean (to west). Surface remains consist of tin cans, aluminum cans, brown, green, and colorless glass bottle and fragments, aluminum foil, unknown substance (possible washcloth or dishrag), waterworn coral and cobbles litter the surrounding area. Grill located immediately to north, foam to south. Surface deposit noted as ash within interior of hearth.

FEATURE N: Hearth
ADJACENT TERRAIN: Low undulating hills and ravines.
VEGETATION: *Kiawe* and grass.
FUNCTION: Recreation
DIMENSIONS: 1.10 m (N-S) by 1.10 m (E-W) by 0.37 m
CONDITION: Fair-good
INTEGRITY: Unaltered
DESCRIPTION: Subangular and waterworn pahoehoe boulders and cobbles stacked to three courses high to form circular modern hearth. The highest edge is the western edge facing the ocean. The interior space is c. 0.40 to 0.45 m diameter. A circular grill and large mesh grill are located within the interior. The component stones range between c. 0.10 to 0.40 m diameter/length. Feature recorded to document modern land use patterns, as instructed by D. Graves. Located on level buff overlooking ocean to west. Feature G to north, D to SE. Ashy soil present to at least 0.05 m.

STATE NO.: 19369 PHRI TEMP. NO.:855-259
SITE TYPE: Foundation
TOPOGRAPHY: Coastal plateau with some undulation caused by lava flow.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair-good

INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Possible military
DIMENSIONS: 10.30 m by 9.50 m
DESCRIPTION: Square shaped enclosure. Walls are constructed of cement mixed with large rocks. Floor is cement with a square shaped depression in the center. Large iron bolts are positioned (cemented in) within the confines of the depression. The floor is cracking and buckling. The corner of the SE wall has been badly damaged, and a rubble pile now occupies the corner area. The north wall has some damage also. The outer fringes of the top of the wall (at surface level) are deteriorating. This feature is located on central coastal portion c. 20.00 m east of coast, c. 40.00 m north of Site 855-258. Some historic trash (cans and beer bottles) in and around site. Surface deposit absent.

STATE NO.: 19370 PHRI TEMP. NO.:855-260
SITE TYPE: C-shape
TOPOGRAPHY: Roughly level to south; 10-15 degree slope everywhere else. Rolling hills above Puako Bay.
VEGETATION: *Kiawe* to the NE and grass.
CONDITION: Poor-fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 4.50 m by 4.00 m
DESCRIPTION: Randomly piled small boulders and cobbles in a C-shape, about two layers of stone on top of raised soil. The C-shape is open to the west/*makai* and nicely formed. Located next to western edge, near white house with gray roof and large stone wall. A Feature A (cairn) was mentioned but noted as "missing, believed dead". Feature B was formerly called an enclosure. Bulldozer tracks all around the site; that is probably what happened to Feature A, looks fairly recent. No surface remains or deposit noted.

STATE NO.: 19371 PHRI TEMP. NO.:1245-261
SITE TYPE: C-shape
TOPOGRAPHY: Undulating bedrock outcrops (pahoehoe). A ravine running roughly N-S is c. 5.00 m north of feature.
VEGETATION: Grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 2.00 m by 1.40 m by 0.40 m (long axis runs 32 to 212 degrees)
DESCRIPTION: Pahoehoe cobbles loosely stacked one to three courses high. Most rocks are less than or equal to 0.30 m in length/diameter; largest is c. 0.60 m. Sits atop a small ridge which runs alongside a ravine immediately to the north. Located in SE corner of project area inland above highway, above/upslope of water tank. No surface remains or deposit noted.

STATE NO.: 19372 PHRI TEMP. NO.:1245-262
SITE TYPE: Cairn
TOPOGRAPHY: Atop a slope facing NE, over undulating bedrock outcrops.

VEGETATION: Grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.40 m by 0.40 m by 0.45 m (0.40 m diameter)
DESCRIPTION: Pahoehoe cobbles stacked two to three courses high. Rocks are less than or equal to 0.30 m in length/diameter. Sits on bedrock. No surface remains or deposit noted.

STATE NO.: 19373 PHRI TEMP. NO.:1245-263
SITE TYPE: Cairn
TOPOGRAPHY: North-sloping hilly terrain.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 1.20 m by 0.90 m
DESCRIPTION: Piled and stacked pahoehoe cobbles and boulders ranging in size from c. 0.10 to 0.35 m. Square in shape with four sides; east side shows signs of collapse. Smaller cobbles in the middle of site appear to be a possible cairn, but from its size and shape, could also be a small mound. Three to four courses high. No surface remains or deposit noted.

STATE NO.: 19374 PHRI TEMP. NO.:1245-264
SITE TYPE: Terrace
TOPOGRAPHY: Westerly sloping hilly terrain.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Possible agriculture
DIMENSIONS: 2.27 m by 0.90 m
DESCRIPTION: Piled and stacked subangular basalt cobbles and boulders ranging in size from c. 0.10 to 0.40 m. One to two courses high. The back of the wall (north side) is almost level with the ground, while the south side is roughly 0.40 m above ground surface. This appears to be some sort of a retaining wall; it might extend further on either end. The wall is running east/west. Some bedrock is observed on the south side of the wall. Wall is at the bottom of a small, westerly sloping hill. Location in project area is near southern central end of parcel, inland of highway. No surface remains or deposit noted.

STATE NO.: 19375 PHRI TEMP. NO.:1245-265
SITE TYPE: Rubble concentration
TOPOGRAPHY: Flat open area, outcrop drop off to the west.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation

DIMENSIONS: 8.40 m by 1.80 m
DESCRIPTION: Piled and stacked subangular basalt cobbles and boulders ranging in size from c. 0.05-0.30 m and four to five courses high. Wall running north, south. Could be clearing for field that lies east of it. The field is virtually void of any sizable rocks. Could also be bulldozer push. It is right next to an electrical station. But there is a good amount of marine shell present around it. There is possible recent stacking on top of the wall at the south end. Stacking is two to three courses high. North end has possible mule trail going through it. Right next to trail opening in the wall is a small upright. Wall tapers down to one to two courses at the far northern end. This wall is just above and to the east of Site 265. Concentration of marine shell at far northern end; scattered marine shell also around the rest of the wall.

STATE NO.: 19376 PHRI TEMP. NO.:1245-266
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Located on west bank of hill, slope 12 degrees downhill to head of ravine.
VEGETATION: *Klawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: This site complex consists of one overhang (Feature A), one U-shape (Feature B), one terrace (Feature C), and one modified outcrop (Feature D).

FEATURE A: Overhang
ADJACENT TERRAIN: Low coastal, undulating hills, basalt outcroppings, small basin-like gully below site area.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.60 m (340 degrees) 2.60 m by 1.40 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: East face of feature consists of a basalt outcropping with a small "pocket area" extending into the outcropping c. 0.60 m, creating an overhang appearance. A semi-circular wall encloses the overhang area. Its radius is c. 1.50 m. Wall is constructed of basalt rock stacked on outcropping base. Major stacking occurs, two to three courses high on north. Rim of wall flattens to one course in the remainder of the wall. Some downhill slumpage is noticeable. Feature A abuts Feature B wall. Wall width varies but is roughly c. 0.70 m at widest point and c. 0.30 m at narrowest point. Site 265 is c. 5.00 m east of this feature, from top of overhang. Feature determination is vague; possibly storage area or used for temporary habitation. Feature A is located on the southwest corner of project area and immediately east of power station.

No portable remains were noted on the surface of this feature. Soil is very loose silt; appears to have been blown in. Only c. 0.03-0.05 m on bedrock in upper portion; some loose rocks in lower portion, but also mostly bedrock. Test Unit #1 placed within "enclosure" on July 23, 1992. No subsurface deposit encountered.

FEATURE B: U-shape
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops. Areas east and southwest of site have been bulldozed level for the power station.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation

DIMENSIONS: 2.00 m by 1.40 m (10 degrees-190 degrees) by 0.63 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe boulders and cobbles stacked one to two courses high to form a U-shape. The "U" opens toward Feature C to the west. The ground inside is fairly level, and it is slightly higher than and immediately adjacent to the terrace formed by Feature C. The two arms of the "U" point directly to the ends of Feature C, terrace. Most rocks are c. 0.50-0.80 m length/diameter. Many are flat and have been set upright. The relationship of B and C suggests an enclosed space. It measures c. 2.90 m from inner edge of B to east side of C. This feature is located northeast of power station. No portable remains were detected. A trowel poked into the soil in the area between B and C hit rock at c. 0.10 mbs. Test Unit #2 placed within southern interior, revealing volcanic glass, waterworn pebbles (possibly slingstones), and ecofactual materials.

FEATURE C: Terrace
ADJACENT TERRAIN: Undulating pahoehoe outcrops, some of which have been bulldozed level for construction of power station to SW.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 4.20 m (10 degrees-190 degrees) by 1.10 m by 0.80 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles and small boulders stacked one to three courses high. Largest rocks, c. 0.65 m length/diameter. Most are c. 0.45 m. The level area formed by the terrace extends c. 1.40 m east, where it meets Feature B. The ends of the terrace are in line with the arms of Feature B, suggesting an enclosed area. From east side of Feature C to inner edge of Feature B measures c. 2.90 m. Small scatter of marine shell below (west) of retaining wall. A trowel poked into soil in the area between B and C hits rock at c. 0.10 mbs. Immediately west of Feature C, there are couple of spots c. 0.10 m, though most of this area is also very shallow. Test Unit #7 was placed on side of retaining wall, which revealed ecofactual materials on both sides of the wall.

FEATURE D: Modified outcrop
ADJACENT TERRAIN: Undulating pahoehoe bedrock outcrops. Areas E & SW of site have been leveled for the power station.
VEGETATION: *Klawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 0.90 m (350 degrees-170 degrees) by 0.75 m by 0.60 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles piled three courses high. All rocks c. 0.55 m length/diameter. Feature lies on a bedrock outcrop along a west facing slope. This feature is located northeast of power station. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19377 PHRI TEMP. NO.:1245-267
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating hills, ridges, and ravines. Site 1245-267 located at top of small hill.

VEGETATION: Grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible agriculture
DESCRIPTION: This site complex consists of one alignment (Feature A) and one modified outcrop (Feature B). The overall site dimensions are c. 4.50 m (north-south) by 1.60 m (east-west).

FEATURE A: Alignment
ADJACENT TERRAIN: Undulating hills, ridges, and ravines.
VEGETATION: Grass.
FUNCTION: Possible agriculture
DIMENSIONS: 5.10 m (236 degrees-146 degrees) by 1.00 m (236 degrees-56 degrees)
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: This alignment was constructed with one course of pahoehoe boulders and cobbles (c. 0.15-0.50 m length/diameter) which forms an edge separating an area (to the east) that appears cleared of stones and an area (to the west) that has loose stone on surface. Feature A is located on top of hill within southwest corner of eastern (upland of highway) parcel. Feature B is immediately to the west. No portable remains or cultural deposits were observed on the surface of this feature.

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Undulating hills, ridges, and ravines.
VEGETATION: Grass.
FUNCTION: Possible agriculture
DIMENSIONS: 0.60 m (north-south) by 0.50 m (east-west) by 0.46 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: One large boulder was placed on top of what appears to have been a boulder that split. Cobbles and small boulders are concentrated between Features A and B. This modified outcrop is west of the alignment and a concentration of cobbles and small boulders is located between the two. This appears to have been constructed by clearing the hilltop of stone to the north and east. It may have been done by bulldozing, but it is really too small to be bulldozer push. It was more likely constructed manually. Feature B is located on top of a hill within southwest corners of the eastern (upland of highway) parcel. Feature A is immediately to the east.

STATE NO.: 19378 PHRI TEMP. NO.:1245-268
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Undulating hills, surface covered with basalt rock, cobbles, and outcrops.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: This site complex consists of two C-shapes (Features A and B). The overall site dimensions are c. 20.00 m in length.

FEATURE A: C-shape
ADJACENT TERRAIN: Undulating hills, mechanical clearing just E of site. Associated with power plant. Small basalt outcropping due west of site.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 6.50 m (335 degrees) by 0.50 m by 0.38 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Subangular basalt rock arranged in "C" shape with corners extending west toward coast. Rock is stacked two to three courses high with some slumping in northern half (probably due to cow disturbance). No midden areas are visible within or without feature confines. Feature A is associated with Feature B, which is c. 12.00 m at 190 degrees south (across property fence). Area in front and behind of feature is relatively flat; feature is built up on small basalt outcropping. The opening of the "C" shape is facing at 260 degrees west.

This feature is located southwest portion of project c. 0.25 miles inland from highway, c. 200.00 m west of power plant on south side of paved utility road, and along a fence line. No portable remains were observed on the surface of this feature. Soil within the C-shape very silty; at least c. 0.10-0.15 m thick before hitting any rock. Behind the C-shape gravely silt, c. 0.03-0.04 m before rock.

FEATURE B: C-shape
ADJACENT TERRAIN: Undulating hills. Surface has basalt rocks, cobbles, and outcrops.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 5.00 m (278 degrees) by 5.00 m by 0.60 m
CONDITION: Fair
INTEGRITY: Altered
DESCRIPTION: Stacked angular/subangular basalt rock (two to three courses high). C-shaped enclosure with wall extending c. 2.00 m on north side. At the end of the wall is a c. 1.00 m open space, then c. 2.50 m wall/alignment at right angle to wall connected to C-shape. C-shape opening faces west. About 2.00 m in front of opening is a concentration basalt rocks. Area in front of C-shape opening highly disturbed by mechanical means. Feature is just c. 5.00 m from highway cut, in the southwest parcel of project area, inland side of highway, c. 100.00 m east of highway, power transformer c. 150.00 m north-northwest of site. Portable remains were limited to marine shells.

STATE NO.: 19379 PHRI TEMP. NO.:1245-269
SITE TYPE: Cairn
TOPOGRAPHY: On top of hill among undulating hills. Basalt rocks, cobbles, and outcrops on surface
VEGETATION: *Kiawe* and grass
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 0.80 m by 0.80 m by 0.50 m
DESCRIPTION: Stacked subangular basalt rocks on top of outcrop. Cairn is about four courses high. Rocks are c. 0.20 m in size. Its width is almost twice its height. This site is located on the southwest parcel of project area, inland side of highway, c. 100.00 m east of highway, c. 120.00 m north of power transformer.

STATE NO.: 19380 PHRI TEMP. NO.:1245-270
SITE TYPE: Modified outcrop
TOPOGRAPHY: Undulating hills, basalt outcroppings, scattered basalt rock and cobble.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 1.20 m by 0.60 m
DESCRIPTION: Relatively large basalt rocks (range 0.15 to 0.40 m) loosely placed on small basalt outcrop; some slumpage may have occurred on north side. One large stone is in semi-upright position. Oriented at 330 degrees. Surface area behind is fairly flat. Rocks project upward from surface c. 0.30-0.40 m. This site is located on the southwestern corner c. 2/3 mile east of main highway, c. 100.00 m north of power station on knoll overlooking project area. No portable remains were noted on the surface of this feature. Minimal soil deposit (c. 0.02-0.03 m thick) on basalt rock and bedrock.

STATE NO.: 19381 PHRI TEMP. NO.:1245-271
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills and ravines.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 2.50 m (east-west) by 0.65 m by 0.65 m
DESCRIPTION: Site 271, a hunter's blind, was constructed with three to four courses of subangular pahoehoe cobbles and boulders (ranging from c. 0.10-0.40 m in length/diameter) piled on pahoehoe bedrock to form a single stone width wall. The wall is arch shaped, i.e., the highest part is center and the sides taper down to bedrock outcrops. The wall is slightly curved, with edges curving north, which is interesting because for a hunter to use this as a blind, the blind then faces south directly to a hill slope. No portable remains or cultural deposits were noted at this site.

STATE NO.: 19382 PHRI TEMP. NO.:1245-274
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: A large hill is to the south blocking the electric plant. To the north is a valley of hills.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DESCRIPTION: This site complex consists of two modified outcrops (Features A and B) and one terrace (Feature C). The overall site dimensions are c. 18.00 m by 9.00 m (90 degrees).

FEATURE A: Modified outcrop
ADJACENT TERRAIN: Located on level ridge tongue w/drop off to N, W, and S. Surrounding area consists of hills and ravines.

VEGETATION: *Kiawe* and grass.
FUNCTION: Possible military
DIMENSIONS: 2.20 m (east-west) by 1.80 m by 0.75 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Feature A, a modified outcrop, was constructed with subangular pahoehoe cobbles and boulders piled on and around a bedrock outcrop to form a circular feature. The native bedrock is dominant part of feature construction; the piled stones primarily used as fill between bedrock cracks. The feature's overall appearance is that of a rock cairn. No portable remains or cultural deposits were observed on the surface of this feature.

FEATURE B: Modified outcrop
ADJACENT TERRAIN: A large hill is south of the feature blocking the electrical building. To the N is a valley of hills.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 1.20 m (360 degrees) by 1.25 m by 0.60 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: An outcrop with c. 0.20-0.25 m basalt stones placed on it and around it. Appears that the area around the outcrop was cleared and the stones placed on the outcrop. It is circular. This feature is located in the southwest corner of the project area. The highway is c. 500 feet to the west. Feature C is c. 7.50 m at 150 degrees. No portable remains or cultural deposits were observed on the surface of this feature.

FEATURE C: Terrace
ADJACENT TERRAIN: Feature is on the northern edge of a knoll. A large hill is to the S and blocks the electrical building. To the north is a valley of hills.
VEGETATION: *Kiawe* and grass.
FUNCTION: Possible agriculture
DIMENSIONS: 5.61 m (90 degrees) by 3.20 m by 0.50 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Two terraces, one facing east and one facing north. Both terraces contain fist-sized cobbles and large boulders. The size of angular, pahoehoe stones ranges from c. 0.15 to 0.50 m. The boulders are natural bedrock, with the smaller stones placed between them to form alignments. The east terrace is built from the east ground up into the west soil, and the north terrace is built from the north ground up into the south soil. Also, on top of the knoll and in between the two terraces may be a possible trail, but it is not exactly clear. This feature is located on the southwest corner of the project area. The highway is c. 500 feet to the west. Feature A is c. 8.00 m south at 27 degrees and Site 885-36 (Feature A and B) is at 66 degrees from this feature. The windmill farm is at 56 degrees. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19383 PHRI TEMP. NO.:1245-275
SITE TYPE: Modified outcrop
TOPOGRAPHY: On west end of ridge running E/W.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered

PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 0.80 m by 0.80 m 0.35 m
DESCRIPTION: Three subangular basalt boulders laid upon bedrock outcrop. Two angular basalt rocks placed atop boulders. This site is located on the southwest parcel of project area, east of highway, Site 855-36 c. 30.00 m at 100.00 degrees, Site 1245-276 c. 27.00 m at 280 degrees. No portable remains or cultural deposits were observed on the surface of this site.

STATE NO.: 19384 PHRI TEMP. NO.:1245-276
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills, gullies, scattered basalt rock and basalt rock outcroppings.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 1.12 m by 0.25 m
DESCRIPTION: Two courses high, stacked basalt rock on basalt outcropping. Overlooks most of project area to the north. Situated on ridge crest and is flush with hillside on south. North face is exposed vertical basalt outcrop. Located c. 1/4 mile east of main highway on ridge lined with intermittent basalt outcroppings. Located in southwestern section of project, c. 27.00 m at 100.00 degrees from Site 1245-275. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19385 PHRI TEMP. NO.:1245-277
SITE TYPE: Modified outcrop
TOPOGRAPHY: At the base of a NNE sloping hill.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible agriculture
DIMENSIONS: 3.20 m by 2.57 m
DESCRIPTION: Piled basalt cobbles one-two courses high ranging in size from c. 0.06-0.30 m. Piling is on top of bedrock. Could be just cracked pieces of bedrock that have, over time, moved around. The whole outcrop is circular, with the possible modification on the north-northeast side of the site. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19386 PHRI TEMP. NO.:1245-278
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills, basalt rock scatters and basalt outcroppings.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 2.00 m by 0.30 m by 0.75 m

DESCRIPTION: Stacked basalt rock six courses high at center, tapering to two courses on ends. Stacking from ground surface up. Some loose rock in front of feature base, but does not appear to be caused from slumping. Oriented at 290 degrees. Feature is very loosely constructed. Approximately 1/8 mile from main highway in southwest project area, c. 60.00 m south from main gully in rear. Spent paper shotgun shells (not collected).

STATE NO.: 19387 PHRI TEMP. NO.:1245-279
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills, small basalt outcroppings, scattered basalt rock.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 2.30 m by 0.60 m by 0.85 m
DESCRIPTION: Subangular basalt rock stacked loosely on basalt outcropping. Wall oriented at 360 degrees and located on upper edge of downhill slope of undulating hill overlooking coast. No visible cleared area in front; on back mostly basalt cobble and gravel. This site is located on the edge of a hill c. 25.00 m inland, above the main highway, c. 200.00 m north of power plant access road entrance from main highway. One small cowry shell c. 3.00 m east of wall (not collected). No other visible remains. One spend shotgun shell (Winchester 20 g) within feature (not collected). Gravely silt c. 0.05-0.06 m thick before appearance of larger rock. No cultural remains noted.

STATE NO.: 19388 PHRI TEMP. NO.:1245-280
SITE TYPE: Complex (3 Features)
TOPOGRAPHY: Rolling pahoehoe bedrock outcrops with small gulch/gully.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible agriculture
DESCRIPTION: This site complex consists of two modified outcrops (Features A and C) and one terrace (Feature B).

FEATURE A: Modified outcrop
ADJACENT TERRAIN: At the south side of a small gulch/gully near the first gully at the southernmost end of project.
VEGETATION: *Kiawe* and grass.
FUNCTION: Possible agriculture
DIMENSIONS: 1.10 m (288 degrees) by 0.40 m by 1.18 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Natural bedrock is protruding from the south side of the gully, and small basalt angular stones are placed on top of the bedrock. There are c. fifteen stones placed and they are c. 0.10-0.25 m in diameter. This runs east-west. This feature is c. 33.00 m at 360 degrees-0 degrees. This feature is in a small gully. No portable remains were observed on the surface of this feature. Trowel tested and no cultural deposit found; not much soil either.

FEATURE B: Terrace
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a west facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Possible agriculture
DIMENSIONS: 2.20 m (104 degrees-284 degrees) by 0.65 m by 0.40 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles loosely stacked one to two courses high. This feature is located 1/4 mile east (*mauka*) of highway. Feature C is c. 5.00 m at 350 degrees upslope.

FEATURE C: Modified outcrop
ADJACENT TERRAIN: Rolling pahoehoe outcrops on a west facing slope.
VEGETATION: *Kiawe* and grass.
FUNCTION: Possible agriculture
DIMENSIONS: 0.70 m (282 degrees-102 degrees) by 0.40 m by 0.56 m
CONDITION: Poor
INTEGRITY: Unaltered
DESCRIPTION: Seven to eight loosely piled cobbles atop a bedrock outcrop. Rocks are c. 0.30 m in length/diameter. This feature is located c. 1.4 mile east (*mauka*) of highway. Feature B is c. 5.00 m at 170 degrees downhill. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19389 PHRI TEMP. NO.:1245-281
SITE TYPE: Terrace
TOPOGRAPHY: Undulating pahoehoe bedrock outcrop.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 12.00 (302 degrees) by 10.50 m
DESCRIPTION: There are three rough basalt stone alignments to form a possible enclosure. These one course high alignments consist of basalt, angular stones (c. 0.05-0.15 m in diameter). A lithic scatter is found in the center of the north wall and a waterworn basalt stone is found near the center of the west wall. Bits of concrete are found throughout the feature. Perhaps the concrete pieces came from the surveyor's marker near the site. The walls are no more than c. 0.15 m wide; one runs north-south and the other two run east-west. The central surface portion of the feature is fairly level. The highway is west c. 200.00 m, observatories are at 94 degrees, Site 855-47 is c. 500.00 m at 360 degrees, Site 855-37 is c. 700.00 m at 188 degrees, and a survey marker is c. 20.00 m at 320 degrees. Basalt flake scatter, small dropping of concrete present. Trowel tested from c. 0.04-0.11 m deep and no cultural deposit found.

STATE NO.: 19390 PHRI TEMP. NO.:1245-282
SITE TYPE: Modified outcrop
TOPOGRAPHY: Undulating exposed and decomposing bedrock; steep gulch bank located c. 8.00 m to south.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered

PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible agriculture
DIMENSIONS: 1.65 m by 0.56 m by 0.30 m
DESCRIPTION: Approximately fifteen (15) sub-rounded basalt cobbles placed along a low bedrock outcrop, oriented northwest-southeast. This site is located in the central south boundary of the project area one the north side of the first large gulch. No portable remains or cultural deposits were noted at this site.

STATE NO.: 19391 PHRI TEMP. NO.:1245-283
SITE TYPE: Complex (2 Features)
TOPOGRAPHY: Situated on top of a small hill with a large hill to the northwest. A small, flat area to the west.
VEGETATION: Moderate *kiawe* to the west and grass.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DESCRIPTION: The site complex consists of one wall (Feature A) and one circular alignment (Feature B). The overall site dimensions are c. 10.30 m (128 degrees) by 4.50 m).

FEATURE A: Wall
ADJACENT TERRAIN: This feature is on top of a hill. Undulating pahoehoe area.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 4.50 m (360 degrees) by 3.25 m by 0.30 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: This is a one to two course high L-shaped wall. It consists of fist-sized stones to small boulders ranging in size from c. 0.10 to 0.90 m in diameter. These stones are angular basalt. The walls join at the southeast corner. They are c. 1.50 m wide, and the north-south wall is built on top of open bedrock.

FEATURE B: Circular alignment
ADJACENT TERRAIN: Undulating pahoehoe.
VEGETATION: *Kiawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 2.00 m (360 degrees) by 1.75 m by 0.37 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This is one to two courses high, consisting of basalt, angular stones (ranging in size from c. 0.10-1.40 m in diameter) and may be a possible hearth. This feature is located on top of a hill. No portable remains were observed on the surface of the feature. Trowel tested and no cultural deposit was found.

STATE NO.: 19392 PHRI TEMP. NO.:1245-284
SITE TYPE: C-shape
TOPOGRAPHY: Undulating hills, two small basalt outcroppings S of feature. Localized area very rocky (subangular basalt).
VEGETATION: *Kiawe* and grass.

CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
DIMENSIONS: 1.60 M BY 0.60 M
FUNCTIONAL INTERPRETATION: Hunting blind
DESCRIPTION: Stacked basalt rock (some fairly large at bottom) on basalt outcropping. Small rocks crowning wall with several larger rocks on ground in front (north of feature). Oriented at 212 degrees. Ground surface within confines of feature relatively clear (overgrown with grass). This area is raised somewhat higher than outside ground surface. This site is located c. 5.00 m west of fence line, c. 70.00 m east of main highway. The southwest project area is c. 100.00 m south of large gully, and on north side of small knoll. No portable remains were noted on the surface of this site. A small amount of gravely silt (c. 0.05-0.10 m thick) in spots on bedrock (both inside and outside).

STATE NO.: 19393 PHRI TEMP. NO.:1245-285
SITE TYPE: Wall
TOPOGRAPHY: Undulating slope to the west with many small bedrock outcrops.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 1.10 M (330 degrees) by 0.62 m
DESCRIPTION: Subangular basalt cobbles loosely stacked on bedrock outcrop. Cobbles average c. 0.30 m in diameter, with smaller cobbles stacked on larger cobbles. This site is located c. 50.00 m east of highway, c. 100.00 m uphill, south of large gulch in southwest portion of *mauka* parcel, and c. 40.00 m southwest of Site 1245-286. No portable remains or cultural deposits were noted on the surface of this site.

STATE NO.: 19394 PHRI TEMP. NO.:1245-286
SITE TYPE: Wall
TOPOGRAPHY: Undulating hills.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Hunting blind
DIMENSIONS: 2.00 m (360 degrees) by 0.60 m
DESCRIPTION: Stacked angular/subangular basalt rocks. Three to five courses high, one to two courses thick. Placed on basalt outcrop. Outcrop is on edge of cliff overlooking gully. It is located on south side of gully, c. 50.00 m east of highway. Portable remains include shotgun shell (once had paper cartridge), "Peters/Victor" sixteen (16) gage.

STATE NO.: 19395 PHRI TEMP. NO.:1245-287
SITE TYPE: Complex (14 Features)
TOPOGRAPHY: Undulating pahoehoe bedrock outcrops on a west facing slope.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair

INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Indeterminate
DESCRIPTION: The site complex consists of two walls (Features A and B), one modified outcrop (Feature C), one midden scatter (Feature D), two cairns (Features E and F), 8 mounds (Feature G). The overall site dimensions are c. 23.00 m (east-west) by 11.00 m (north-south).

FEATURE A: Wall
ADJACENT TERRAIN: This feature is on a hilltop. The south edge is c. 12 m and the north edge is c. 14 m. Sloping down to the west. Very large hill is just beyond the southernmost gully.
VEGETATION: *Kiawe* and grass.
FUNCTION: Military
DIMENSIONS: 3.60 m (245 degrees) by 1.10 m by 0.49 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: A wall consisting of fist-sized angular basalt stones to small boulders. Stones range in size from c. 0.10-0.55 m in diameter. There are flat pahoehoe slabs on top of the wall. The wall runs north-south and consists of approximately fifty (50) stones. This feature is located in the southwest corner of project. Cannot see the windmill farm. Observatories on Mauna Kea are at 92 degrees, crane at Mauna Kea Bluffs is at 326 degrees, Site 35 is at 116 degrees and c. 11.90 m, and Site 1245-287 Feature C is c. 6.70 m at 352 degrees. This feature was trowel tested and no portable remains or cultural deposits were noted.

FEATURE B: Wall
ADJACENT TERRAIN: On top of a hill. A gully is c. 17.00 m south and large hill south of that. Slopes down to the west.
VEGETATION: *Kiawe* and grass.
FUNCTION: Military
DIMENSIONS: 7.20 m (240 degrees) by 1.10 m by 0.47 m
CONDITION: Excellent
INTEGRITY: Unaltered
DESCRIPTION: This feature has organization to it. There are three upright pahoehoe basalt slabs at the southwest corner of feature and large boulders running along the west edge. Small cobbles fill the center and are piled even to the ground on the east edge. The stones are angular basalt ranging in size from c. 0.10 to 0.70 m in diameter, including first-sized cobbles and small boulders. This wall runs north-south, but the north edge curves westward. This feature is located in the same area as Feature A, but c. 6.00 m west of Feature A at 308 degrees. Feature C is c. 8.60 m at 73 degrees. This feature is trowel tested but no portable remains or cultural deposits are observed.

FEATURE C: Modified outcrop
ADJACENT TERRAIN: Undulating pahoehoe outcrops on a W facing slope. Ground is level to immediate S, slopes down to N.
VEGETATION: *Kiawe* and grass.
FUNCTION: Possible agriculture
DIMENSIONS: 12.90 m (110 degrees-290 degrees) by 1.40 m by 0.35 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: A bedrock outcrop with pahoehoe cobbles intermittently piled one to three courses high along its length. Cobbles are c. 0.40 m length/diameter, most are c. 0.20 m. This

feature is located c. 0.25 m east of the highway. No portable remains or cultural deposits were detected on the surface of the feature.

FEATURE D: Midden scatter
ADJACENT TERRAIN: Gully is c. 17.00 m S of feature and a large hill is S of that. Slopes down to the W. On top of a hill.
VEGETATION: *Klawe* and grass.
FUNCTION: Temporary habitation
DIMENSIONS: 4.00 m (360 degrees-0 degrees) by 3.00 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Much marine shell scattered in a c. 4.00 m by 3.00 m area. One waterworn basalt stone also found. This feature is located in the same area as Feature A and c. 2.30 m west of Feature B. Ecofact scatter and waterworn basalt stone were found but not collected. Trowel tested and nothing found in the subsurface.

FEATURE E: Cairn
ADJACENT TERRAIN: Rolling outcrops of pahoehoe bedrock.
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 0.65 m by 0.60 m by 0.51 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked one to three courses high. Cobbles are c. 0.30 m length/diameter. Approximately eight small stone mounds lie nearby, in addition to Feature E. This feature is c. 0.25 m east (*mauka*) of the highway. Feature A is c. 4.00 m at 330 degrees. No portable remains or cultural deposits were observed on the surface of this feature.

FEATURE F: Cairn
ADJACENT TERRAIN: Rolling pahoehoe bedrock outcrops.
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 0.67 m by 0.54 m by 0.38 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles stacked two to three courses high. Cobbles are c. 0.50 m length/diameter. This feature is c. 0.25 m east of the highway. Feature B is c. 4.00 m at 150 degrees. Eight other small mounds are nearby. No portable remains were detected on the surface of this feature.

FEATURE G: Mound (8)
ADJACENT TERRAIN: Undulating pahoehoe outcrops on a west joining slope.
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 15.50 m (east-west) by 8.50 m (north-south)
CONDITION: Poor-fair
INTEGRITY: Unaltered
DESCRIPTION: Pahoehoe cobbles piled one to three courses high. Cobbles are up to c. 0.40 m length/diameter. This feature is located c. 0.25 m east of the highway. No portable remains were detected on the surface of this feature. Trowel poked into areas of soil hits rock at c. 0.10 mbs.

STATE NO.: 19396 PHRI TEMP. NO.:1245-301
SITE TYPE: Depression
TOPOGRAPHY: Undulating pahoehoe outcrops on a west facing slope.
VEGETATION: *Klawe* and grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DIMENSIONS: 2.20 m BY 2.20 m
DESCRIPTION: A shallow depression near the top of the southwest side of a hill. A ring of bare dirt and rock surrounds the depressed part at the center, which has some grass growing in it. The center of the depression is c. 0.40 m below the nearest undisturbed soil uphill. The downhill rim of the crater is c. 0.10 m above the center. This site is located c. 0.75 mile east of the highway. There were two jagged scraps of metal; the largest is c. 4.50 m by 4.50 m has threading on one side, at its thicker end. The smaller scrap is c. 2.00 m by 1.00 m and is also threaded on one side.

STATE NO.: 19397 PHRI TEMP. NO.:1245-303
SITE TYPE: Complex (7 Features)
TOPOGRAPHY: Located on southern edge of gulch (which extends E-W) with adjacent undulating hills and ravines.
VEGETATION: *Klawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Military
DESCRIPTION: The site complex consists of one rubble concentration w/associated military debris (Feature A), three modified outcrops (Features B-D), one enclosure (Feature E), one wall (Feature F), and one roadbed (Feature G). The overall site dimensions are c. 150.00 m (east-west) by 40.00 m (north-south).

FEATURE A: Rubble concentration
ADJACENT TERRAIN: Undulating hills, ridges, and ravines.
VEGETATION: Grass.
FUNCTION: Military
DIMENSIONS: 2.70 m (north-south) by 2.50 m (east-west) by 0.41 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Feature A was a circular, low uneven-surfaced (i.e. not level or consistently sloping) concentration of subangular pahoehoe cobbles and boulders piled one to two courses high. Similar in construction to Features B, C, and D although bedrock outcrop was not apparent and therefore not part of construction. Located on end of ridge spur (ridge spur oriented northwest-southeast) with gulch to north and east. On the northern edge of southern half of eastern upslope parcel. Feature B is c. 71.00 m at 140 degrees (center to center).

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Undulating hills, ridges, and ravines.
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 2.70 m (north-south) by 2.50 m (east-west) by 0.41 m

CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Feature B is amorphous. It is a low, fairly level concentration of subangular pahoehoe cobbles and boulders piled one to two courses high around small bedrock outcrops on ridge overlooking surrounding terrain. This feature is similar to Feature C in construction and type. This feature is located at northern edge of the south half of east (upland) parcel on ridge; gulch to north, highway and ocean to west. Located c. 37.00 m at 120 degrees from Feature C; Feature A is c. 71.70 m at 320 degrees (center to center).

FEATURE C: Modified outcrop
ADJACENT TERRAIN: Undulating hills and basalt outcroppings.
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 3.20 m by 3.00 m by 0.52 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Loosely stacked basalt rocks on basalt outcropping. Positioned on edge of top of hill facing coast. Some sloping on downhill (northwest) side. This feature is located on the southern part of the project area, close to easternmost extent between Feature B and Feature D on hill. No portable remains were noted on the surface of this feature.

FEATURE D: Modified outcrop
ADJACENT TERRAIN: Undulating hills.
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 3.50 m (310 degrees) by 2.50 m by 0.30 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Modified outcrop situated on northeast edge of hill top. Overlooks gully downslope to north. Loosely piled basalt rocks on outcrop are one course high. This feature is located on the south half of eastern parcel. Feature E is c. 30.00 m at 9 degrees. Feature C is c. 19.00 m at 230 degrees.

FEATURE E: Enclosure
ADJACENT TERRAIN: Located on low ridge extending parallel to gulch.
(gulch to N) w/hill to S.
VEGETATION: *Klawe* and grass
FUNCTION: Military
DIMENSIONS: 3.50 m (24 degrees-204 degrees) by 3.10 m (294 degrees - 114 degrees) by 0.48 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: This small, low circular enclosure was constructed with subangular cobbles and boulders (ranging in size from c. 0.10-0.50 m in diameter/length) piled and stacked one to four courses high. Because of the slope to the west, the northwest corner and most of the north side is a retaining wall, not a standing wall. There appears to be an entrance (c. 1.00 m wide) on the western edge, and the walls are not as high on the eastern edge, possibly forming another entrance (c. 0.40 m wide). The retaining wall is stacked but not faced. This feature is located at the northern edge of the southern half of parcel east (upland) of the highway. Feature F is 270 degrees at c. 12.00 m from SW opening. Feature G is c. 17.08 m at 86 degrees from eastern

edge. Portable remains include rifle clips (possibly M-1). Small test revealed no cultural deposit.

FEATURE F: Wall
ADJACENT TERRAIN: Edge of gully (south side). Hills rise to N and S. Gully declines to W as does general slope.
VEGETATION: No vegetation.
FUNCTION: Military
DIMENSIONS: 10.00 m by 8.00 m by 0.50 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Stacked basalt rocks on outcrop, which forms south side of gully. Stacking is one to two courses high and one course wide. Average size of rocks is c. 0.30 m. Feature F is actually two walls, forming an obtuse angle. The stacked rock portions of the wall are intermittent and the rest is made up of bedrock outcrop. This wall can also be called a modified outcrop, as the rocks fill in a natural wall of bedrock. This feature is located on the south half of the eastern parcel, at south side of gully which divides south half and north half of eastern parcel. No portable remains or cultural deposits were observed on the surface of this feature.

FEATURE G: Road bed
ADJACENT TERRAIN:
VEGETATION: *Klawe* and grass.
FUNCTION: Military
DIMENSIONS: 6.75 m by 5.75 m by 1.20 m
CONDITION: Fair
INTEGRITY: Unaltered
DESCRIPTION: Cement and basalt cobble road fill c. 1.20 m deep (judging from fill wall to gully bottom). Surface is buckling and cracking. Some natural slumping from gully edges. Paved area for vehicle crossing. This feature is located on the southern project area in small gully toward easternmost end of the project and c. 17.80 m from Feature E at 266 degrees. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19398 PHRI TEMP. NO.:1245-304
SITE TYPE: Complex (4 Features)
TOPOGRAPHY: Located on top of hill overlooking undulating hills and ravines.
VEGETATION: Grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Multiple
DESCRIPTION: The site complex consists of one wall (Feature A), one modified outcrop (Feature B), one terrace (Feature C), and a parallel wall (Feature D). The overall site dimensions are c. 20.00 m (25 degrees) by 20.00 m.

FEATURE A: Wall
ADJACENT TERRAIN: Undulating hills; general slope declines to the sea (west).
VEGETATION: Fountain grass.
FUNCTION: Military
DIMENSIONS: 3.50 m (30 degrees) by 1.00 m by 0.90 m
CONDITION: Good

INTEGRITY: Unaltered
DESCRIPTION: Outcrop extended with stacked basalt rocks forming wall. East half of wall is outcrop, west half wall constructed of stacked basalt rocks (three courses high) about c. 0.40 m in size. Wall is on south side of hilltop and overlooks lower terrain below. About 1.00 m to the south of is a concentration of military debris. North of wall are two military electronic components of unknown type or function. This feature is located on the south half of the eastern parcel. Portable remains include military debris (food containers, bottles, cans, grenade fuse cans, ordnance containers, grenade, hand/container, M.42A2.

FEATURE B: Modified outcrop
ADJACENT TERRAIN: Undulating hills; general slope declines to the sea (W).
VEGETATION: *Kiawe* and grass.
FUNCTION: Military
DIMENSIONS: 1.80 m (290 degrees) by 1.10 m by 1.10 m
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Prominent outcrop on top of hill. Rocks stacked on north side. Sections of outcrops have broken off and lie about its face, possibly used as target. Small areas on outcrop chipped, not weathered. This feature is located on the south half of eastern parcel. Military debris (glass jar, grenade fuse containers, and can) were noted on the surface of this feature.

FEATURE C: Terrace
ADJACENT TERRAIN: Undulating hills; basalt outcrops; basalt rock (fairly dense) scatter.
VEGETATION: *Kiawe* and grass.
FUNCTION: Agriculture
DIMENSIONS: 3.75 m (north-south) by 2.00 m by 0.36 m
CONDITION: Poor
INTEGRITY: Indeterminate
DESCRIPTION: Semi-intact basalt rock wall alignment two courses high, abutting gentle downhill slopes. Most of wall disturbed and scattered; impossible to ascertain whether disturbance is result of mechanical (military) or natural causes. Area behind contains wide scattering of basalt rock. Front of feature area is relatively clear. Trowel test of soil (gravely silt) is c. 0.05-0.07 m on bedrock. This feature is located on the southern half of the easternmost project boundary.

FEATURE D: Parallel walls
ADJACENT TERRAIN:
VEGETATION: *Kiawe* and grass.
FUNCTION: Military
DIMENSIONS:
CONDITION: Good
INTEGRITY: Unaltered
DESCRIPTION: Subangular basalt rock and cobble-stacked parallel walls. Uphill wall has southern end extending east c. 0.75 m. Walls are c. 1.60-1.80 m apart and run basically at 349 degrees. The slightly smaller downhill wall shows some evidence of slumping. Trowel soil test recovered a c. 0.05-0.07 m thick gravely silt on bedrock. This feature is located on the southern portion of project's most eastern part on one of the highest hills. Noticeable basalt outcropping visible in skyline. Steel cans (food containers) and ammo clips were observed on the surface. No cultural deposits noted.

STATE NO.: 19399 PHRI TEMP. NO.:1245-305
SITE TYPE: Terrace
TOPOGRAPHY: Slight hills, fairly flat from dozing. Sloping gently south.
VEGETATION: *Koa-haole*, *kiawe*, and grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 13.30 m (160 degrees) by 1.30 m (30 degrees)
DESCRIPTION: Roughly square shaped terrace, mostly visible along the south-southeast region. Possibly bulldozed over the top. South-southeast portion two to three courses of stacked subangular basalt cobbles and boulders (up to c. 0.40 m). Rough paving along surface. Northwest and central portions flush with ground surface. Another possible terrace is two small courses high (possible bulldozer push). This site is located on the north portion of *makai* parcel c. 7.00 m east of Site 885-127.

STATE NO.: 19400 PHRI TEMP. NO.:1245-306
SITE TYPE: Terrace
TOPOGRAPHY: Undulating bedrock outcrops. Site sits on the slope of a dry creek bed.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Agriculture
DIMENSIONS: 11.00 m by 2.50 m
DESCRIPTION: Pahoehoe cobbles stacked one to four courses high with long axis oriented 114 degrees-294 degrees. Slope is oriented at 336 degrees-156 degrees, at an angle of 30 degrees. Terrace is divided into three segments which are c. 2.50 m, c. 1.30 m, and c. 2.40 m in length, from lowest to highest. The lowest is in best condition. It is c. 0.75 m high. This feature is located on the southwest quad of the project area, c. 150.00 m east of shore. No portable remains were detected on the surface of this terrace. A trowel test revealed a c. 0.12 m thick soil. Soil is very rocky.

STATE NO.: 19401 PHRI TEMP. NO.:1245-307
SITE TYPE: Enclosure
TOPOGRAPHY: Rolling pahoehoe outcrops. Sits about 2/3 the way up the south side of a gully.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor-fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 8.10 m by 6.30 m
DESCRIPTION: Pahoehoe cobbles/small boulders stacked one to eight courses high. Long axis is at 297 degrees-117 degrees. Rectangular shaped. South wall is almost entirely rubble; east wall is slightly better shape. North and west walls have also been affected by tree falls. Walls are c. 0.60-0.90 m thick. They consist of cobble/boulder stacking on either side, with a thin layer of cobbles and gravel sandwiched between. Outer rocks are c. 0.25-0.60 m in length/diameter, average c. 0.40 m. Greatest height is inside southeast corner (c. 1.15 m). This site is

located on the southwest quad, c. 200.00 m east of the ocean. Metal bucket hoop, and a metal strip with rivets were noted associated with this site. Soil is deeper than a trowel blade length (more than c. 0.13 m).

STATE NO.: 19402 PHRI TEMP. NO.:1245-308
SITE TYPE: Wall
TOPOGRAPHY: Coastal slope (moderate), slight undulation, relatively flat area south of wall.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 17.25 m by 4.60 m by 0.96 m
DESCRIPTION: Stacked basalt rock forming split wall (two sections) alignment. Rocks are very large overall, with smaller cobble stacking intermittently. Large amounts of coral are incorporated in construction (some coral rocks are quite large). Some waterworn basalt cobbles are also incorporated in construction. Wall oriented east-west at 274 degrees, and c. 3.00 m gap separates the two sections of the wall. Soil deposit ranges from c. 0.03 to 0.10+ m. No midden visible in trowel test around and adjacent to feature. This site is located on the southwestern project area c. 60.00 m north of boat ramp inland from coast c. 10.00 m.

STATE NO.: 19403 PHRI TEMP. NO.:1245-309
SITE TYPE: Enclosure
TOPOGRAPHY: Undulating pahoehoe outcrops. Sits in a gully with a dry creek bed.
VEGETATION: *Kiawe*, dense dry vine ground cover with very small leaves.
CONDITION: Fair-good
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 13.00 m by 9.50 m
DESCRIPTION: Flat pahoehoe boulders stacked one to two courses high with gravel, coral and cobble fill in north half of feature. The boulders are roughly rectangular. North side is bowed out slightly. Long axis is at 200 degrees-20 degrees. Facing rocks are c. 0.50-1.55 m in length/diameter. Highest point is on interior of the north wall (c. 1.14 m). North wall is level with outer ground surface. South end is open. Interior is level, with cobbles over most of area. A couple of concentrations of coral fragments are near center of interior. This site is located on the southwest quad, c. 20.00 m from shore, and c. 100.00 m north of small concrete dock. Several modern beer bottles were observed on the surface of the site. Trowel poked into silt at north end is unobstructed (soil more than c. 0.13 m deep).

STATE NO.: 19404 PHRI TEMP. NO.:1245-310
SITE TYPE: Circular enclosure
TOPOGRAPHY: Gently undulating hills.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Indeterminate

FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 6.30 m by 4.50 m
DESCRIPTION: A circular enclosure of randomly piled pahoehoe cobbles and boulders. Some stones have been knocked off. Shape is roughly circular and average height is c. 0.35 m above ground surface. The *kiawe* tree does not appear to have damaged the walls. Site sits on a somewhat flat hilltop next to a gentle slope going down to the next lower elevation of hills. Bedrock outcrops appear to the northeast and east. Clusters of *kiawe* trees are c. 0.40 m northeast and c. 10.00 m southeast. This site is located directly east of the dump. There is no shell or waterworn cobbles or coral visible near or in the structure.

STATE NO.: 19405 PHRI TEMP. NO.:1245-311
SITE TYPE: Alignment
TOPOGRAPHY: Undulating hills, ridges, and ravines. Located on level ridge above shallow ravine.
VEGETATION: Grass.
CONDITION: Fair
INTEGRITY: Indeterminate
PROBABLE AGE: Indeterminate
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 30.00 m (northwest-southeast) by 1.50 m
DESCRIPTION: This site might be the remnant of a prehistoric alignment or indications of military fire fighting activity in area. There is evidence of activity within the surrounding area. The alignment is constructed of subangular pahoehoe boulders and cobbles one course high in a intermittent, undulating pattern. Within several areas there are "parallel" alignments but spaced close together (c. 1.00 m). The main reason a possible prehistoric temporal assignation has been made is because some of the aligning stones are "set" deep within the soil. This site is located east of the dump within the southern section below highway. No portable remains or cultural deposits were noted on the surface of this feature.

STATE NO.: 19406 PHRI TEMP. NO.:1245-312
SITE TYPE: Trail
TOPOGRAPHY: Rolling hills near coast.
VEGETATION: *Kiawe*.
CONDITION: Poor-good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Transportation
DIMENSIONS: 1.00 to 0.75 m (width).
DESCRIPTION: Heavily traveled and rutted along most of the length. Sometimes cobble-lined and for a short distance coral-lined. This site is located on the western portion of *makai* section. Midden, rifle shells, other military and surface scatters.

STATE NO.: 19407 PHRI TEMP. NO.:1245-313
SITE TYPE: Cairn w/adjoining wall
TOPOGRAPHY: Small valley parallel to water. Small hill between site and water.
VEGETATION: *Kiawe* and grass.
CONDITION: Good
INTEGRITY: Altered

PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Marker
DIMENSIONS: 3.90 m (31 degrees) by 1.20 m (120 degrees)
DESCRIPTION: Large section is stacked five to seven courses high, with three nicely faced sides of basalt boulders (c. 0.15 m by 0.25 m by 0.35 m) and cobbles forming a rectangular cairn with a low (two courses high) stacked wall extending from the southwest side and curving to the south. This site is located near the northeast corner (east of North Point) of Wailea Bay. Concrete chunk and three waterworn basalt (two cobbles and one pebble) were observed on the surface of this site. No cultural deposits were noted.

STATE NO.: 19408 PHRI TEMP. NO.:1245-315
SITE TYPE: Enclosure
TOPOGRAPHY: NNW sloping down to Hapuna Beach Park.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Temporary habitation
DIMENSIONS: 5.20 m by 4.50 m
DESCRIPTION: Piled subangular basalt cobbles one course high ranging in size from c. 0.09 to 0.22 m. Two walls running east-west c. 5.00 m apart. The south wall has corners at the east and west ends. From these corners, small remnant walls stick out toward the north c. 1.00 m. The north wall has no corners and is very straight. Towards the west end of the wall there is a modern glass bottle. The two walls were probably connected at one time. There is bulldozer activity throughout this area, which probably altered this feature. This site is located c. 70.00 m at 167 degrees from Site 161, c. 35.00 m from gravel road, c. 150.00 m south of Hapuna Beach Park. One recent whole clear glass bottle was noted on the site.

STATE NO.: 19409 PHRI TEMP. NO.:1245-316
SITE TYPE: Terrace
TOPOGRAPHY: Fairly flat, burned and bulldozed.
VEGETATION: *Kiawe* and grass.
CONDITION: Poor
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Possible agriculture
DIMENSIONS: 2.80 m (50 degrees) by 2.10 m (310 degrees)
DESCRIPTION: Consists of two remnant rock alignments on the edges of a raised area. The basalt rocks are only one course high and measure c. 0.20-0.50 m in size. The two alignments are almost perpendicular, and do not connect. A few pieces of concrete are in the wall alignments, and may have been a later modification. This site is located in a low flat area (burned) west of Road 10. No portable remains or cultural deposits were observed on the surface of this feature.

STATE NO.: 19410 PHRI TEMP. NO.:1245-318
SITE TYPE: Trail
TOPOGRAPHY: Shoreline, rolling hills.
VEGETATION: *Kiawe* and grass.

CONDITION: Good
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Transportation
DIMENSIONS:
DESCRIPTION: Trail with larger rocks removed. Trail is extremely worn down in some places. It is located in the extreme west central portion at *makai*. Marine shell, coral, and historic trash were observed on the surface of this site.

STATE NO.: 19411 PHRI TEMP. NO.:1245-325
SITE TYPE: Hearth
TOPOGRAPHY: Rolling pahoehoe outcrops on west facing slope.
VEGETATION: *Kiawe* and grass.
CONDITION: Excellent
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Recreation
DIMENSIONS: 0.85 m by 0.85 m
DESCRIPTION: Angular pahoehoe cobbles and gravel stacked one to three courses high, surrounding a gravel interior. Roughly square in shape, with the axis at 330 degrees-150 degrees. This site is located on the coast near the northwest corner. Aluminum can, Foremost cartoon, cellophane snack wrapper, ball of aluminum foil, charcoal, and metal grill were observed at the site.

STATE NO.: 19412 PHRI TEMP. NO.:1245-326
SITE TYPE: Paved area
TOPOGRAPHY: Flat sandy area along coastal zone.
VEGETATION: *Kiawe*, *naupaka*, and small palms.
CONDITION: Fair
INTEGRITY: Unaltered
PROBABLE AGE: Historic
FUNCTIONAL INTERPRETATION: Indeterminate
DIMENSIONS: 2.99 m (294 degrees) by 0.65 m
DESCRIPTION: Approximately thirty-eight (38) waterworn basalt cobbles arranged in a small area. The feature appears to be a remnant of what may have been a large structure at one time. A large *kiawe* tree root has disturbed the north side of the paving. This site is located in the central portion of Beach Sixty-nine (Beach 69), *makai* of houses, and c. 3.00 m from fence line. Two pieces of waterworn coral were observed on the surface of this feature.

STATE NO.: 19413 PHRI TEMP. NO.:1245-327
SITE TYPE: Trail
TOPOGRAPHY: Rolling pahoehoe outcrops on a west facing slope.
VEGETATION: *Kiawe* and grass.
CONDITION: Fair
INTEGRITY: Altered
PROBABLE AGE: Prehistoric
FUNCTIONAL INTERPRETATION: Transportation
DIMENSIONS: 200.00 m by 0.50 m

DESCRIPTION: A footpath running roughly southwest-northeast toward the coast. Fades out c. 50.00 m from shore. Trail identified by local informant (lived in house by Sweep 8). The ends of the trail are indistinct. Only c. 200.00 m section is extant within the center of the peninsula within the *makai* addition parcel.

The trail is a cleared path through the grass. There are a few areas where the trail has worn down, but the majority of the trail is defined by the absence of grass and stones. There is no paving or lining evident. Similar trails tested (312, 318) indicate no construction, i.e. paving episodes.

No portable remains or cultural deposits were detected on the surface of this feature.

APPENDIX B: Summary of Identified Sites and Features

*SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	#CRM Value Mode Assess. R	I	C
19250	Complex (2)	Hunting blind	L	L	L
A	C-shape	Hunting blind			
B	C-shape	Hunting blind			
19251	C-shape	Hunting blind	L	L	L
19252	C-shape	Hunting blind	L	L	L
19253	Complex (2)	Hunting blind/military	L	L	L
A	C-shape	Hunting blind/military			
B	C-shape	Hunting blind/military			
19254	C-shape	Hunting blind	L	L	L
19255	Mound	Military	L	L	L
19256	Cairn	Military	L	L	L
19257	Cairn	Military	L	L	L

* State Inventory of Historic Places (SIHP) numbers. SIHP numbers are five- digit numbers prefixed by 50-10-11 (50=State of Hawaii; 10=Island of Hawaii; 11=USGS 7.5' series quad map ["Puu kinai, Hawaii"]).

\# Cultural Resource Management Value Mode Assessment

—Nature:
- R = scientific research,
- I = interpretive
- C = cultural

—Degree:
- H = high
- M = moderate
- L = low

\+ Field Work Tasks:
- DR = detailed recording (scaled drawings, photographs, and written descriptions)
- SC = surface collections
- EX = test excavations

** Number of component features within complex.

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19258	Complex (3)	Military	L	L	L
A	Mound	Military			
B	Mound	Military			
19259	Complex (2)	Military	L	L	L
A	Cairn	Military			
B	Cairn	Military			
19260	Complex (3)	Military	L	L	L
A	Cairn	Military			
B	Mound	Military			
C	Cairn	Military			
19261	Cairn	Marker	L	L	L
19262	Depression	Military	L	L	L
19263	Cairn	Marker	L	L	L
19264	Complex (2)	Military	L	L	L
A	Cairn	Military			
B	Cairn	Military			
19265	Modified outcrop	Temporary habitation	L	L	L
19266	Terrace	Temporary habitation	L	L	L
19267	Mound	Military	L	L	L
19268	Wall	Hunting blind/military	L	L	L
19269	Wall	Hunting blind	L	L	L
19270	Rubble concentration	Military	L	L	L
19271	Complex (2)	Marker	L	L	L
A	Cairn	Marker			
B	Cairn	Marker			
19272	Complex (2)	Hunting blind	L	L	L
A	Wall	Hunting blind			
B	Wall	Hunting blind			
19273	Complex (7)	Multiple	L	L	L
A	Modified outcrop	Temporary habitation			
B	Upright stones	Possible military			
C	Cairn	Military			
D	Terrace(4)	Possible agriculture			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19274	Cairn	Marker	L	L	L
19275	Cairn	Marker	L	L	L
19276	Alignment	Military	L	L	L
19277	Modified outcrop	Hunting blind/military	L	L	L
19278	Modified outcrop	Military	L	L	L
19279	Mound	Marker	L	L	L
19280	Cairn	Marker	L	L	L
19281	Complex (4)	Multiple	L	L	L
A	Cairn	Marker			
B	Modified outcrop	Possible post support			
C	Wall	Temporary habitation			
D	Terrace	Possible agriculture			
19282	Cairn	Marker	L	L	L
19283	Cairn	Military	L	L	L
19284	C-shape wall	Military	L	L	L
19285	Wall	Hunting blind/military	L	L	L
19286	Terrace	Military	L	L	L
19287	C-shape	Military	L	L	L
19288	Mound	Indeterminate	L	L	L
19289	Ramp	Military	L	L	L
19290	Cairn	Military	L	L	L
19291	Pylons (6)	Water transport	L	L	L
A	Pylon(3)	Water transport			
B	Pylon(3)	Water transport			
19292	C-shape	Hunting blind/military	L	L	L
19293	Terrace	Agriculture	L	L	L
19294	Complex (4)	Temporary habitation	L	L	L
A	Terraces w/adjoining wall	Temporary habitation			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19294 (cont.)					
B	Terraces w/adjoining wall	Temporary habitation			
C	Enclosure w/adjoining C-shape	Temporary habitation			
D	Circular enclosure	Temporary habitation			
19295	Complex (5)	Multiple	L	L	L
A	Enclosure	Temporary habitation			
B	Mound	Military clearing piles			
C	Adjoining C-shapes	Temporary habitation			
D	C-shape	Military			
E	Modified outcrop	Possible agriculture			
19296	Complex (2)	Temporary habitation	L	L	L
A	C-shape	Temporary habitation			
B	Wall segment	Temporary habitation			
19297	Cairn	Marker	L	L	L
19298	Complex (2)	Military	L	L	L
A	Enclosure	Military			
B	L-shape wall	Military			
19299	C-shape	Military	L	L	L
19300	Complex (2)	Indeterminate	L	L	L
A	Mound	Indeterminate			
B	Mound	Indeterminate			
19301	Circular enclosure	Military	L	L	L
19302	Mound	Military	L	L	L
19303	Rubble concentration	Temporary habitation	L	L	L
19304	C-shape	Temporary habitation	M	L	L
19305	Modified outcrop	Possible ceremonial	M	M	M
19306	Complex (7)	Multiple	L	L	L
A	Enclosure	Temporary habitation			
B	Wall	Temporary habitation			
C	Cairn	Military			
D	C-shape	Temporary habitation			
E	Terrace	Possible agriculture			
F	Terrace	Agriculture			
G	Terrace	Agriculture			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19307	Wall	Possible military	L	L	L
19308	Mound	Possible military	L	L	L
19309	Cairn	Military	L	L	L
19310	Complex (2)	Contemporary	L	L	L
A	Terrace	Park maintenance			
B	Terrace	Park maintenance			
19311	Cairn	Military	L	L	L
19312	C-shape	Temporary habitation	M	L	L
19313	Complex (5)	Multiple	M	L	L
A	C-shape	Temporary habitation			
B	Adj. C-shapes	Temporary habitation			
C	Enclosure	Temporary habitation			
D	C-shape	Temporary habitation			
F	Wall	Agriculture			
19314	Complex (6)	Multiple	M	L	L
B	L-shape alignment	Temporary habitation			
D	C-shape	Temporary habitation			
E	C-shape	Temporary habitation			
F	C-shape	Temporary habitation			
G	L-shape alignment	Temporary habitation			
H	C-shape	Temporary habitation			
19315	Complex (8)	Multiple	L	L	L
A	Cairn	Possible post support			
B	Cairn	Possible post support			
C	Cairn	Possible post support/agriculture			
D	Cairn	Possible post support/agriculture			
E	Cairn	Possible post support/agriculture			
F	Cairn	Possible post support/agriculture			
G	Cairn	Indeterminate			
H	Cairn	Possible post support/agriculture			
19316	Circular enclosure	Temporary habitation/ hunting blind	L	L	L
19317	Complex (4)	Multiple	L	L	L
A	Adjoining C-shapes	Temporary habitation			
B	Mound	Military clearing piles			
C	C-shape w/adjoining wall	Temporary habitation/military			
D	C-shape	Temporary habitation			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19318	Midden scatter	Temporary habitation	M	L	L
19319	Modified outcrop	Temporary habitation	M	L	L
19320	Complex (2)	Military	L	L	L
A	C-shape	Military			
B	Modified outcrop	Military			
19321	C-shape	Military	L	L	L
19322	Modified outcrop	Indeterminate	L	L	L
19323	Alignment	Military	L	L	L
19324	Complex (2)	Military	L	L	L
B	Wall	Military			
C	Wall	Military			
19325	Wall segment	Hunting blind/military	L	L	L
19326	C-shape	Temporary habitation	L	L	L
B	C-shape	Temporary habitation			
19327	Terrace	Temporary habitation/ military/hunting	L	L	L
19328	Complex (2)	Agriculture	L	L	L
A	Terrace	Agriculture			
C	Modified outcrop	Agriculture			
19329	Complex (2)	Temporary habitation	L	L	L
A	C-shape	Temporary habitation			
B	C-shape	Temporary habitation			
19330	Circular enclosure	Agriculture/military	L	L	L
19331	Mound	Indeterminate	L	L	L
19332	C-shape	Possible military	L	L	L
19333	Modified outcrop	Temporary habitation	L	L	L
19334	Modified outcrop	Temporary habitation	L	L	L
19335	U-shape	Temporary habitation	M	L	L
19336	C-shape	Temporary habitation	L	L	L

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19337	Complex (8)	Multiple	L	L	L
A	Enclosure	Temporary habitation/military			
B	Enclosure	Temporary habitation/military			
C	Enclosure	Temporary habitation/military			
D	C-shape	Temporary habitation/military			
E	C-shape	Temporary habitation			
F	C-shape	Temporary habitation			
G	U-shape	Indeterminate			
H	C-shape	Temporary habitation/military			
19338	Complex (25)	Multiple	M	L	L
A1	Enclosure w/ modified outcrop	Temporary habitation			
A2	Mound	Military clearing piles			
A3	Mound	Military clearing piles			
A4	Mound	Military clearing piles			
A5	Mound	Military clearing piles			
A6	Mound	Military clearing piles			
A7	Mound	Military clearing piles			
A8	Mound	Military clearing piles			
A9	Mound	Military clearing piles			
A10	Mound	Military clearing piles			
A11	Mound	Military clearing piles			
A12	Mound	Military clearing piles			
A13	Mound	Military clearing piles			
A14	Mound	Military clearing piles			
A15	Mound	Military clearing piles			
A16	Mound	Military clearing piles			
A17	Mound	Military clearing piles			
A18	Mound	Military clearing piles			
A19	Mound	Military clearing piles			
B	Modified outcrop	Temporary habitation			
C	L-shape	Temporary habitation			
D	C-shape	Possible agriculture			
E	Circular alignment	Possible agriculture			
F	Modified outcrop	Indeterminate			
19339	Complex (3)	Multiple	L	L	L
B	Modified outcrop	Temporary habitation/military			
D	Modified outcrop	Indeterminate			
E	Enclosure	Temporary habitation			
19340	Complex (5)	Multiple	L	L	L
A	Rectangular alignment	Temporary habitation			
B	C-shape	Temporary habitation			
C	Terrace	Agriculture			
D	C-shape	Temporary habitation			
E	Terrace	Agriculture			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19341	Complex (4)	Multiple	L	L	L
A	Enclosure	Temporary habitation/military			
B	U-shape	Temporary habitation/military			
C	Mound	Military			
E	Terrace	Agriculture			
19342	Complex (2)	Temporary habitation	L	L	L
A	Wall	Temporary habitation			
G	C-shape	Temporary habitation			
19343	Wall	Fenceline	L	L	L
19344	Enclosure w/ adjoining C-shape	Temporary habitation/ military	M	L	L
19345	Complex (14)	Multiple	L	L	L
B	Circular wall	Temporary habitation			
C	Enclosure	Temporary habitation			
D	Circular wall	Temporary habitation			
E	Enclosure	Temporary habitation			
F	Terrace	Agriculture			
G	Modified outcrop	Possible agriculture			
H	Mound	Possible military			
I	Mound	Indeterminate			
K	Mound	Indeterminate			
L	Alignment	Military			
M	Terrace	Agriculture			
N	Terrace	Agriculture			
O	C-shape	Agriculture			
P	Terrace	Possible agriculture/military			
19346	Complex (12)	Multiple	L	L	L
A	U-shape	Temporary habitation			
B	C-shape	Military			
C	Cairn	Military			
D	C-shape	Temporary habitation/military			
E	C-shape	Temporary habitation/military			
G	Enclosure	Military			
L	C-shape	Military			
M	Mound	Military			
N	Enclosure	Military			
O	C-shape	Temporary habitation/military			
P	Wall	Indeterminate			
Q	C-shape	Temporary habitation			
19347	Complex (15)	Multiple	L	L	L
A	C-shape w/ adjoining wall	Temporary habitation			
B	U-shape	Temporary habitation			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19347 (cont.)					
C	Terrace	Possible agriculture			
D	C-shape	Temporary habitation			
E	Wall	Temporary habitation			
G	Cairn	Marker			
I	C-shape	Temporary habitation			
J	C-shape	Temporary habitation			
K	C-shape	Temporary habitation			
L	C-shape	Temporary habitation			
M	C-shape	Temporary habitation			
N	Enclosure	Temporary habitation			
O	Enclosure	Temporary habitation			
P	L-shape	Temporary habitation			
Q	C-shape	Temporary habitation			
19348	Complex (3)	Multiple	L	L	L
A	Terrace	Temporary habitation/military			
B	Terrace	Temporary habitation/military			
C	Wall	Hunting blind			
19349	Complex (4)	Multiple	M	L	L
A	Enclosure	Temporary habitation			
B	Cairn	Post support			
C	Cairn	Post support			
D	Modified outcrop	Agriculture			
19350	Complex (2)	Multiple	L	L	L
A	U-shape	Hunting blind/military			
B	U-shape	Military-agriculture			
19351	Midden scatter	Habitation	L	L	L
19352	C-shapes (5)	Military	L	L	L
A	C-shape	Military			
B	C-shape	Military			
C	C-shape	Military			
D	C-shape	Military			
E	C-shape	Military			
19353	C-shapes (5)	Military	L	L	L
A	C-shape	Military			
B	C-shape	Military			
C	C-shape	Military			
D	C-shape	Military			
E	C-shape	Military			
19354	Complex (3)	Multiple	M	L	L
A	U-shape	Temporary habitation			
B	Terrace	Agriculture			
C	Modified outcrop	Agriculture			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C	Field Work Tasks DR	SC	EX
19355	Complex (2)	Military	L	L	L			
A	Cairn	Military						
B	C-shape	Military						
19356	Complex (2)	Temporary habitation	L	L	L			
B	Modified outcrop	Temporary habitation						
F	Terrace	Temporary habitation						
19357	Terrace	Temporary habitation	L	L	L			
19358	Terrace	Temporary habitation	L	L	L			
19359	C-shape	Agriculture	L	L	L			
19360	Complex (5)	Multiple	L	L	L			
A	Modified outcrop	Temporary habitation						
B	Alignment	Temporary habitation						
C	Mound	Agriculture						
D	Modified outcrop	Temporary habitation						
E	Terrace	Possible agriculture						
19361	Complex (5)	Temporary habitation	L	L	L			
A	Enclosure	Temporary habitation						
B	Alignment(4)	Temporary habitation						
19362	Complex (4)	Multiple	L	L	L			
A	Enclosure	Temporary habitation						
B	Terrace	Agriculture						
C	Terrace	Agriculture						
D	Wall	Agriculture						
19363	Terrace	Agriculture	L	L	L			
19364	Complex (2)	Multiple	M	L	L			
C	Paved terrace	Temporary habitation						
D	Hearth	Recreation						
19365	Complex (13)	Habitation	M	M	M			
A	Enclosure	Habitation						
B	Wall segment	Indeterminate						
C	Wall segment	Indeterminate						
D	Mound	Agriculture						
E	Terrace	Possible burial						
F	Terrace	Habitation						
G	Modified outcrop	Habitation						
H	Alignment	Transportation						
I	Alignment	Transportation						
J	Terrace	Habitation						
K	Trail segment	Transportation						

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19365 (cont.)					
M	Mound	Possible burial			
O	Terrace	Habitation			
19366	Complex (28)	Multiple	H	H	H
A	Enclosure	Habitation			
B	Wall	Habitation			
C	Wall remnant	Habitation			
D	Enclosure	Habitation			
E	C-shape	Habitation			
F	Mound	Possible ceremonial			
G	Circular alignment	Habitation			
H	Trail	Transportation			
I	Enclosure	Habitation			
J	D-shape alignment	Possible ceremonial			
K	Semi circular alignment	Trail marker			
L	Terrace	Habitation			
M	Terrace	Habitation			
N	Cairn	Marker			
O	Enclosure	Habitation			
P	Circular enclosure	Habitation			
Q	Circular enclosure	Hearth			
R	Terrace	Habitation			
T	Midden	Habitation			
U	Enclosure	Habitation			
V	C-shape	Military			
W	Terrace	Agriculture			
X	Trail	Transportation			
Y	Cleared area	Agriculture			
Z	Cleared area	Agriculture			
AA	Cleared area	Agriculture			
BB	Cleared area	Agriculture			
CC	Hearth	Recreation			
19367	Complex (12)	Multiple	M	M	L
A	Mound	Indeterminate			
B	Mound	Indeterminate			
D	U-shape	Habitation			
E	U-shape	Habitation			
F	U-shape	Habitation			
G	Wall	Agriculture			
H	Terrace	Agriculture			
J	Paved area	Habitation			
K	Modified outcrop	Habitation			
L	Wall	Habitation			
M	Terrace	Habitation			
O	Terrace	Indeterminate			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19368	Complex (9)	Multiple	H	H	L
C	Terrace(3)	Agriculture			
D	Hearth	Recreation			
E	Terrace	Habitation			
G	Paved area	Habitation			
L	Paved area	Habitation			
M	Hearth	Recreation			
N	Hearth	Recreation			
19369	Foundation	Possible military	L	L	L
19370	C-shape	Temporary habitation	L	L	L
19371	C-shape	Temporary habitation	L	L	L
19372	Cairn	Marker	L	L	L
19373	Cairn	Marker	L	L	L
19374	Terrace	Possible agriculture	L	L	L
19375	Rubble concentration	Temporary habitation	L	L	L
19376	Complex (4)	Multiple	L	L	L
A	Overhang	Temporary habitation			
B	U-shape	Temporary habitation			
C	Terrace	Temporary habitation			
D	Modified outcrop	Agriculture			
19377	Complex (2)	Possible agriculture	L	L	L
A	Alignment	Possible agriculture			
B	Modified outcrop	Possible agriculture			
19378	Complex (2)	Temporary habitation	L	L	L
A	C-shape	Temporary habitation			
B	C-shape	Temporary habitation			
19379	Cairn	Marker	L	L	L
19380	Modified outcrop	Agriculture	L	L	L
19381	Wall	Hunting blind	L	L	L
19382	Complex (3)	Agriculture	L	L	L
A	Modified outcrop	Possible military			
B	Modified outcrop	Agriculture			
C	Terrace	Possible agriculture			
19383	Modified outcrop	Agriculture	L	L	L

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19384	Wall	Hunting blind	L	L	L
19385	Modified outcrop	Possible agriculture	L	L	L
19386	Wall	Hunting blind	L	L	L
19387	Wall	Hunting blind	L	L	L
19388	Complex (3)	Possible agriculture			
A	Modified outcrop	Possible agriculture			
B	Terrace	Possible agriculture			
C	Modified outcrop	Possible agriculture			
19389	Terrace	Temporary habitation	L	L	L
19390	Modified outcrop	Possible agriculture	L	L	L
19391	Complex (2)	Temporary habitation	M	L	L
A	Wall	Temporary habitation			
B	Circular alignment	Temporary habitation			
19392	C-shape	Hunting blind	L*	L	L
19393	Wall	Hunting blind	L	L	L
19394	Wall	Hunting blind	L	L	L
19395	Complex (14)	Indeterminate	L	L	L
A	Wall	Military			
B	Wall	Military			
C	Modified outcrop	Possible agriculture			
D	Hidden scatter	Temporary habitation			
E	Cairn	Military			
F	Cairn	Military			
G	Mound(8)	Military			
19396	Depression	Military	L	L	L
19397	Complex (7)	Military	L	L	L
A	Rubble concentration	Military			
B	Modified outcrop	Military			
C	Modified outcrop	Military			
D	Modified outcrop	Military			
E	Enclosure	Military			
F	Wall	Military			
G	Road bed	Military			
19398	Complex (4)	Multiple	L	L	L
A	Wall	Military			
B	Modified outcrop	Military			

Appendix B (cont.)

SIHP Site No.	Formal Site/Feature Type	Tentative Functional Interpretation	CRM Value Mode Assess. R	I	C
19398 (cont.)					
C	Terrace	Agriculture			
D	Parallel walls	Military			
19399	Terrace	Temporary habitation	M	L	L
19400	Terrace	Agriculture	L	L	L
19401	Enclosure	Temporary habitation	M	L	L
19402	Wall	Temporary habitation	L	L	L
19403	Enclosure	Temporary habitation	M	L	L
19404	Circular enclosure	Temporary habitation	L	L	L
19405	Alignment	Indeterminate	L	L	L
19406	Trail	Transportation	M	L	M
19407	Cairn w/ adjoining wall	Marker	M	L	L
19408	Enclosure	Temporary habitation	L	L	L
19409	Terrace	Possible agriculture	L	L	L
19410	Trail	Transportation	L	L	M
19411	Hearth	Recreation	L	L	L
19412	Paved area	Indeterminate	M	L	L
19413	Trail	Transportation	M	L	M

APPENDIX C: Stratigraphic Descriptions for Excavated Test Units

SITE 19265,
TU-4, North Face

Layer	*Description*
I	0-26 cmbd, 10 to 26 cm in thickness; very dark grayish brown (10YR 3/2 dry); fine sandy loam; structureless; loose dry consistence; many roots; cultural.

TU-10, North Face

Layer	*Description*
I	0-20 cmbd, 8 to 20 cm in thickness; very dark grayish brown (10YR 3/2 dry); fine sandy loam; structureless; loose dry consistence; many roots; cultural.

SITE 19266,
TU-3, West Face

Layer	*Description*
I	10-55 cmbd, 33 to 43 cm in thickness; dark yellowish brown (10YR 3/6 dry and moist); silt loam; structureless; loose, very friable consistence; many roots; abrupt, smooth boundary; non-cultural;
II	25-66 cmbd, 9-12 cm in thickness; dark yellowish brown (10YR 3/6 dry), dark yellowish brown (10YR 4/6 moist); structureless; loose, very friable consistence; many roots; non-cultural.

SITE 19273, FEATURE A
TU-5, South Face

Layer	*Description*
I	0-10 cmbs; 7 to 8 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark yellowish brown (10YR 4/2 dry); gravelly silt; structureless; loose, non-sticky, non-plastic consistence; common, fine, tubular roots; many fine vesicular pores; abrupt, wavy boundary; cultural;
II	8-14 cmbs; 2 to 6 cm in thickness; very dark brown (10YR 2/2 moist), dark yellowish brown (10YR 4/2 dry); gravelly silt; loose, very friable, non-sticky, non-plastic consistence; few, fine, tubular roots; many, fine, vesicular pores; non-cultural.

SITE 19294, FEATURE A
TU-8, South Face

Layer	*Description*
I	0-48 cmbs; 35 to 48 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark yellowish brown (10YR 4/2 dry); gravelly silt; structureless; loose, very friable, slightly sticky, slightly plastic consistence; common, fine, tubular roots; many, fine to medium, vesicular pores; cultural.

FEATURE B
TU-9, North Face

Layer	*Description*
I	0-50 cmbs, 40 to 50 cm in thickness; dark yellowish brown (10YR 3/4 moist), dark yellowish brown (10YR 3/6 dry); structureless; loose, very friable, slightly sticky, slightly plastic consistence; many, micro to medium vesicular roots; many, fine to medium, vesicular pores; cultural.

FEATURE C
TU-13, South Face

Layer	*Description*
I	0-52 cmbs; 37 to 49 cm in thickness; very dark brown (10YR 2/2 moist), dark yellowish brown (10YR 3/4 dry); moderate, very fine, crumb structure; soft, very friable, slightly sticky, non-plastic consistence; many, fine to micro roots; very abrupt, wavy boundary; cultural.

SITE 19295
TU-12, East Face

Layer	*Description*
I	0-4 cmbs, 1 to 4 cm in thickness; very dark brown (10YR 2/2 moist), dark yellowish brown (10YR 4/4 dry); silt, gravel; structureless; loose very friable, slightly sticky, slightly plastic consistence; many, very fine roots; many, fine to medium pores; abrupt, wavy boundary; cultural;
II	1-8 cmbs, 1 to 7 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark yellowish brown (10YR 4/6 dry); silt, gravel; structureless; loose, very friable, slightly sticky, slightly plastic consistence; many, very fine roots; many, fine to medium pores; non-cultural.

FEATURE C
TU-11, West Face

Layer	*Description*
I	0-11 cmbd, 4 to 5 cm in thickness; brown/dark brown (10YR 4/3 moist and dry); gravelly clay loam; strong, medium, single grain structure; slightly hard, loose, slightly sticky, non-plastic consistence; common, very fine vesicular roots, cultural;
II	11-23 cmbd, 8 to 17 cm in thickness; very dark brown (10YR 2/2 moist), very dark grayish brown (10YR 3/2 dry); strong, fine, single grain structure; slightly hard, very friable, slightly sticky, slightly plastic consistence; few, very fine, vesicular roots; abrupt boundary; cultural;
HF-1	19-23 cmbd, 2 to 3 cm in thickness; very dark gray (10YR 3/1 moist), dark gray (10YR 4/1 dry); silt; weak, very fine, crumb structure; soft, very friable, non-sticky, non-plastic consistence; very few, vesicular roots; cultural.

SITE 19312, FEATURE E
TU-26, South Face

Layer	*Description*
I	2-12 cmbd, 8-10 cm in thickness; very dark grayish brown (10 YR 3/2 moist), dark yellowish brown (10YR 4/4 dry); silt, gravel; structureless; loose, non-sticky, non-plastic consistence; few, fine, vesicular roots; very few, very fine, interstitial pores; clear; cultural.

SITE 19313, FEATURE C
TU-23, North FAce

Layer	*Description*
I	0-17 cmbs, 15 to 20 cm in thickness; very dark brown (10YR 2/2 moist), dark yellowish brown (10YR 4/4 dry); gravelly silt; weak, very fine, crumb and single grain structure; soft, very friable, slightly sticky, slightly plastic consistence; common, fine, tubular roots; many, very fine to fine, vesicular pores; non-cultural.

SITE 19314, FEATURE B
TU-28, North Face

Layer	*Description*
I	0-27 cmbs, 23 to 27 cm in thickness; dark yellowish brown (10YR 3/4 moist), yellowish brown (10YR 5/4 dry); silt loam; weak, very fine, granular structure; soft, very friable, slightly sticky, plastic consistence; many, micro to very fine, vesicular roots; many, very fine, interstitial pores; non-cultural

FEATURE C
TU-27, North Face

Layer	*Description*
I	13-43 cmbd; 26 to 28 cm in thickness; very dark brown (10YR 2/2 moist), brown/dark brown (10YR 4/3 dry); silt loam; strong, fine, granular structure; soft, very friable, slightly sticky, slightly plastic consistence; many, micro to fine, tubular roots; common, very fine to fine, interstitial pores; non-cultural.

FEATURE E
TU-24,West Face

Layer	*Description*
I	0-42 cmbd, 10 to 13 cm in thickness; very dark brown (10YR 2/2), dark yellowish brown (10YR 4/4 dry); silt loam; weak, fine, crumb structure; soft, very friable, non-sticky, non-plastic consistence; few, very fine, vesicular roots; few, fine, interstitial pores; non-cultural.

SITE 19315, FEATURE I
TU-14, South Face

Layer	*Description*
I	0-34 cmbs, 15 to 26 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark yellowish brown (10YR 3/4 dry); gravelly silt loam; weak, very fine, crumb structure; soft, very friable, slightly sticky, slightly plastic consistence; many, micro to fine, vesicular roots; common, fine, interstitial pores; cultural.

SITE 19318
TU-25, South Face

Layer	*Description*
I	0-27 cmbs, 18 to 27 cm in thickness; dark yellowish brown (10YR 4/4 moist), dark brown (10YR 3/3 dry); gravel, clayey silt; soft, friable, slightly sticky, plastic consistence; few, fine, vesicular roots; cultural.

SITE 19354, FEATURE C
TU-7A, South Face

Layer	*Description*
I	0-40 cmbd; 35 to 38 cm in thickness; dark yellowish brown (10YR 4/4 dry); very fine sandy loam; structureless; loose dry consistency; very few roots; cultural.

SITE 19365, FEATURE A
TU-15, North Face

Layer	*Description*
I	16-26 cmbd, 5 to 10 cm in thickness; basalt cobble layer.
II	26-72 cmbd, 42 to 62 cm in thickness; dark brown (7.5YR 3/4 moist), brown/dark brown (7.5YR 4/4 dry); weak, very fine, granular structure; loose, slightly sticky, slightly plastic consistence; few, very fine roots; cultural.

TU-16, North Face

Layer	*Description*
I	0-40 cmbs, 35 to 40 cm in thickness; very dark brown (10YR 2/2 moist), dark brown (10YR 3/3 dry); cobbly silt; moderate, very fine, granular structure; soft, very friable, non-sticky, non-plastic consistence; many, very fine to medium, vesicular roots; common, fine, interstitial pores; abrupt, wavy boundary; cultural;
II	40-52 cmbs, 10 to 13 cm in thickness; very dark brown (10YR 2/2 moist), brown/dark brown (10YR 4/3 dry); silt, gravel; weak, very fine, granular structure; loose, slightly sticky, slightly plastic consistence; few, very fine to fine, vesicular roots; common, fine, interstitial pores; cultural.

SITE 19267, FEATURE G
TU-17, West Face

Layer	Description
I	0-14 cmbs, 8 to 18 cm in thickness; dark yellowish brown (10YR 3/4 moist), dark yellowish brown (10YR 4/4 dry); silt; weak, very fine, granular structure; soft, very friable, slightly sticky, non-plastic consistence; common, micro to fine, vesicular roots; common, very fine to fine, interstitial pores; cultural.

SITE 19368, FEATURE G
TU-19, North Face

Layer	Description
I	5-10 cmbd, 3 to 4 cm in thickness; coral pebble paving; cultural
II	9-33 cmbd, 22 to 23 cm in thickness; dark brown (7.5YR 3/3 moist), brown/dark brown (7.5YR 4/3 dry); silty clay; weak, very fine, crumb structure; slightly hard, friable, slightly sticky, slightly plastic consistence; common, fine, vesicular roots; common, very fine to fine, interstitial pores; non-cultural.

SITE 19376, FEATURE A
TU-1, West Face

Layer	Description
I	56-76 cmbd, 12 to 17 cm in thickness; dark brown (10YR 3/3 moist), brown/dark brown (10YR 4/3 dry); very fine silty loam; structureless; loose, very friable, slightly sticky, non-plastic consistence; non-cultural.

FEATURE B
TU-2, South Face

Layer	Description
I	0-42 cmbs, 20 to 28 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark yellowish brown (10YR 4/4 dry); silty clay; weak, fine, crumb structure; soft, very friable, slightly sticky, slightly plastic consistence; common, micro to fine, vesicular roots; many, fine, interstitial pores; cultural.

FEATURE C
TU-7B, South Face

Layer	Description
I	0-32 cmbd, 13-32 cmbd; dark yellowish brown (10YR 4/4 dry); silt loam, gravel; structureless; loose, very friable, slightly sticky, slightly plastic consistence; many fine roots; cultural.

SITE 19389
TU-6A, West Face

Layer	Description
I	0-43 cmbs; 7 to 24 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark yellowish brown (10YR 4/4 dry); gravelly silt; structureless; loose, friable, slightly sticky, slightly plastic consistence; few, very fine roots; many, fine, vesicular pores; non-cultural.

TU-6B, East Face

Layer	Description
I	0-8 cmbs, 4 to 8 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark grayish brown (10YR 4/2 dry); gravelly silt; structureless; loose, very friable, slightly sticky, slightly plastic; few, fine, tubular roots; common, fine to medium, vesicular pores; non-cultural.

SITE 19391, FEATURE B
TU-20, East Face

Layer	Description
I	0-19 cmbs, 14 to 19 cm in thickness; very dark grayish brown (10YR 3/2 moist), dark grayish brown (10YR 4/2 dry); gravelly silt; structureless; loose, very friable, slightly sticky, slightly plastic consistence; common, fine, tubular roots; many, very fine to fine, vesicular pores; abrupt, wavy boundary; non-cultural;
II	19-34 cmbs, 4 to 12 cm in thickness; very dark brown (10YR 2/2 moist), dark brown (10YR 3/3 dry); silt; structureless; soft, very friable, slightly sticky, slightly plastic consistence; few, very fine, tubular roots; many, very fine, vesicular pores; non-cultural.

SITE 19406
TU-15F, South Face

Layer	Description
I	0-5 cmbs, 3 to 5 cm in thickness; dark yellowish brown (10YR 4/4 moist), brown/dark brown (10YR 4/3 dry); gravel, clay, silt; strong, medium, single grain structure; very hard, very firm, non-sticky, slightly plastic consistence; very few, medium, vesicular roots; very abrupt, smooth boundary; non-cultural;
II	3-10 cmbs, 2 to 5 cm in thickness; dark yellowish brown (10YR 4/4 moist), yellowish brown (10YR 5/4 dry); weak, fine, crumb structure; soft, friable, slightly sticky, plastic consistence; very few, micro, vesicular roots; non-cultural.

SITE 19409
Trench, West Face

Layer	*Description*
I	0-6 cmbs, 4 to 6 cm in thickness; dark yellowish brown (10YR 4/4 moist and dry); gravelly clay and silt; strong, fine, single grain structure; loose, very friable, slightly sticky; non-plastic consistence; common, very fine, vesicular roots; abrupt, smooth boundary; non-cultural;
II	6-19 cmbs, 6 to 14 cm in thickness; dark yellowish brown (10YR 4/4 moist and dry); silt; weak, very fine, crumb structure; loose, very friable, sticky, slightly plastic consistence; very few, micro, vesicular roots; non-cultural.

SITE 19410
TU-21, South Face

Layer	*Description*
I	0-23 cmbd, 7 to 23 cm in thickness; dark yellowish brown (10YR 4/4 moist); cobbly clay, silt; weak, medium, granular structure; loose, slightly sticky, slightly plastic consistence; many, medium roots; very few vesicular pores; non-cultural.

APPENDIX D:
Historical Documentary Research

by Kepā Maly, Cultural Resources Specialist

BACKGROUND

This report is meant to provide readers with an overview of settlement patterns and cultural practices in the Hāpuna-Waiale'a area of Lālāmilo (Puakō), in the district of South Kohala. The report is a compilation of information from recently translated Hawaiian legends, from Land Commission Award (LCA) records, and from previous archaeological or ethnographic studies. Provided in this report is information on (a) the prehistoric environment and settlement in the region, (b) use of land and ocean resources, and (c) changes in land use and the environment following western contact.

The project area is situated along the leeward (*kona*) shore of the district of Kohala, in the coastal zone of the land unit now identified as Lālā-milo (*Milo [Thespesia populnea]* branch). This site includes portions of Hāpuna and Waiale'a, two prominent bays of South Kohala, and their immediate coastal flat lands (*ko kula kai*). Though identified as Lālāmilo today, there is some confusion over the actual name of the land unit in which the project area is located; early traditional accounts and mid-1800s land records generally identify the land as *Pua-kō* (cane tassels or blossoms), rather than Lālāmilo. It appears that the name changed by c. 1928, as territorial survey maps in that year began identifying the land as Lālāmilo. Why the change took place is unknown.

The project area, arid land with limited vegetation, receives approximately 10 inches of rain annually (Carlquist 1980:77). Most of the rain falls during the six-month winter season (October-November through March-April), which was traditionally called *ho'oilo* (literally, to sprout or germinate; the time of sprouting). It was during this time that *Lono*, Hawaiian god of agriculture, was honored for his powers. Lono's attributes included the billowing horizon clouds and rain-laden clouds, which were manifestations of the seasonal *Kona - Niulu*, or southerly storms.

Note: Although diacritical (macron and glottal) marks were not generally used at the time that most of the native narratives were originally written, they have been added here when the original meaning and/or pronunciation was discernible. For people and/or place names which have several possible interpretations and in which the intended meaning is not clear, diacritical marks have not been added, although in some cases hyphens have been inserted to identify separate words within a particular name. Quoted references from books and/or articles have been written as they were originally printed (usually without diacritical marks). Brackets [ ] are used to identify author's annotations and parentheses ( ) generally enclose translations.

People who were living at the time of recording the legendary sources and Land Commission Awards (LCA) documentation knew the proper pronunciations of each word; accordingly, diacritical marks were not necessary. Today, this understanding has been greatly diminished, thus the inclusion of diacritical marks adds significantly to the preservation Hawai'i's legacy. Proper pronunciation of Hawaiian words can greatly enhance interpretation of site events and activities.

Hawaiian Settlement

Current theory places Polynesian settlement voyages between Hawai'i and *Kahiki* (the ancestral homelands of the Hawaiian gods and people) in two major periods, A.D. 300 to 600 and A.D. 1100 to 1250 (Emory IN Tatar 1982:16-18). The ethnographer and author of texts on Hawaiian practices, E.S.C. Handy, speculates that when the first settlers reached the Hawaiian islands, they found a flora which was much like that of their ancestral homeland (Handy 1972:12), but the topography of the islands was notably different.

The broad, watered flatlands of Kaua'i, O'ahu and Maui, and the expansive cultivable mountain slopes of Kona and Ka'ū on Hawai'i permitted the development of a systematic and elaborate planting culture. Such topographic features had not been present on the ancestral islands; the features allowed agricultural practices to evolve to a higher level in Hawai'i, as compared to other Polynesian islands (ibid.:16).

It is believed that for generations following initial settlement, the population clustered along the well watered windward shores of the Hawaiian Islands where fresh water was available, agriculture could become established, and where access to marine resources was good. Small bays generally had a cluster of houses where fishermen and their families lived (Handy 1972:287). Only after the best areas became populated and perhaps crowded (c. A.D. 800 to 1000) did the Hawaiians begin settling more remote, and less desirable areas.

In this region of South Kohala, potable water was primarily provided by coastal springs, water caves, dew fall, and catchment, and was used for some crop cultivation and to sustain human life. The ocean provided most of the meat of the Hawaiian diet. Because of the importance of fishing, and its high level of development, bays like Hāpuna and Waiale'a were prime locations for further settlement during this expansion period. Recent archaeological studies for surrounding areas—'Anaeho'omalu-Kalāhuipua'a (Kirch 1979), Puakō-Paniau (Boudreau and Graves 1993), and Hāpuna (Dunn and Rosendahl 1992)—indicate that initial settlement in this section of South Kohala occurred as early as c. AD 1200.

Hawaiian Land Management Practices

The *moku-o-loko* (district; literally: interior island) of Kohala, is one of the six major traditional districts of Hawai'i Island. A description of the boundaries of Kohala, and its various inner divisions, generally called *'okana* or *'okina* (land divisions smaller than the *moku*, but comprising several *ahupua'a*), is documented in "The Legend of *Ka-Miki*" (Maly in prep), translated from articles published in the Hawaiian language newspaper *Ka Hōkū o Hawai'i* between 1914-1917:

> *O Kohala nui, o Kohala iki, o Kohala loko, o Kohala waho, o Kohala makani 'Āpa'apa'a, o Pili o Kalāhikiola o Nā-pu'u-haele-lua. 'Oia ho'i! 'Oia la! O nā 'ōkina iho la 'ia o ka 'āina ha'aheo i ke kāhili a ka makani 'Āpa'apa'a e ho'olā'au mai ana me he ipo ala ka nē hone i ka poli o ke aloha.*
>
> Large Kohala, little Kohala, inner Kohala, outer Kohala, Kohala of the *'Āpa'apa'a* wind, [Kohala] of *Pili* and *Kalāhikiola*–the two traveling hills. Indeed! These are the combined districts of this proud land brushed by the *'Āpa'apa'a* wind, maturing like a love nestled fondly in the bosom of love. [An epitaph for the land divisions of Kohala which extend from *Honoke'āon* the Hāmākua boundary to *Ke-ahu-a-Lono* on the Kona boundary 3/22/1917.]

The project area is situated in Puakō-Lālāmilo Ahupua'a, in the *okana* (region) generally known as *Kohala makani 'Āpa'apa'a* (Kohala in the *'Āpa'apa'a* wind); this region is famed for its strong land-drying (*'Āpa'apa'a*) winds. Just as the land is today, the legendary accounts depict the area as a rugged land buffeted by various winds including *Kuehulepo* (scattering dust), *Ho'ohaehae* (to drive, stir up the waves), and *Nāulu* (the shower bearing squalls of the winter season). The *ahupua'a*, a traditional unit of land, is generally pie-shaped and stretches from the ocean to the islands' interior. The *ahupua'a* boundaries were usually marked by an altar with an image of a pig placed upon it.

The *ahupua'a* were divided into smaller parcels. These units, such as the *'ili, 'ili lele, kihāpai, māla, kō'ele*, and *mo'o* (respectively: small land unit, detached parcels with resources in various environmental zones, gardens, dry-land agricultural parcels, and agricultural parcels worked by commoners for the chiefs) were inhabited and managed by the *maka'āinana* (people of the land) and their extended families. The common people who lived within individual *ahupua'a* generally had access to all of the resources from mountain slopes to the ocean.

Entire *ahupua'a*, or portions, were generally under the jurisdiction of appointed *konohiki* or lesser chief-landlords, who answered to an *ali'i-'ai-ahupua'a* (chief who controlled the *ahupua'a* resources). The *ali'i-'ai-ahupua'a* in turn answered to an *ali'i 'ai moku* (chief who claimed the abundance of the entire district) thus *ahupua'a* resources also supported the royal community of regional or island kingdoms. This form of district subdividing was integral to Hawaiian life and was the product of a strictly adhered to policy of managing resources.

In the traditional system of land management, the settlements in the *'ili* of Hāpuna and Waiale'a probably owed allegiance to the larger *ahupua'a* of Puakō-Lālāmilo. Legendary and early historic period accounts tell us that fishing was an important occupation for residents of this region, as it was in the surrounding traditional communities of Kawaihae, 'Ōuli, Lālāmilo, Puakō, and 'Anaehu'omalu. In particular, this coastal zone was known for its' *lawai'a 'ōkilo he'e* (fishermen who fished with lures for octopus from canoes). In an account concerning Kanakanaka (written as Kanekanaka on current maps), and Piliamo'o (in the land of 'Ōuli), readers are told that this form of octopus lure fishing originated in or near the project area and then later spread throughout the Hawaiian Islands. While people living on the coast were primarily fishermen, this same account attributes extensive agriculture in the uplands to other relatives of Pili-a-mo'o and Lālāmilo. These relatives' names—Pu'uhina'i, Po'opo'o, Pu'u'iwa'iwa, and Waikōloa—are also the names of upland sites or land divisions. Travelling via various trails, trade occurred between lowland and upland families (*Ka'ao Ho'oniua Pu'uwai no Ka-Miki* IN the Hawaiian Newspaper *Ka Hōkū o Hawai'i*, 1914-1917).

About the Legend of Ka-Miki

Hawaiian legends communicate the sense of relationship which ancient Hawaiians felt with their environment, and document land use, cultural practices, and site features (architectural and topographic). Legends also provide information about travel and the relationships between *kūlanakauhale* (villages), *ahupua'a* and *moku* (districts). "*Ka'ao Ho'oniua Pu'uwai no Ka-Miki*" (The Heart Stirring Story of Ka-Miki; referred to here as "The Legend of Ka-Miki") is an account of two supernatural brothers, Ka-Miki (The quick, or adepts one) and Maka-'iole (Rat [squining] eyes), who traveled around the island of Hawai'i along the ancient *ala loa* and *ala hele* (trails and paths) that encircled the islands.

Their story provides a wealth of information pertaining to more than 790 place name origins and documents site and community histories, local and regional practices, and

ceremonial and *mele* (chant) texts. The legend appears to have been primarily recorded for the paper by Hawaiian historians John Wise and J.W.H.I. Kihe. A PHRI Hawaiian language newspaper translation project has recently made the narratives available in English (Maly, in prep). During the process of working on the translations, numerous other Hawaiian legendary accounts were reviewed as well. Some of the pertinent narratives are included here because of their importance to understanding the region.

Ka-Miki and Maka-'iole were empowered by their ancestress Ka-uluhe-nui-hihi-kolo-i-uka (The great entangled growth of *uluhe* fern which spreads across the uplands), a reincarnate form of the goddess *Haumea* (the creative force of nature; also called *Papa* and/or *Hina*; who was also a goddess of priests and competitors), who lived at Kalama 'ula in the uplands of Kohana-lki, Kona. During their journey, Ka-Miki and Maka-'iole competed alongside the trails they traveled, and in royal courts, against *'ōlohe* (experts skilled in fighting or in other competitions, such as running, fishing, debating, or solving riddles). They also challenged priests whose dishonorable conduct offended the gods of ancient Hawai'i. While in the district of Kohala, the major events of the legend occurred at Pololū, Hala'ula, Keawewai, 'Ōuli, and Lālāmilo-Puakō.

The legend is set in the time when Hikāpōloa and Kapa'au-iki-a-Kalana were the two primary chiefs of Kohala, and Pili-a-Ka'aiea was the sovereign chief of all Kona (c. A.D. 13th century). The project area lands are referenced in the legend when Ka-Miki is competing at the *kahua le'ale'a* (contest field) of Hinakahua in Puapua'a, North Kona. The following place name narratives present a picture of life in the traditional communities of South Kohala, as seen through the eyes of native storytellers. To a contemporary visitor, the project area lands appear barren and desolate. It is difficult to believe that many people could have lived in the area without modern conveniences, but traditional accounts of this area describe native settlements in both the coastal and upland zones. Agricultural fields were developed and maintained, fishing was excellent, and well-defined trails were in-place, thus allowing access to various resources. The English translations are a synopsis of the Hawaiian texts, with emphasis upon the main events of the narratives. The following excerpts are organized according to place name, not chronologically.

HĀPUNA (a spring, or spring fed pool) - The land of Hāpuna (Kohala) was named for Leina-Hāpuna (leap [of] Hāpuna) an *'ōlohe* chief, and the son of Hanawi (an ahupua'a chief in Hilo). Hāpuna was married to Kalaoa (also called Pu'umoi), and they were master contest riddlers and fighters. Hāpuna and Kalaoa became the guardians of Kalapana, who was the son of Kapalaoa (Kalaoa's sister), and her husband Kāne-pō-iki. Hāpuna and Kalaoa instructed Kalapana in riddling competitions and he became one of the famous riddlers of his time (5/4/1916).

COMMENT: The legend of Ka-Miki implies that the lands in which this family dwelt all carry their names to this day; Hāpuna (in Kohala), Kapalaoa and Kalaoa (in North Kona), and Kalapana (in Puna). Kāne-pō-iki is also identified as a god of riddling competitors. Additionally, the occurrence of the word *Leina* in the full name of Hāpuna could describe a leaping site. *Leina* are associated with the sport of ocean and cliff leaping, and the departure places of spirits as they leapt to reach the spirit realm.

KANAKANAKA (Interpretive translation: Man with dry or cracked skin; written as Kanekanaka on maps)

While Ka-Miki was competing in a riddling contest with *Pina'au*, the foster son and riddler champion of the chief *Palikū-a-Kiko'oko'o* (*Hilo Palikū*), riddles which described the various districts of the island and extolled famous land features, and/or site practices were exchanged. One riddle spoke of Kanakanaka — *'ōlelo no'eau*:

> *Ho'okahua ka 'āina, hānau ke kanaka, o Kanaka-naka he 'āina...*
>
> The land was established, the man was born, it was the land of *Kanakanaka*... (9/21/1916).

Kanakanaka was the husband of Pili-a-mo'o (at 'Ōuli), they were the parents of Nē'ula (a fishing goddess), and Nē'ula she was the mother of Lālāmilo. Kanakanaka's sister was the wind goddess *Waikōloa*.

Kanakanaka was an expert *lawai'a hī-'ahi* (deep sea tuna lure fisherman), and he provided Lālāmilo with *olonā* cordage and gourd container in which his prized supernatural octopus lure *Kalokunu* was kept. Whenever Lālāmilo left his octopus lure at home, he secured it in the *hōkeo aho hī 'ahi* (tuna lure and fishing line gourd container) of Kanakanaka, and then hid the container in the ridge pole of his house. The land where Kanakanaka lived [the point between Hāpuna and Waiale'a Days] now bears his name (7/5/1917).

LĀLĀMILO (*Milo* [*Thespesia populnea*] branch), *PUAKŌ* (Sugar cane tassel, or blossoms) and regional place names

The land of Lālāmilo was named for the chief Lālāmilo, who was also an expert *'ōlohe* and fisherman. Through his wife Puakō, Lālāmilo came to possess the supernatural *lehe* (cowrie octopus lure) which had been an *'ōnohi* (cherished) possession of Ha'aluea, a goddess with an octopus form. Ha'aluea and her family came from *Kāne-hūnā-moku* (The hidden land of *Kāne*) and settled at Kapa'a, Kaua'i. Ha'aluea was the wife of the wind and ocean god Halulu-ko'ako'a, and grandmother of 'Iwa-nui-kilou-moku (Great 'Iwa the island catcher). How this octopus lure came to be found by Puakō *mā* * on the reefs fronting their land remains a mystery.

The *lehe* was so powerful that if it was only shown to the *he'e* (octopus), they would climb upon the canoe and be caught. Lālāmilo carefully guarded this lure and even slept with it. When Lālāmilo did leave the lure, he stored it in the *hōkeo aho hī-'ahi* (tuna lure and line storage gourd) of his grandfather Kanakanaka, and this was hidden, tied to the ridge pole of his house.

Lālāmilo's grandmother *Pili-a-mo'o* was an *'ōlohe* seer, and she discerned the nature of the lure, and instructed *Lālāmilo* to kill all people who inquired about the lure, or sought to see it. Because the fame of this lure spread around Hawai'i and people were curious about it, many people went to Lālāmilo and were killed.

* *Mā* - a Hawaiian word which means "and companion" or "and friends"

Pili-a-Ka'aiea the chief of Kona greatly loved octopus fishing, and had sent several messengers to inquire of Lālāmilo how he might acquire the lure. All of the messengers were killed by Lālāmilo and Pili-a-mo'o. While at Hinakahua (in Puapua'a), Ka-Miki agreed to fetch the lure for Pili as one of the conditions he needed to fulfill in order to become the foremost favorite and champion of Pili. Now as these events at the court of Pili were unfolding, Lālāmilo decided to visit his father Pu'u-hina'i (Basket hill); his sister Pu'u'iwa'iwa (Fern hill); and his grand aunt Waikōloa (Water carried far), who was Pu'u'iwa'iwa's guardian. To this day, places are named for all of these people as well.

Lālāmilo arose and told his wife Puakō, and his mother Nē'ula that he was going to the uplands to visit his father, sister, and the people who worked the upland plantations. Lālāmilo desired to eat the sugar cane and bananas, and drink the 'awa which grew on the hill of Po'opo'o. Po'opo'o was also a seer (*makāula*) and saw to the continued peaceful dwelling of the people. Lālāmilo placed the lure in the fishing line gourd container which Kanakanaka had given him, and secured it near the ridge pole of his house. Lālāmilo then asked Puakō and Nē'ula to go and look after the gourd in which the *'ōnohi* (eyeball or cherished possession) of Ha'aluea was kept [i.e., the octopus lure].

Lālāmilo then departed and traveled up towards the residence and agricultural lands of Pu'uhina'i *mā*. As he drew near his destination, his thoughts returned to his cherished lure. Lālāmilo looked towards the ocean, and his desire to see the lure was very great (7/5/1917). At the same time, Lālāmilo also had a premonition, so he returned to the shore without visiting his father and sister. While Lālāmilo was gone, Ka-Miki had traveled to Lālāmilo's region and met with a man of the area named Nlheu. Ka-Miki inquired, "Where is the chief Lālāmilo's house?" Nlheu said, "It is there above the canoe landing." Ka-Miki then asked, "And where is the chief?" Nlheu responded , "I don't know, perhaps he is in his house." Ka-Miki then went to Lālāmilo's house. Peering in he saw the gourd container and he lowered it, removing the cordage. Ka-Miki then took out the lure and departed from Lālāmilo without incident.

[The narrator then proceeds to tell the account of how Puakō and her family left Puna, settled in the regions of Kohala and Kona; and how Puakō came to marry Lālāmilo and found the magical *lehe* (cowrie octopus lure)].

Pua-kō was the daughter of Wa'awa'a (k=male) and Anahulu (w=female), and the sister of: 'Anaeho'omalu (w); Pū'ālā'a (k); and Maui-loa (k), and the family dwelt in the district of Puna. Puakō's great desire was to eat *he'e* (octopus), and Pū'ālā'a was kept continually busy acquiring *he'e* for Puakō, and getting *pa'ou'ou* fish for *'Anaeho'omalu*. When he could no longer provide adequate fish for his sisters they left Puna (Pū'ālā'a, at 'Āpua) and set out in search of a suitable husbands who could provide for their needs.

Arriving at Kapalaoa in the Kekaha lands of Kona, 'Anaeho'omalu married Nāipuakalaulani, son of the chiefess Kualwa of Kapalaoa. Puakō went on to

Waimā (Discolored water) where she met with natives of that area, and was introduced to the chiefess Nē'ula, mother of the fisherman-chief Lālāmilo. When Nē'ula learned that Puakō greatly coveted *he'e*, she told Puakō that her son was the foremost *lawai'a 'ōkilo he'e* (octopus fisherman) of the region. And because Puakō was so beautiful, Nē'ula introduced her to Lālāmilo. Lālāmilo saw Puakō, and compared her to the foremost "*he'e*" he could catch.

One day, after Lālāmilo and Puakō were married, Puakō went to the shore to gather coastal fish and seaweeds. It was low tide at Waimā, and she was able to go far out upon the flats where she saw an *he'e* (octopus) spread out upon the reef. Puakō speared the *he'e* and took it towards the shore. This *he'e* was so heavy she could barely carry it, and Nē'ula saw Puakō and inquired who had given it to her. Puakō told Nē'ula how she found the octopus on the coral out cropping. Nē'ula responded that she was native of the place and had never before seen an octopus of that nature in the area (7/19/1917).

While Puakō and Nē'ula were talking, Lālāmilo returned from octopus fishing and saw Puakō's octopus. Lālāmilo asked Puakō where she had gotten that octopus from and she related the events to him. Lālāmilo accused her of lying, and asked how an ocean octopus could be found on the reef. Lālāmilo then struck Puakō, thinking that she had gotten her octopus from some other man. He struck her so hard that her skin darkened, and Nē'ula interceded saying that they should go to the place where the octopus came from. Nē'ula told Lālāmilo that perhaps what Puakō said was true, and that they should go look upon the reef. Indeed, when they arrived at the spot, there was an octopus upon the reef, and Lālāmilo caught it. Coming before Puakō, Lālāmilo apologized for thinking that someone else had taken the restricted fish of the chief (i.e., Puakō). Lālāmilo then went to investigate why the *he'e* were attracted to that spot on the reef. He looked and found a small hole with something red like an *'ōhi'a* blossom inside it. He realized that it was a beautiful *leho* (cowrie shell) which had attracted the *he'e*, and indeed it was the foremost lure of all Hawai'i.

Lālāmilo broke the reef and took the cowrie, and from that time, no more *he'e* appeared on the reef. Lālāmilo took the *leho* to his house and cleaned the meat from it. He then fastened it with rope, making the lure, and he kept it close to him. Lālāmilo placed the lure in a container and went octopus fishing. When he got to the *lūhe'e* (octopus fishing) site, Lālāmilo removed the lure from the container and secured it to his hand. At the same time, a *he'e* came up and climbed upon the canoe, but when the lure was covered the *he'e* stopped coming into the canoe. Lālāmilo caught some 120 *he'e* in a short time, and he returned to show his wife and mother the results. Nē'ula suggested that Lālāmilo take the lure and an offering of *he'e* to his grandmother, the seer Pili-a-mo'o.

Lālāmilo went to Pili-a-mo'o and showed the lure to her. Pili-a-mo'o discerned the nature of the lure and told Lālāmilo that this was not an ordinary cowrie lure, but a god, the *'ōnohi* (favorite or cherished one) of Ha'aluea the mysterious supernatural octopus being of the ocean depths. The being who

was the grandmother of Iwa the rascal of Makalwa at Kapa'a, Kaua'i. Pili-a-mo'o went onto to say that it was indeed mysterious that the center of Ha'aluea's attention came to dwell along the shore of Nē'ula the Kū'ula (fishing deity); the shore where salt is hardened as the wind *Kuehu lepo* wind picks up the sea mist, and where the three canoe sailing winds of *Hachae, Nāulu,* and *Ho'olua* blow. *Pili-a-mo'o* consecrated the *leho* and the *he'e* which it attracted. She also told Lālāmilo that the first *he'e* caught must always be brought to her as an offering. Pili-a-mo'o then told Lālāmilo that no one should be allowed to see the *leho*, and that anyone who sought to see it had to be killed. As the fame of the lure spread through the land, people were curious about it, and many people were killed by Lālāmilo (7/19/1917).

[It is at this point, that the narrative returns to *Ka-Miki* and his successful acquiring of the lure.]

Because of his premonition that something was amiss with the lure (see narrative from 7/5/1917 above); Lālāmilo returned to his home from the uplands and found that the *leho* had indeed been stolen. Lālāmilo went empty handed to Pili-a-mo'o, and she ignored him, thinking he had forgotten to bring her the offering of the first caught *he'e*. Lālāmilo called to Pili-a-mo'o lamenting the loss of the prized possession of Ha'aluea — *mele kahea*:

E ala e ka Ho'olua,
E ke Kiu ho'ohae a ka Nāulu,
Ulu a ka moana ke lele 'ino nei ke ao,
Ua kaiko'o ka 'āina
Ku ka puna kea i ka pōhuehue,
Ua he'e, Ua hu'e 'ia ka 'ōnohi maka o Ha'aluea la,
Ua lilo minamina wale au e,
O wau nei o Lālāmilo
O ke kama a Kanakanaka,
Iiua o Piliamu'o
Ku'u kupuna wahine alwaiwa e,
moe nei la
E ala mai!

Arise o *Ho'olua* [Piliamo'o, like the strong wind]
O lashing *Kiu* gusts of the *Naulu* storms
The sea is agitated and the clouds fly by
The waves rise to the land
Throwing the coral pieces upon the pōhuehue growth
[The lure] has fled [vanished], the prize of Ha'aluea's
eye has been removed
I am overcome with grief
It is I, Lālāmilo
The offspring of Kanakanaka and my mysterious ancestress
Piliamo'o who sleeps here, arise!

Learning of the theft, Pili-a-mo'o commanded that Lālāmilo seek out a black pig, a white rooster, *'awa* from Po'opo'o, an *'ahuluhulu* (red fish), and a red *malo* before the setting of the sun. Lālāmilo acquired all of the items and

returned to the house of Pili-a-mo'o overlooking the shore of Kauna'oa (in the ahupua'a of 'Ōuli). Pili-a-mo'o told Lālāmilo to release the pig and chicken, and both of them entered the canoe, which Pili-a-mo'o had prepared as the method by which Lālāmilo would travel to *Kaua'i-o-Kamāwaeluaiani* (the island of Kaua'i), where he would find 'Iwa at Makaiwa, Kapa'a.

Pili-a-mo'o called to Lālāmilo saying, "The gods have approved your offerings, and here is your path (canoe) to present the offerings to 'Iwa, the mysterious rascal of the land which snares the sun, 'Iwa the sacred ward of Halulu-ko'ak'oa." With the offerings set in the canoe, and the sail raised, Pili-a-mo'o then prepared, an 'awa ceremony.

The pig was at the mast, the 'awa and fish were set on the platform, the rooster sat on the outrigger end, and the *malo* was placed at the stern of the canoe. After Pili-a-mo'o and Lālāmilo drank 'awa they slept, and when half the night passed the rooster crowed. Pili-a-mo'o arose and went out of the house where she saw the navigators' star high above. Pili-a-mo'o then called to Lālāmilo, "Arise great shark of the sea, o offspring of Hulihia-ka-lani, o flippers of the turtle Kamilo-holu-o-Waiākea. Awaken for the light of the star *Hiki'i-maka-o-Unulau*, the *Kualau* (shower bearing wind) blows and the traveler will touch Kaua'i." Lālāmilo arose, entered the canoe and prepared to journey to Kaua'i (8/2/1917).

As the narratives continue, readers are told about the canoe journey to Kaua'i, and the return of Lālāmilo and 'Iwa to Kohala. The two friends then go octopus fishing with the fishermen of the chief Pili in Kona (the texts contain extensive references to octopus fishing), and they craftily retrieved the lure (9/6/1917). At the time when Lālāmilo returned to his lands, Puakō's brother, Pū'ālā'a, arrived from Puna and Lālāmilo divided the *leho* with him. Because the divided shells looked like portions of baked taro, the lure came to be called *Kalo-kunu*, or broiled taro (9/13/1917).

Additional information about Puakō and her family has been documented by Hawaiian historian and author *J.W.H.I. Kihe*. Kihe was a regular contributor to the Hawaiian newspaper *Ka Hōkū o Hawai'i*. On September 2, 1914 Kihe authored an article entitled "*Pu'uanahulu i ka uka 'Iu'iu, Kona mau Luhiehu Hihiu*" (Pu'uanahulu of the Distant Uplands, with its Uncommon Beauty). In this article Kihe tells the following story about Puakō, her family, and lands named for them. *Ka-holoi-wai-a-ka-Nāulu* was an elder brother of the *Pele* priestess, *Anahulu*. When Anahulu and *Wa'awa'a mā* moved from Puna, to be closer to *Anaeho'omalu* and *Puakō*, Kaholoiwai followed as well. From his dwelling place at *Kaho'opulu*, above Kawaihae, Kaholoiwai cared for his sister, watching for her needs. When a period of dryness came upon the land, Kaholoiwai would send the *Nāulu* showers across the lands, reaching up to *Pu'uwa'awa'a*; thus food plants were able to grow upon the land.

NĒ'ULA (Interpretive translation: Red *nē* seaweed [certain seaweeds were used as offering to *Kū'ula* upon *ko'a* (fishing shrines) and red was sacred to *Kū'ula*; a site identified as being along the coast of Puakō-Lālāmilo)

Nē'ula was named for the mother of Lālāmilo (7/5/1917). When Puakō arrived at Waimā, and expressed her desire for *he'e*, the natives of that area took her to meet with Nē'ula the mother of their chief, Lālāmilo, who

excelled in *he'e* fishing. Puakō's beauty entranced Lālāmilo, and she soon became his wife..

One day, while Puakō was catching shore fish and gathering seaweeds, she came across a large octopus on the reef, and caught it. Both Nē'ula, and Lālāmilo were surprised and did not believe Puakō had caught the squid until they went to this place along the reef at Waimā. They found that a deep red cowrie, like an *'ōhi'a* blossom was what had attracted the *he'e* to the reef (7/19/1917; see Lālāmilo above). The shore line of Nē'ula where the octopus lure was found was described – *'ōlelo no'eau*: ...*Ke kaha ho'ohāhā pa'akai a Nē'ula ke Kū'ula kau huna pa'akai o ka makani Kuehulepo i nā makani kelewa'a*... – The shore where salt is gathered at Nē'ula who is the *Kū'ula* on which salt grains are placed by the wind *Kuehulepo* which scatters dust, the gusts by which canoes are sailed... (7/26/1917).

WAIMĀ (Discolored water; Water [which] fades as when salt is formed; a site identified as being along the coast of Puakō-Lālāmilo)

Puakō departed from 'Anaeho'omalu and arrived at the community of Waimā where she was greeted by the residents of the area. Puakō was introduced to the chiefess Nē'ula, who in turn introduced Puakō to her son Lālāmilo. Lālāmilo was an octopus fisherman, and because of his skill, he gained the beautiful Puna chiefess, Puakō as his wife (7/19/1917). The compound of Lālāmilo was above the canoe landing (7/5) of this area. One day at low tide, Puakō went to the shore of Waimā where she gathered *limu lipe'epe'e*, *limu manauea*, *pai'ea* crabs, salt, and various *'ōhua* (young fish) along the exposed reef flats. On this particular day, Puakō was surprised to see a large octopus on the reef. It was this *he'e* which led to the discovery of "*leho*" (cowrie shell octopus lure) which came to be called *Kalo-kunu*.

Nē'ula was also a *Kū'ula* fishing deity of this coastal area where salt is hardened in the wind *Kuehulepo*, and where the sailing canoe winds *Haehae*, *Nāulu*, and *Ho'olua* blow (7/26/1917).

One additional excerpt is included here as it mentions agricultural practices in the region, and provides the reader with documentation of the relationship between coastal communities and those in the uplands:

PO'OPO'O (Hollow; descriptive of a protected area used for agriculture) Po'opo'o was a *makāula* (priest and seer) who served under the chief Pu'uhina'i. He watched over the lands of Pu'uhina'i, Pu'u'iwa'iwa, Lālāmilo, Pili-a-mo'o, Kanakanaka, and Nē'ula. This upland region was well populated and in extensive agricultural use. Sugarcane and bananas were important crops of the region (7/5/1917), and at Po'opo'o an 'awa plantation was maintained. This fine 'awa growth is remembered by the saying...

'Awa kipulu a Po'opo'o – [The] Mulched 'awa growth of Po'opo'o (8/2/1917).

Aside from the recently translated texts cited above, there are several other legendary or historic period accounts that briefly reference Puako. As mentioned earlier, there has been confusion regarding the name of the *ahupua'a* (Lālāmilo or Puakō). If Puakō is only identified as one coastal village area, as it has been for much of this century, legendary and historic texts which reference Puakō would only relate to a small area. But if the accounts, particularly legends that refer to Puakō are *ahupua'a* descriptions, researchers are then provided with a larger picture of regional activities.

The following legendary accounts, from the Fornander Collection of Hawaiian Antiquities and Folk-lore (1917-1919) and An Account of the Polynesian Race (1969), briefly mention Puakō:

(a) The story of Pupualenalena describes the nature and skills of a *kupua* (a shape changer - supernatural) dog named Pupualenalena (also written Puapualenalena), who dwelt with his master somewhere in the coastal area of the *ahupua'a* of Puakō. The narratives place the events in the time of Hakau, brother of 'Umi-a-Līloa (c. A.D. 1450). Most of the narratives are centered in Waipi'o, and relate to how Hakau enlisted the aid of Puapualenalena to reclaim the sacred conch shell Kiha-pū, which had been stolen by the spirits who dwelt in the uplands (1917 [IV]:558-560);

(b) The legend of Kulanakapūki'i describes Puakō as a handsome man who was a salt maker. The narratives tell of Puakō's short relationship with a beautiful chiefess named Mailelauli'i, who was the daughter of Kaumalumalu (k) and Lanihau (w). Puakō was a salt maker, and in the early mornings, he would go gather sea water and fill pools in which to make his fine salt. While in the land which bears Puakō's name, Mailelauli'i thought to marry Puakō, but her sisters would not have it, because they did not want to be enlisted to assist with his hard labor of salt making (1917 [IV]:560-561);

(c) While narrating accounts around the life of Lonoikamakahiki (a grandson of 'Umi-a-Līloa) and his wife, the sacred chiefess Kaikilani, Fornander (1969) tells readers of a rebellion on the island of Hawai'i. Returning to Hawai'i, Lonoikamakahiki, Kaikilani, and Pupuakea joined with their forces at 'Anacho'omalu where the rebel chiefs had encamped. The next day, Lonoikamakahiki and forces marched down to Wai[a]le'a, not far from the pond of Wainānāli'i. The victory was claimed by the forces of Lonoikamakahiki, and the rebels were pursued to Kauna'oa between Puakō and Kawaihae, where the victory again went to the forces of Lonoikamakahiki...(Fornander 1969:120-121).

While describing battles between the forces of Lonoikamakahiki, chief of Hawai'i and Kamalālāwalu of Maui, Hawaiian historian Samuel Kamakau (1961) mentioned events around Puakō (c. 1575-1600). While at Kawaihae, two old men falsely counseled Kamalālāwalu that Pu'oa'oaka along the Waimea plain would be a good battle site. They instructed the chief to have all their canoes dismantled and destroyed upon landing at Puakō, so that none of his warriors could retreat. Their instructions were followed, and the troops of Kamalālāwalu began their march to the battle grounds on the arid upland plain of Waimea. The warriors of Lonoikamakahiki then surrounded the Maui troops and a great battle took place and few of the Maui warriors could escape because their canoes had been destroyed. The Maui chief Kamalālāwalu "was killed on the grassy plain of Puako" (Kamakau 1961:58-60).

Proto Historic References

One account which may have involved the people and resources of Puakō is associated with the reconstruction and dedication of the great *heiau* of Pu'ukoholā at Kawaihae, approximately 3 miles from the boundary of Puakō-Lālāmilo. In late 1790 Kamehameha I called many of his people to this region of Kohala, to build Pu'ukoholā. During this time, thousands of people were "encamped on the neighboring hillsides" (Fornander 1969:2,238). In 1791 Kamehameha dedicated this *heiau* to his war god *Kū-kā'ili-moku*, and went on to gain control of the entire Hawaiian Island group.

In a series of articles authored by Kamakau and printed in the Hawaiian newspaper *Ku'oko'a*, July 6, 1867 (as translated and published IN Ruling Chiefs of Hawai'i 1961), readers were told about additional events at Puakō (between c. 1796-1802) in the time of Kamehameha I:

> While Kamehameha was living with the chiefs at Waimea [he was] engaged in restoring the old heiaus. When the fence of images (*paehumu*), the oracle tower (*anu'unu'u*), and the pavement (*kipapa*) of the heiau of Uli had been restored, all the people had to go down to Puako after coconuts. When each had taken up his load to return there remained still 480 nuts unhusked. All had gone except Kamehameha and one other to whom the chief was unknown. Kamehameha turned to him and said, "It looks as if there would not be enough coconuts for the dedication in the morning." It is possible that the man recognized the chief for he replied, "They will all be there. The two put the nuts into nets and fastened them together into a huge load that stood taller than either of them. The road from Puako to Waimea is close to twenty miles in length. Occasionally when the man seemed tired Kamehameha took a turn at the load. At dusk as they neared their destination, and it came time for evening prayer, Kamehameha left the man saying, 'When you get to the heiau spend the night with people of the place, but do not tell them that Kamehameha helped carry the load on his back.' Because of this feat of strength and another later, when he took up two hogs each more than a fathom long and carried them without help, this Kuihelani, as his name was, became a great favorite with the chief and held an important office under him. He was allowed to have ten wives, an honor allowed to no other chief besides, and there was no home happier than his, no governor of a district to be compared with Kuihelani (Kamakau 1961:183).

Between 1866 to 1870, John Papa I'i, another early Hawaiian historian, and influential member of the court of Kamehameha III, wrote a series of articles in the Hawaiian newspaper, *Ku'ōko'a*, pertaining to traditional practices and events around the court of the Kamehamehas (translated IN Fragments of Hawaiian History 1959). In 1812 Kamehameha I and his court departed from O'ahu, returning to Hawai'i. At the time, I'i was a young boy, but he recalled passing the Kawaihae and Kekaha (an arid coastal region which stretches between South Kohala and North Kona) shoreline. In his narrative, he comments on the fishing fleets of the region:

> Soon the fishing canoes from Kawaihae, the Kaha lands, and Ooma, drew close to the ship to trade for the pa'i'ai (hard poi) carried on board, and shortly a great quantity of aku lay silvery-hued on the deck. The fishes were cut into pieces and mashed; and all those on board fell to and ate, the women by themselves (I'i 1959:109-110).

Historic Period References and Land Tenure

Within a year following the death of Kamehameha I (1819), American missionaries arrived in the Hawaiian Islands. By 1824, parish districts were being established throughout the islands. English missionary William Ellis visited Hawai'i between 1822-1823, during which time he and several others traveled around the island of Hawai'i. In his journal (1963) Ellis provided a brief description of the village at Puakō. Having traveled from the uplands at Pu'ukapu:

> ...in twilight of the evening reached Puako, a considerable village, four or five miles to the southward of Towaihae [Kawaihae], where he [Thurston] took up his lodging for the night... (Ellis 1963:289).

On July 16 1832, Lorenzo Lyons (*Makua Laiana*), one of the most famed and beloved missionaries of all those who came to Hawai'i, replaced Reverend Dwight Baldwin as minister at Waimea, Hawai'i. Lyons' "Church Field" was centered in Waimea, at what is now the historic church 'Imiola, and included both Kohala and Hāmākua (Doyle 1953:40 & 57).

One of Lyons' churches was Hōkū Loa (Evening star) at the village of Puakō, the present structure was completed March 21, 1859 (Doyle 1945:167). Lyons kept a journal describing his journeys and activities throughout the "field," and in 1835 he briefly mentioned his journey from Kawaihae to Puakō:

> Rose at four o'clock and walked to Puako, five or six miles distant. When it was light I gathered a few shells. I walked along the shore--alone. On one hand was the ocean; on the other a dreary, desolate waste--rocks, lava, coral... I reached Puako at an early hour. As I was alone carrying my own calabash, the natives mistook me for some wandering foreigner, and when I spoke to them in their own language how startled they were!... I excited a great deal of curiosity, I then had breakfast--that is I sat on a stone and ate a biscuit. No water could be found but salt water. As soon as the people could be collected together I talked to them; examined their school, after which I took a look at their salt works...

About Puakō Village Lyons said:

> ...Puako is a village on the shore, very like Kawaihae, but larger. It has a small harbor in which native vessels anchor. Coconut groves give it a verdant aspect. No food grows in the place. The people make salt and catch fish. These they exchange for vegetables grown elsewhere (Doyle 1945:84-85).

Another entry from Lyons journal, an entry made between the years of 1839-1846, offers the following narrative:

> Not infrequently at Kawaihae and Puako there is no food to be had. The people live without food for days, except a little fish which prevents starvation. Nor is this to be had everyday, the ocean being so rough they cannot fish, or a government working day interferes, when the sailing of a canoe is tabu-unless the owner chooses to pay a fine. The water too at these places is such that I cannot drink it. I would as soon drink a dose of Epsom salts... On the way to Puako, all is barren and still more desolate. After an hour's walk from my house, not a human dwelling is to be seen till you reach the shore, which requires a walk of about five hours (Doyle 1945:108-109).

Lyons estimated the population of Kawaihae-Puakō around this time period to be approximately 734 persons (Doyle 1945:122).

Citing other early foreign visitor's accounts and the recollections of local informants (c. 1930), Handy (1940) and Handy and Handy (1972) provide readers with a description of agriculture, fishing, and life in the South Kohala region. Among the references are the following narratives:

> ...From Puako to Anaehoomalu at the southern end of Kohala and from Kapalaoa, at the northern extreme of Kona, to Kailua there are no streams whatever, and certainly there were no terraces.
>
> South Kohala produced much dry taro in the lower forest zone which formerly extended far down over what is now open pasture... (Handy 1940:119).
>
> The coastal section of Waimea, now called South Kohala, has a number of small bays with sandy shores where fishermen used to live, and where they probably cultivated potatoes in small patches. Anaehoomalu, Waialua Honokaope, Kalahuipuaa and Pauoa all have sandy strips along the sea; and there is an area of black cinder in this section where sweet potatoes might be grown in rainy seasons. Puako was a sizable fishing village at one time where were undoubtedly many sweet potato patches... Between Kawaihae and the upland taro plantations in the vicinity of Waikoloa Stream (below the present town of Waimea) there were many plantations on the *kula* lands from the coast to 2,500 feet as is indicated by the stone walls and dry terraces on the hillsides... (ibid:163).

The authors note that dry taro was planted along the lower slopes of the Waimea side of the Kohala Mountains (1972:532). It is likely that the taro-producing areas supplied coastal communities with vegetables, and the coastal communities provided the upland residents with fish and other marine resources.

Menzies (IN Handy and Handy 1972), a surgeon with Captain Vancouver in 1793 described his journey to the upland plantations of Waimea, and commented on his encounters along the trail with people taking produce to the coast. He wrote:

> ...From the number of people I met loaded with the produce of their plantations and bringing it down to the water side to market, for the consumption was now great, not only by ship, but by the concourse of people which curiosity had brought into the vicinity of the bay (IN Handy and Handy 1972:532).

Land Tenure - Transitions In Land Use

Between 1790 and the 1840s, western ways continued to gain influence over the *ali'i* (rulers) , and land management and use was changing radically. Following the death of Kamehameha I, American missionaries arrived and Hawaiian ways continued to erode away.

Western influences reshaped the Hawaiian sense of community. Hawaiian settlements of the period reflect missionary concepts regarding acceptable communities; i.e. the "benefits" of living under the watchful eyes of church leaders, close to churches, and in "civilized" villages and towns. After the arrival of the missionaries, churches were built in populated areas easily accessible to natives. The churches became gathering places—the village centers. In 1848, a Western-style land ownership system was set in place. Preceding this event, called the *Māhele* (a division of land between the crown, government, lesser chief's [*konohiki*], and native tenants of the land), all land and natural resources had been held in trust by the high chiefs, and their use was controlled by the high chiefs (*ali'i 'ai ahupua'a* or *ali'i 'ai moku*) and their representatives or land agents (*konohiki*), who were generally lesser chiefs as well.

This radical restructuring of the Hawaiian land management system was called The Great *Māhele* (Division [of land]). The *Māhele* defined the land interests of the King (Kamehameha III), the high-ranking chiefs, and the *konohiki*, who were originally those in charge of tracts of land on behalf of the king or a chief (Chinen 1958:vii and Chinen 1961:13). More than 250 of the highest-ranking chiefs and *konohiki* in the kingdom joined Kamehameha III in this division. The first *Māhele* was signed on Jan. 27, 1848 by Kamehameha III and Princess Victoria Kamāmalu, and by her guardians Mataio Kekūanaō'a and Ione [John Papa] I'i. The last *Māhele* was signed by the King and E. Enoka on March 7, 1848 (Chinen 1958:16).

The *Māhele* did not convey title to any land. The chiefs and *konohiki* were required to present their claims to The Land Commission to receive awards for lands quit claimed to them by Kamehameha III. They were also required to pay commutations to the government in order to receive royal patents on their awards. Until an award was issued, title remained with the government. The lands awarded to the lesser chiefs and *konohiki* became known as *konohiki* lands. Because there were few surveyors in Hawai'i at the time of the *Māhele*, the lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This expedited the work of the Land Commission and speeded the transfers (Chinen 1961:13).

During this process all land was placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, and *Konohiki* Lands. These were all "subject to the rights of the native tenants," (Laws of Hawaii 1848:22). The *hoa 'āina* or native tenants were the common Hawaiian people who lived on the land and worked it for their subsistence and the welfare of the chiefs. Questions concerning the nature of these native tenants rights began to arise as the King, the government, and *konohiki* began selling parcels of land to foreigners. On December 21, 1849 the Privy Council attempted to clarify the situation by adopting four resolutions intended to protect the rights of native tenants referred to in the 1848 law (Chinen 1958:29).

These resolutions (IN *Kanawai Ho'opa'i Karaima no ko Hawai'i Pae 'Āina*, 1850:123-124) authorized the Land Commission to award fee simple title to all native tenants who occupied and improved any portion of Crown, Government, or Konohiki lands. These awards were to be free of commutation except for house lots located in the districts of Honolulu, Lāhainā, and Hilo (Chinen 1958:29). Before receiving their awards from the Land Commission, the native tenants were required to prove that they cultivated the land for a living. They were not permitted to acquire wastelands underline between or lands which they cultivated "with the seeming intention of enlarging their lots." Once a claim was confirmed, a survey was required before the Land Commission was authorized to issue any award. The lands of the native tenants became known as "*Kuleana* Lands."

By the time of its dissolution on March 31, 1855, the Land Commission had issued only 8,421 *kuleana* claims to the native tenants, with claims equaling only 28,658 acres of land (Kame'eleihiwa 1992:295). Though the commoners were required to provide proof of land use and habitation, royal claims rarely included any documentation. For the commoners, this "requirement of proof" produced a series of volumes of registry and testimony. Today, these volumes often help researchers understand land use practices, crop production, resource harvesting, and architectural sites of the time. Because the narratives help provide a view into 1800s communities, claim registers and testimonies for lands within the project area are included below.

Māhele Awards

The *Buke Māhele* (Records of the Land Division) and subsequent Indices of Awards (1929) indicate that only a few land parcels were claimed by native tenants in the *ahupua'a* of Puakō and/or the *'ili* (land parcel) of Lālāmilo. Almost all of the claims appear to be associated with the *'ili* of Lālāmilo (the project area). Most of the *'ili* of Lālāmilo was awarded to William Charles Lunalilo, who later became King of the Hawaiian Nation, as a part of LCA 8559-B *'Apana* (portion) 6. As an *ali'i*, Lunalilo was not required to provide documentation of land use.

The register and testimony of native tenants offer the following descriptions of life and residence in Puakō:

Native Register Volume 8:

LCA 3758 (page 52) - 'Akāhi claimed one house lot on the shore enclosed by a stone wall from ancient times.

LCA 3736 (page 52) - Wahakāne claimed house lots at Puakō and Waimea, and 17 lo'i kalo (taro pond fields) at Waipi'o.

LCA 4099 (page 384) - Keawekuloa, Kaholoa'a, and Kahumoku claimed a lot containing three houses. Additionally, the claim also included 7 coconut trees, 2 pandanus trees, and 5 salt making pools.

LCA 4102 (page 65) - Kamahi'ai claimed a house lot at Puakō which included three houses and a couple of [coconut] trees.

Native Testimony Volume 4:

LCA 3758 (page 20) - 'Akāhi; witnesses confirmed 'Akāhi's house lot claim at Puakō with four houses upon it. Two houses were for 'Akāhi, and one house each were for Kahenehene and Nāpu'upu'u.

LCA 3736 (page 19-20) - Wahakāne; witnesses confirmed Wahakāne's claim of a house lot in the *'ili* of Lālāmilo at Puakō. It contained one house for Wahakāne and one house for Kau'i who dwelt under Wahakāne. The lot was not enclosed by a wall.

LCA 4099 (page 147-148) - Keawekuloa, Kaholoa'a, and Kahumoku; witnesses confirmed that there in the *'ili* of Puakō, *ahupua'a* of Waimea were

> 3 houses , one for each of them. This was an ancient land from the time of their parents and ancestors before the time of Kamehameha I. The *'āina pa'akai* (salt making land) produced fine salt. Their lot also included several *kula mahi 'uwala* (dryland sweet potato patches).
>
> LCA 4102 (page 21) - Kamahi'ai; witnesses confirmed 'Akāhi's claim for a house lot with three houses in the 'ili of Lālāmilo next to Puakō. One house was for Kamahi'ai, and one house each was for Nāoho and Kaha'anapilo

Because 'Akāhi, Wahakāne, and Kamahi'ai share some similar boundaries with Uilama Pakele (William Beckley, *konohiki* of the Waikōloa-Waimea lands), it appears that all their claims were within the *'ili* of Lālāmilo. Additionally it is interesting to note that Wahakāne's award provided him with access to coastal-marine resources and fishing grounds at Puakō, while in the district of Hāmākua at Waipi'o, he had access to taro pond fields (i.e., cross regional access to resources).

Land Use Following the Māhele

After native Hawaiian commoners were granted the opportunity to acquire their own parcels of land through the *Māhele* (1848), foreigners were also awarded the right to own land in 1850, provided they had sworn an oath of loyalty to the Hawaiian Monarch (Kame'eleihiwa 1992:300). This opened the door to foreign business interests, primarily American, and the stage was set for the full scale development of a variety of businesses, including Hawai'i's sugar industry.

As recorded in land documentation research reported by Kalima and Wong Smith (1992), the Land Index Files of the Hawai'i State Archives contain the following information about the *'ili* of Lālāmilo and *ahupua'a* of Puakō:

> Interior Dept., Dec. 28, 1854
> Testimony given by Palea and Kuuku re: above Ili [of Lālāmilo], that said Ili rightfully belongs to Wm. C. Lunalilo.
>
> Aug. 31,1864 Letter from S.C. Wiltse to J.O. Dominis
> ...G.D. Davis claims that all the ilis in the ahupuaa as named [Puako] are all his and being a part of his private property known as Waikoloa...
>
> July 19,1858 Letter from Isaac Y. Davis to Wm. Webster
> ...Requesting that Lalamilo and Waimea in Puako not be given to Kauhini until they have talked the matter over together.

Kalima and Wong Smith also state:

> Land Patents were granted to people who wanted to insure their claims to lands. Although the L.C.A.'s were generally regarded as a sign of outright ownership, patents further insured that no claims could be put against your land. Richard Smart of the Parker Ranch was the first to apply for a patent in the Puako area (patent for a parcel in L.C.A. 8559-B applied for in 1952; Patent S-8547). The patent verified that the land was originally the property of Lunalilo and had not been given up for commutation to the government, (further verified in the Indices of Awards, page 22), and that Richard Smart, having purchased a parcel of this land was the absolute owner (Kalima and Wong Smith 1992:C-5).

Puakō Sugar Plantation

Two Chinese immigrants began planting and processing sugar in c. 1827 in the upland portion of the Lālāmilo-Puakō region, at Lihu'e, below Waimea Village. Though their efforts failed, the efforts were not forgotten (Barrera and Kelly 1974:47). In 1863 Kohala Sugar Company was incorporated in Hala'ula, North Kohala. Through the 1870s, other plantation and milling operations were started, and around 1880, Robert Hind started up the Hāwi mill. In c. 1895-1899 Hind and his son John acquired land in the Puakō area and began planting sugar cane there as well. In a typed manuscript, John Hind (ms. nd.) has provided readers with a brief history of the Puakō Plantation and other family business interests, with insightful comments on the changing Kohala environment brought on by the diminishing upland forests. Unfortunately, there are few dates accompanying the narratives, and approximate dates can only be assumed:

> Mr. W.I. Vreedenburg one Sunday came to Hawai in a state of considerable excitment, with four or five sticks of fine looking cane strapped to his saddle, which, as he put it, he discovered at Puako the day before while on a shooting trip. This cane was grown without irrigation, and he enthusiastically announced there were large areas of as good land as that on which these particular sticks were grown... To make a long story short, conditions appeared extremely favorable for cane growing. Soil was analyzed, and found of unusual fertility, in fact received special mention by Dr. Maxwell the Director of the H.S.P.A. Experimental Station. A well was sunk (about ten feet) water analyzed and found to contain no more salt than water on other plantations, using well water. An experimental plot was planted, which for growth exceeded anything I had ever seen. Negotiations were entered into with Parker Ranch, for the proporty and as their appeared to be no bidders for our Waipunalei [Hilo] land, an exchange was finally arranged whereby Sam Parker, secured our rights in Waipunalei, for his rights in Puako.
>
> A fine up to date little mill with all the appurtenances which go with a modern plantation was installed, on an ideal site, a hundred or so yards from the landing...(Hind nd.:46-48)

Hind goes on to tell how the first crop was growing exceedingly well when "freshets and semityphoons" caused substantial loss of the crop. Additionally, the high winds "proved disasterous (Hind nd.:48). Of the winds, Hind says:

> During the first year or two we only had a few severe visitations, but later, while we might be exempt for several months, and everything flourishing, we would have a continuation of storms, which at times would threaten to put us off the map (ibid.).

The winds so dried out the soils that the salt level was too high to be washed out in time by irrigation. Hind continues his description, saying:

> We found a good rain was of very great benefit, and finally as a forlorn hope, after keeping tab, on the Waimea stream for over eighteen months, put in an

> eight mile flume, but strange as it may seem, the water failed just before the flume was finished. Mr. Carter the Manager of the Parker Ranch [c. 1903*] attributed the failure to the unprecedented dry weather in the mountains, but as the stream, never after that, continued to flow with any degree of regularity, it would appear the shrinkage of forest area in the mountains was having its effect... Puako, as a sugar proposition, I was satisfied, was hopeless, so finally was closed down, and parts gradually sold off at what they would bring... (Hind nd.:49-50).

The Puakō sugar venture failed in 1914 (Conde and Best 1973:115), and the plantation remains were described by Albert Baker when he visited the Puakō petroglyph fields in 1919:

> Just before reaching Puako one is surprised by overlooking vivid green irrigated alfalfa fields, the alfalfa being raised for feeding the pigs and a few cattle of this one-time sugar plantation, of which scarcely a suggestion now remains (A. Baker 1920:48).

Portions of the land acquired by the Hinds from Parker Ranch were a part of Lunalilo's Lālāmilo *'ili* award (LCA 8559-B). In 1952, Robert Hind, Ltd., a Hawaiian Corporation sold 7.42 acres of their Lālāmilo back to Parker Ranch-Richard Smart (Bureau of Conveyances in Liber. 2598:383-389) (Kalima and Wong Smith 1992:C-5).

In 1974 Barrera and Kelly prepared a report describing regional land use and history, covering both the legendary and historic periods. Their report should be referred to for additional documentation particularly as related to upland "*kula*" areas of Lālāmilo.

During this century, the coastal region of Lālāmilo-Puakō has become a favorite retreat; the beaches of Hāpuna and Waiale'a are among the finest on Hawai'i. In *Beaches of the Big Island*, Clark (1985) refers to the modern Puakō community and also mentions some of the sites and events that occurred within the Puakō-Lālāmilo area:

> The residential community of Puakō, which dates from the early 1950s, begins at Puakō Bay and extends for 3 1/2 miles of shoreline along the paved extent of Puakō Road.
>
> A large wave-washed bench of rock fronts almost the entire length of this long stretch of low-lying coast, but the irregular beach contains many small points, inlets, coves, and tidal pools, all of which are suitable for pole fishing, net fishing, spear fishing, snorkeling and in some areas, swimming...
>
> Fresh water intrusion from shoreline springs in this area often forms a layer of cool, brackish water on the surface of the ocean. The only true fringing reef of consolidate limestone on the Big Island fronts this section of the shoreline, an excellent site for near-shore scuba diving (Clark 1985:130).
>
> Waialea, commonly misspelled and mispronounced as Wailea, is one of the Big Island's most beautiful white sand beaches. The beach slopes gently into deeper waters offshore and offers excellent opportunities for swimming,

* *By 1903 "a severe reduction in rainfall" brought about discussions which led to the development of the Kohala Ditch. In 1904, John Hind "launched his ditch campaign" (Stephenson 1977:14)*

> snorkeling, and near-shore scuba diving. Many families, especially those with small children, prefer the more sheltered conditions at Waialea to those at neighboring Hāpuna, where the longer, straighter beach is more exposed to the open ocean....The pole closest to the dirt road leading to Waialea is number 69, so Waialea Beach is commonly known to many Big Islanders as Beach 69 (ibid:132).
>
> The beautiful white sand beach at Hāpuna stretches for over half a mile between the points of lava that form its boundaries. During the summer months, the beach is more than 200 feet wide - the widest white sand beach on the Big Island. High winter surf often erodes the beach considerably, but still leaves beachgoers more than enough sand for various activities. About midway along the beach, a lava promontory that was known to Hawaiian fishermen as Ihumoku (the "bow [of the] ship") crosses the sand and effectively divides the beach in half... At the southern end of the beach, enthusiastic swimmers have great fun jumping and diving into the ocean from several places in the sea cliffs. Plunging feet first into the water with the least possible splash was a popular ancient Hawaiian sport known as *lelekawa*.
>
> When the Territory of Hawai'i first opened Hāpuna Beach as a public park, it did not have title to a large triangular portion of the park property immediately south of Ihumoku, the rock promontory that divides the beach. This section of land, part of the land division of 'Ouli owned by the Parker Ranch, was subsequently acquired through the cooperation of Alfred Wellington Carter, the manager of the Parker Ranch from 1899 to 1937. In recognition of his assistance the park was named A.W. Carter Beach Park, but this name was eventually changed in favor of Hāpuna Beach State Recreation Area when the property was developed and improved with public facilities (ibid:132-134).

REFERENCES CITED

Baker, A.S.
1920 Still More Petroglyphs. *Thrum's Hawaiian Annual and Almanac* 1920. Honolulu, Hawai'i.

Barrera, W., Jr., and M. Kelly
1974 Archaeological and Historical Surveys of the Wāimea to Kawaihae Road Corridor ,Island of Hawaii. Prepared for the Department of Transportation, State of Hawaii. B. P. Bishop Museum, Honolulu, Hawai'i.

Board of Commissioners
1929 Indices of Awards made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands. Honolulu.

Boudreau, M., and D. Graves
1992 Interim Report: Archaeological Mitigation Program, Puako Road Extension Corridor. Phase II - Data Recovery and Interim Site Preservation. Land of Lalamilo, South Kohala District, Island of Hawaii (TMK:3-6-9:01:12,17). PHRI Report 1187-100192.

Carlquist, S.
1980 Hawaii, A Natural History. SB Printers, Inc., Honolulu, Hawaii. (Printed for the Pacific Tropical Botanical Garden.

Chinen, J.J.
1958 *The Great Mahele: Hawaii's Land Division of 1848*. Honolulu: University of Hawaii Press.

1961 *Original Land Titles in Hawaii*. Honolulu: privately published.

Clark, J.R.K.
1985 *Beaches of the Big Island*. Honolulu: University of Hawaii Press.

Conde J.C., and G.M. Best
1973 *Sugar Trains: Narrow Gauge Rails of Hawaii*. Big Tree Press and Pacific Book Binding.

Doyle, E.L.
1945 Makua Laiana: The Story of Lorenzo Lyons. Compiled from the manuscript journals, 1832-1886. Honolulu Star-Bulletin, Honolulu, Hawaii.

Dunn, A.E., and P.H. Rosendahl
1991 Phased Archaeological Inventory Survey, Puako Beach Road Extension Corridor, Land of Lalamilo, South Kohala District, Island of Hawaii (TMK:3-6-9-01:Por.12,Po.17). PHRI Report 975-050592. Prepared for Paniau Partners.

Ellis, W.
1963 *Journal of William Ellis*. Honolulu: Advertiser Publishing Co., Ltd.

Fornander, A.
1917 Honolulu: Hawaiian Antiquities and Folk-Lore. Memoirs. Vol. 4. B.P. Bishop Museum, Honolulu.

1969 *An Account of the Polynesian Race, Its Origin and Migrations*. Charles E. Tuttle Company: Rutland, Vermont & Tokyo, Japan.

Handy, E.S.C.
1940 The Hawaiian Planter: His Plants, Methods and Areas of Cultivation. B.P. Bishop Museum Bulletin 161. Bishop Museum Press: Honolulu.

Handy, E.S.C., and E.G. Handy
1972 Native Planters in Old Hawaii. *B.P. Bishop Museum Bulletin* 233. Bishop Museum Press, Honolulu. (With M.K. Pukui)

Hind, J.
n.d. A Brief History of Robert R. Hind's entry into the Sugar Business, and its Continuance Under the Management of his son John. (95 leaves, UH-Hilo HJ9118.H25 H5).

I'i, J.P.
1973 *Fragments of Hawaiian History*. Honolulu: Bishop Museum Press.

Kalima, L., and H. Wong Smith
1992 Historical Documentary Research. IN B. Burgett et al. (1992). Archaeological Inventory Survey, Paniau Development Parcel Project Area. Land of Lalamilo, South Kohala District, Island of Hawaii. PHRI Report 715-051892. Prepared for Paniau Partners.

Kamakau, S.
1961 *Ruling Chiefs of Hawaii*. Honolulu: The Kamehameha Schools Press.

Kame'eleihiwa, L.
1992 Native Land, and Foreign Desires. Bishop Museum Press.

Kirch, P.V.
1979 Marine Exploitation in Prehistoric Hawai'i: Archaeological Investigations at Kalahuipua'a, Hawai'i Island. *Pacific Anthropological Records* 29. Dept. Anthro., B.P. Bishop Museum.

Maly, Kepā (translator)
in prep. *Ka'ao Ho'oniua Pu'uwai no Ka-Miki* (The Heart Stirring Story of Ka-Miki). A translation of a legendary account of people and places of the island of Hawai'i. published in the Hawaiian Newspaper *Ka Hōkū o Hawai'i*, January 8, 1914 - December 6, 1917. Ms., Paul H. Rosendahl, Ph.D., Inc.

Stephenson, L.K.
1977 Kohala Keia (This is Kohala) Collected Expressions of a Community, A Product of Kohala People. Privately published.

Tatar, E.
1982 Nineteenth Century Hawaiian Chant. Pacific Anthropological Records No. 33, B.P. Bishop Mus. Honolulu.

APPENDIX H

2010 Traffic Impact Assessment Report for
Hapuna Beach State Recreation Area Expansion

2010 TRAFFIC IMPACT ASSESSMENT REPORT

FOR

HAPUNA BEACH STATE
RECREATION AREA EXPANSION

9 February 1995

Lalamilo, South Kohala, Hawaii

Prepared for:

State of Hawaii
Department of Land and Natural Resources

Prepared By:

Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 6D
Honolulu, Hawaii 96814

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY 1
Project Description 1
Methodology 1
Conclusions and Recommendations 3

II. PROJECT DESCRIPTION 5
Future Expansion of Hapuna Beach Area 8

III. EXISTING CONDITIONS 10
Land Uses 10
Existing Roadway Facilities 10
Existing Traffic Conditions 13

III. FUTURE CONDITIONS 15
Future Land Uses 15
Future Roadway Facilities 16

IV. PROJECTED TRAFFIC CONDITIONS 17
Future Traffic Without Project 17
Future Traffic With Project 22

V. TRAFFIC IMPACTS ANALYSIS 25
Analysis Methods 25
Project Impact Analysis 25
Improvement Analysis 29

VI. CONCLUSIONS AND RECOMMENDATIONS 32

APPENDICES

Appendix A. Definitions of Level-of-Service for Unsignalized Intersections and Signalized Intersections
Appendix B. Manual Traffic Count Data

LIST OF TABLES

Table 1. Future Developments 15
Table 2. Land Use Differences - 2020 vs 2010 (West Hawaii) . . 18
Table 3. Trip Generation for Proposed Project 22
Table 4. Trip Distribution for Proposed Project 23
Table 5. Unsignalized Intersection Analysis 26
Table 6. Signalized Intersection Analysis 30

LIST OF FIGURES

Figure 1. Project Location Map 6
Figure 2. Existing Facilities 7
Figure 3. Project Site Plan 9
Figure 4. Study Intersection Laneage 12
Figure 5. Existing 1994 Weekday Traffic Volumes 14
Figure 6. Year 2010 Without Project Peak Hour Traffic Volumes 21
Figure 7. Year 2010 With Project Peak Hour Traffic Volumes . 24

FOREWORD

The traffic forecasts shown within this report's figures and tables are the direct result of Pacific Planning & Engineering, Inc.'s proprietary analytical tools. For report editing and review purposes, the forecast values have been rounded to the nearest five vehicles from our mathematical results, although we do not imply this level of accuracy can exist in any forecast method. The rounded values, however, reasonably quantify the forecasted traffic volumes for the purposes of this study.

This report is an update to an initial draft completed in February 1994 for the Hapuna Beach Park Expansion. Since that date, the State Department of Transportation has begun work to update their Island-wide Transportation Plan. At the time of this writing, the Plan is still being prepared, and 2020 forecast results were not available. The results of this study should not be used in lieu of the DOT's 2020 forecasts, nor should the results be used to interpret the final improvement needs for Queen Kaahumanu Highway as this is a function of DOT's updated Long Range Plan. The forecasts contained in this report are based on land use information prepared for the 2020 transportation plan, as well as our research on available land use and project plans for the area.

EXECUTIVE SUMMARY

Pacific Planning & Engineering, Inc. (PPE) was engaged to identify and assess future traffic impacts during the year 2010 that would be caused by the proposed Hapuna Beach State Recreation Area Expansion. Additional traffic would impact Queen Kaahumanu Highway at the park's two access points.

Project Description

The State Department of Land and Natural Resources, Division of State Parks is proposing to expand the existing Hapuna Beach State Recreation Area located in the South Kohala District on the Big Island of Hawaii. The proposed improvements will be conducted in six phases and encompass a total of 937 acres, when completed by the year 2010.

The proposed improvements include: adding concession, outdoor shower and water safety facilities at the Wailea Beach area; additional facilities for picnicking such as pavilions, picnic tables, and barbecue grills; additional camping area for groups and families; trail improvements; a new 18-hole golf course mauka of the highway; and realignment of the existing internal roadway.

Access to the project area from the rest of the island is provided by Queen Kaahumanu Highway, via Hapuna Beach Road and Puako Spur Road.

Methodology

Analysis was conducted at the unsignalized intersections of Queen Kaahumanu Highway with Hapuna Beach Road and Queen Kaahumanu Highway with Puako Spur Road to determine the relative impact of the proposed project on the local roadway system.

The time periods analyzed include the weekday morning and afternoon peak hour periods. The weekday peak periods were selected to identify project traffic impacts since the project traffic would have the largest impact during these times.

Future traffic without the project was forecasted by analyzing the following:

1) Year 2020 land use data for the current update study of the Island of Hawaii Long Range Highway Plan conducted by the State Department of Transportation. The forecasts from the study were not available as of this writing. However, 2020 land uses were made available for analytical purposes.

2) Year 2010 land use data from the original Island of Hawaii Long Range Highway Plan completed in 1991.

3) Year 2010 average daily traffic forecasts from the original Island of Hawaii Long Range Highway Plan completed in 1991 for Queen Kaahumanu Highway on sections adjacent to the project access points.

4) 1994 State DOT traffic counts for Queen Kaahumanu Highway.

5) Directional and peak hour traffic factors derived from 1994 State DOT traffic counts.

6) Trend analysis of State DOT counts on Queen Kaahumanu Highway since 1976.

Conclusions and Recommendations

The proposed Hapuna Beach State Recreation Area Expansion project will not have a significant impact on traffic flow at the project access intersections of Queen Kaahumanu Highway with Puako Spur Road and Hapuna Beach Road, when the project is completed in year 2010.

Queen Kaahumanu Highway is estimated to operate at Level of Service D during the 2010 afternoon peak hour even with the addition of the project's traffic. Drivers entering or exiting the project access roads are expected to experience long to very long delays (LOS E or F) due to the increase in traffic volumes along Queen Kaahumanu Highway. Similar traffic conditions will be experienced by existing and future intersections along Queen Kaahumanu Highway, left turning vehicles will experience increasingly greater wait times before entering Queen Kaahumanu Highway traffic flows.

To provide a greater access to the park expansion project, the following actions might be taken:

- Signalize the intersections of Hapuna Beach Road and Puako Spur Road with Queen Kaahumanu Highway when warranted. If signalized, the intersections will operate at LOS B during the

afternoon peak hour, and higher during lower traffic volume hours.
- For the intersection of Queen Kaahumanu Highway and the Golf Course Access Road, provide a fully channelized intersection with exclusive left turn lanes and acceleration and deceleration lanes.

The traffic volumes forecasted for year 2010 are based on future land uses contemplated in the Year 2020 Update to the State DOT's Island of Hawaii Long Range Highway Plan. The 1991 plan called for expanding Queen Kaahumanu Highway to four lanes divided, with a possibility of frontage roads and requirements for an access-controlled type facility. Clearly, the reduction in land uses reflect the current economic situation on the Big Island and in the State. Major projects are not included in the 2020 update, that were included in previous forecast studies. As might be expected, the forecasts for 2010 are much lower than previous traffic forecasts estimated in other prior studies.

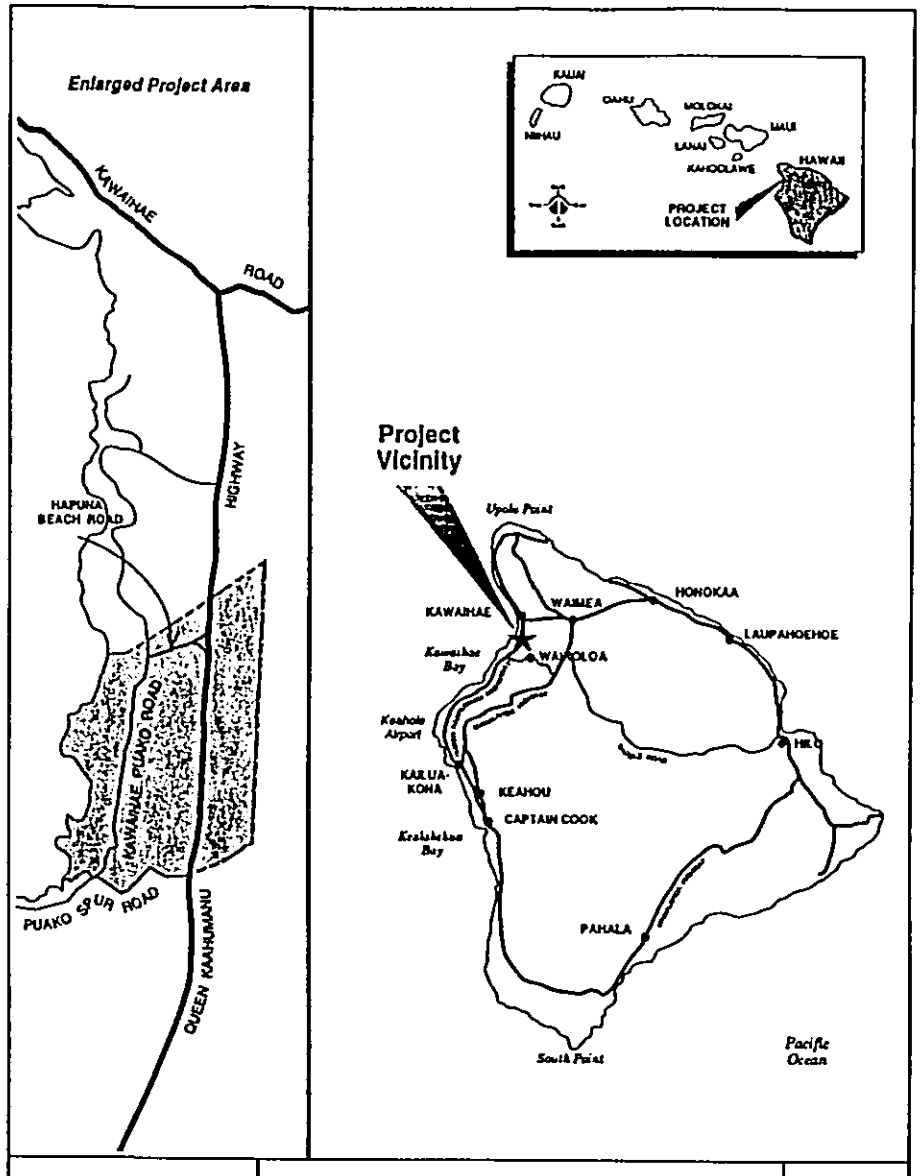
PROJECT DESCRIPTION

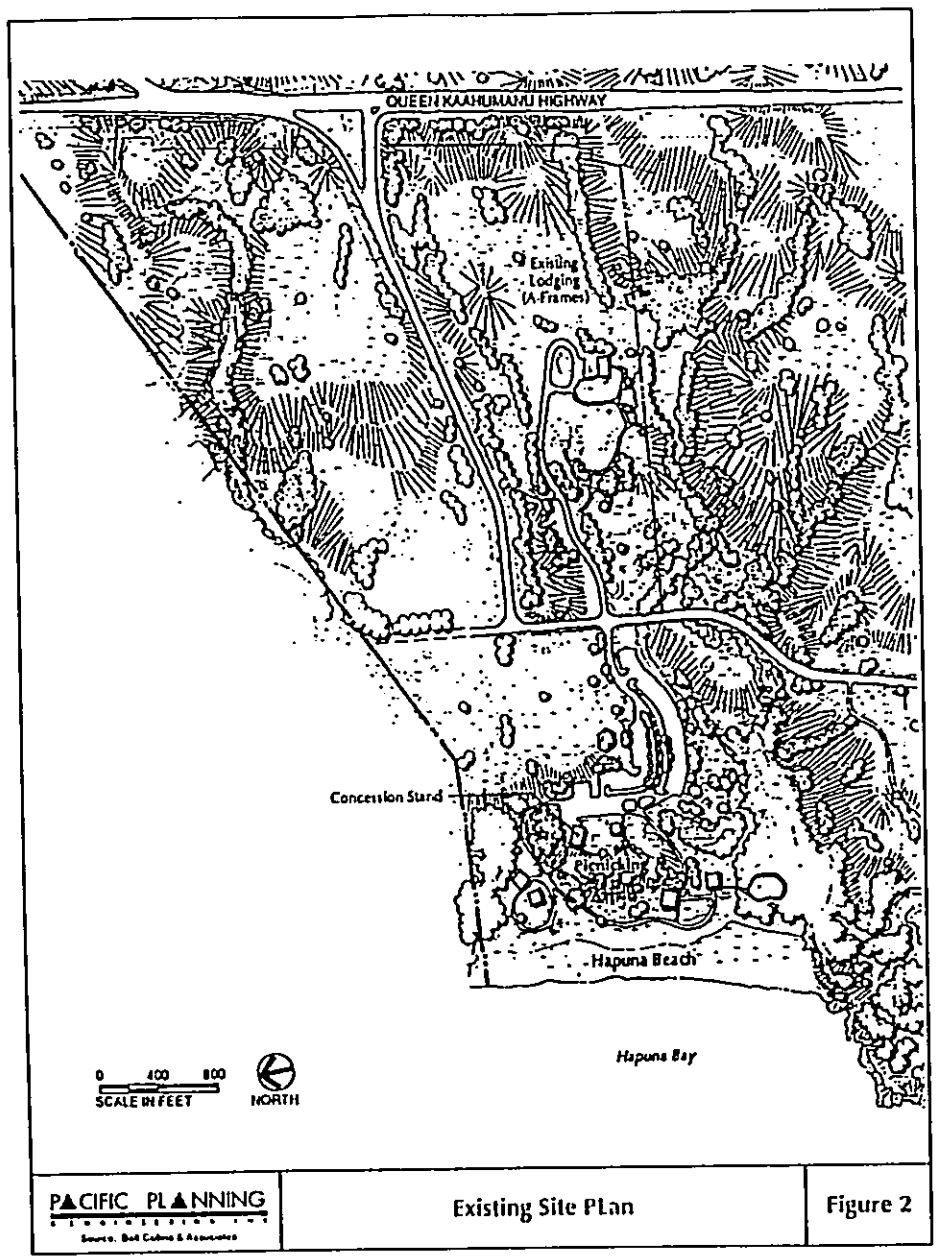
The State Department of Land and Natural Resources, Division of State Parks is proposing to expand the existing Hapuna Beach State Recreation Area located in the South Kohala District on the Big Island of Hawaii. The proposed improvements will be conducted in six phases and encompass a total of 937 acres when completed in the year 2010.

The project site is located along Queen Kaahumanu Highway about 15 miles west of Waimea and 50 miles north of Kailua-Kona. Access to the Hapuna Beach State Recreation Area is provided via Queen Kaahumanu Highway, Hapuna Beach Road and Puako Spur Road. There is an existing internal road, Kawaihae-Puako Road, within the project site. Figure 1 shows the project location and roadway network in the vicinity.

The existing park, located makai of Queen Kaahumanu Highway, is approximately 62 acres in size. The existing facilities include six overnight cabins, two pavilions, eight picnic shelters, eight outdoor picnic tables, three restroom facilities, caretaker's house, maintenance building, and three outdoor showers. Parking is provided for about 237 vehicles. Additionally, there are a total of 21 privately owned residential lots located within the project area near Wailea Bay. Figure 2 shows the existing Hapuna Beach State Recreation Area.

There are three beaches located within the project area: Hapuna Beach, Beach 68 and Wailea Beach. However, easy access is available only for Hapuna Beach via Hapuna Beach Road. Access to Beach 68 and Wailea Beach is provided from the unimproved Kawaihae-Puako Road and dirt trails. Additionally, several trails to the coastline are provided makai of Kawaihae-Puako Road. Due to the terrain, access is primarily by 4-wheel drive vehicles.





PACIFIC PLANNING	Existing Site Plan	Figure 2

Future Expansion of Hapuna Beach Recreation Area

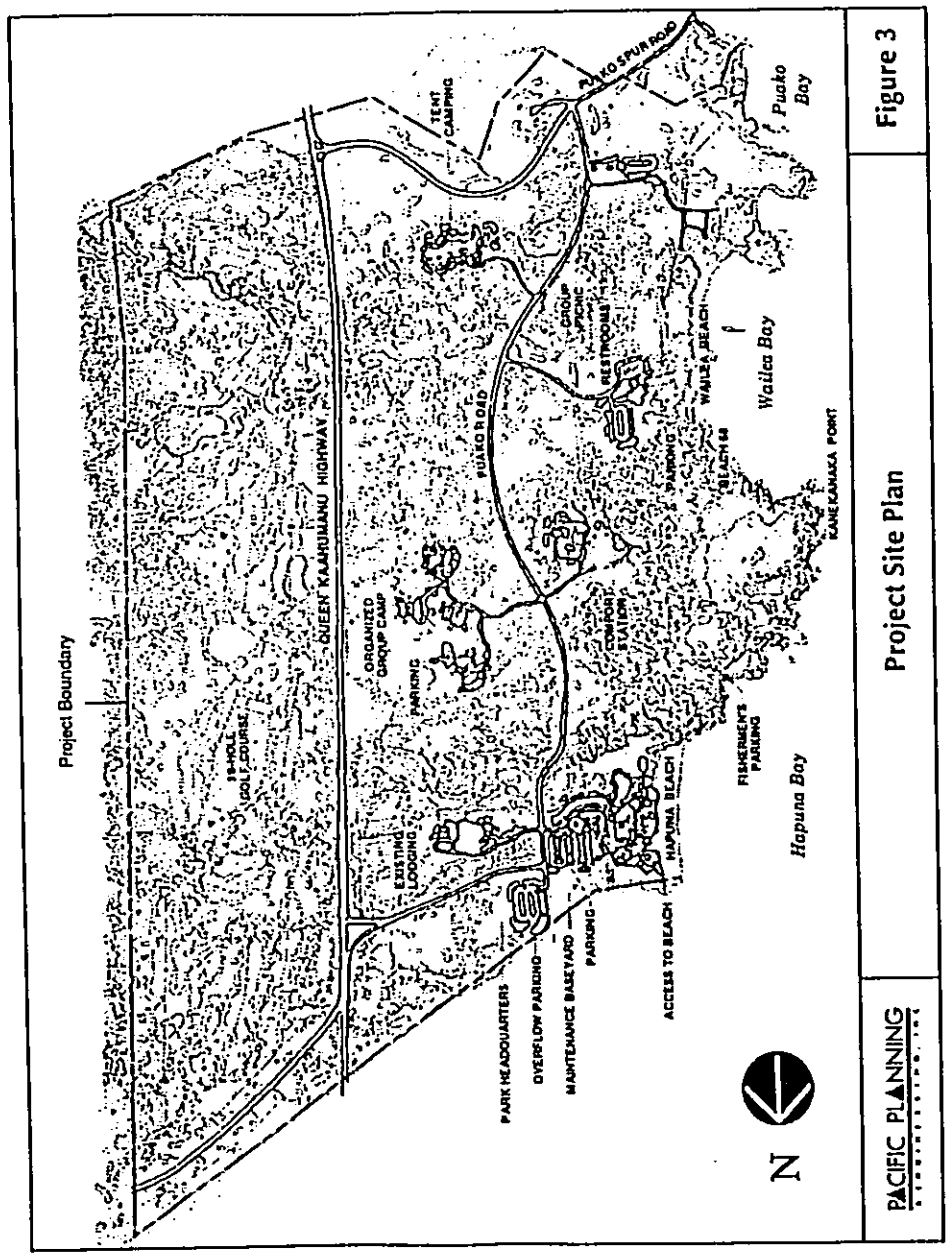
The proposed expansion of the Hapuna Beach State Recreation Area consists of the construction of a combination food concession/water safety facility located behind Wailea Beach. Outdoor shower facilities would be installed behind Wailea Beach. Additional picnic facilities would be provided in the Wailea Beach area as well. The picnic facilities would include separate picnic tables with barbecue facilities and a fresh water supply.

Three pavilions for group picnic rentals would also be constructed to accommodate 200 persons. The location of the pavilions would be makai of Kawaihae-Puako Road near Wailea Bay.

Facilities would also be provided for organized group and family campers. Approximately 80 campsites would be constructed throughout the project site. Each campsite would accommodate approximately 10 persons per site. Additionally, 8 cabins accommodating up to 16 persons each would be provided for organized group camping.

Construction of an 18-hole municipal golf course and clubhouse would be included as part of the expansion. The golf course would be located mauka of Queen Kaahumanu Highway on a 298 acre site.

A 3,000 square-foot park headquarters facility would also be constructed. The park headquarters would house park personnel including: a park manager, administrative personnel, lifeguards, security officers, and maintenance personnel. Figure 3 shows the project site plan.



EXISTING CONDITIONS

An inventory of existing conditions was conducted to determine the current traffic conditions in the area and to provide a basis for estimating the potential traffic impact of the proposed project. The site investigation included the land uses in the area, roadway facilities, and existing traffic conditions.

Land Uses

Presently, much of the land surrounding the project site consists of lava fields. There are a several resort hotels located within the South Kohala District. Some of the hotels within the area of the project site include the Mauna Lani Hotel and the Waikoloa Hotels located to the south and the Mauna Kea Hotel to the north.

Located to the north are the towns of Kohala, Waimea and Honokaa. South of the project is Keahole Airport, which is the major State-owned airport serving the West Hawaii region. Further south is Kailua-Kona Town which is the main business center for West Hawaii and consists of offices, hotels, shopping malls, and businesses.

Existing Roadway Facilities

The existing roadway network in the vicinity of the project is shown in Figure 1. The major roadways in the area are Queen Kaahumanu Highway and Mamalahoa Highway. Queen Kaahumanu Highway and Mamalahoa Highway are parallel facilities.

Queen Kaahumanu Highway is the main highway in the South Kohala and Kona districts, running in a north-south direction along the coastline between Kailua-Kona and Kawaihae. It is a State maintained two-lane undivided highway with a 24-foot wide pavement and a posted speed limit varying between 35 to 55 miles per hour (mph).

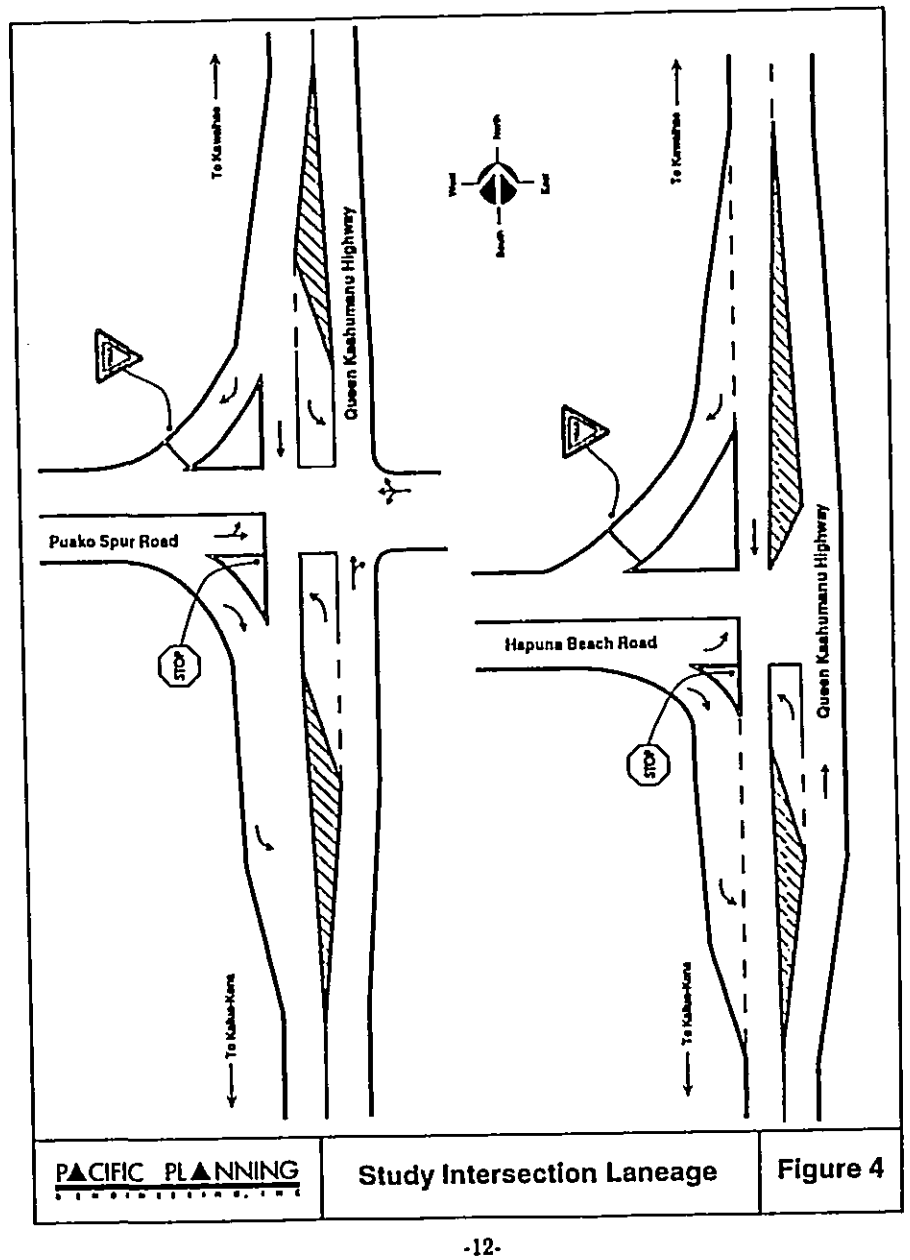
Mamalahoa Highway is a two-lane State highway with a pavement width varying between 18 and 24 feet and a posted speed limit varying between 35 to 55 mph.

Hapuna Beach Road is a two-lane road with 12-foot lanes and 10-foot shoulders. Hapuna Beach Road provides access to the Hapuna Beach State Recreation Area and the Hapuna Beach Prince Hotel which is currently under construction.

Puako Spur Road is a two-lane road with 12-foot lanes and 10-foot shoulders. Puako Spur Road has a posted speed limit of 35 mph

Hapuna Beach Road and Puako Spur Road, at their intersection with Queen Kaahumanu Highway, are channelized with left-turn storage lanes, deceleration and acceleration lanes. These intersections are located approximately 1 mile apart from each other. The posted speed limit along Queen Kaahumanu in the vicinity of these intersections is 55 mph. Figure 4 shows the existing laneages at these intersections.

Kawaihae-Puako Road varies in width from 10 to 16 feet. Kawaihae-Puako Road is well worn with several potholes and cracks within the pavement. Kawaihae-Puako Road provides access to the coastline via several dirt trails accessible by 4-wheel drive vehicles. Kawaihae-Puako Road also provides internal circulation within the project site between the existing Hapuna Beach State Recreation Area and the undeveloped land.



Existing Traffic Conditions

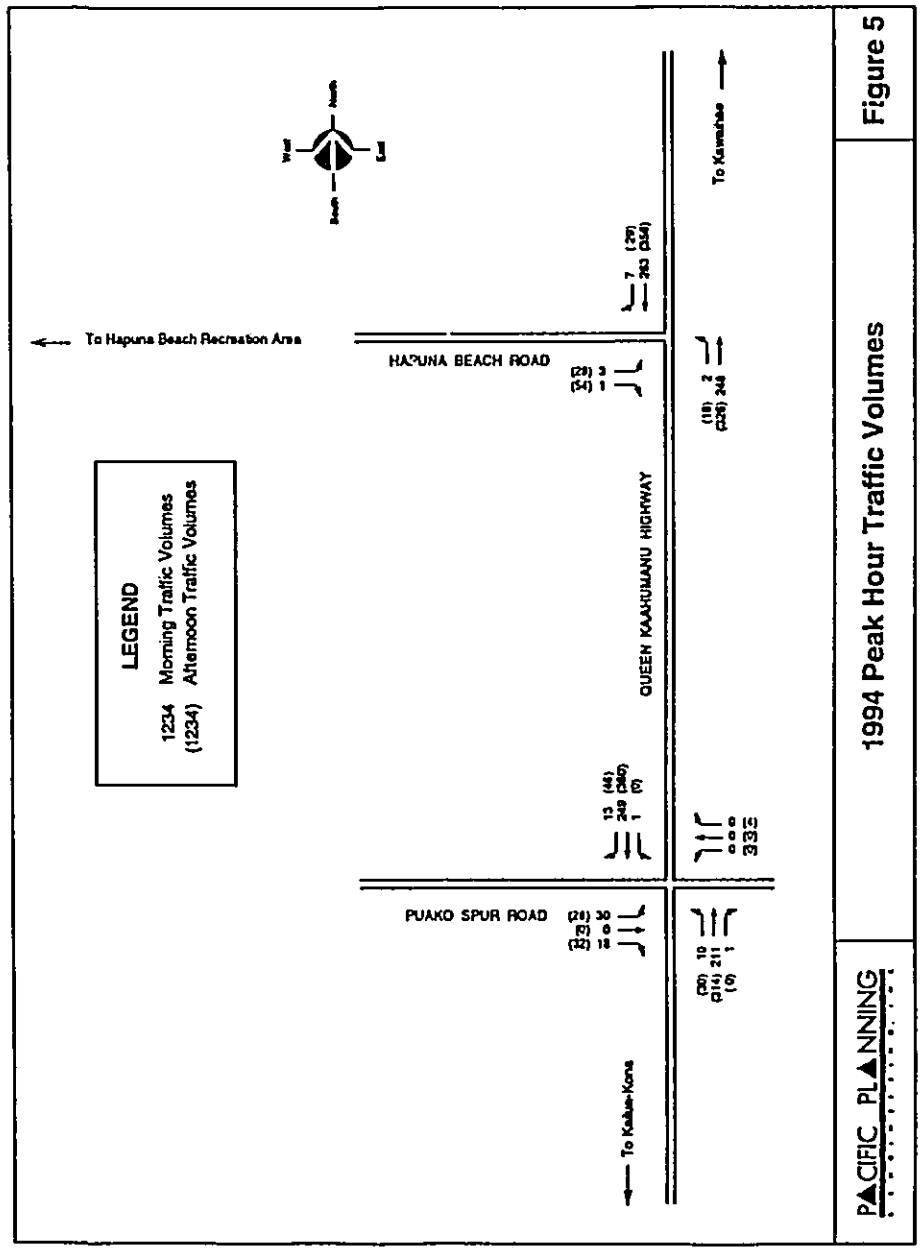
State Department of Transportation 24-hour traffic count data indicates the peak traffic periods along Queen Kaahumanu Highway generally occurs from 6:00 to 8:00 in the morning and from 2:30 to 4:30 in the afternoon. Manual traffic counts were taken at the intersections of Queen Kaahumanu Highway with Hapuna Beach Road and Queen Kaahumanu Highway with Puako Spur Road. The counts were taken on Tuesday, January 25, 1994 from 2:30 to 5:00 pm and on Wednesday, January 26, 1994, from 6:00 to 8:30 am.

Manual counts were taken of passenger cars, trucks and buses by turning movements and approaches. During the field counts, the weather was sunny and the roadway pavement was dry. Figure 5 shows the present volume of traffic at the study intersections for the observed study periods. The manual traffic count data for the study periods is summarized in Appendix B.

Observed Traffic Conditions

The following observations were made during the field survey:

- Average speed in the area ranged from 55 mph to 65 mph.
- Slow moving heavy vehicles travelling along Queen Kaahumanu Highway used the shoulder to allow faster vehicles to pass.
- Vehicles along Queen Kaahumanu Highway would usually arrive in platoons of 3 to 7 vehicles.
- Midday observation of the Hapuna Beach park showed the parking lot to be approximately 75% full.



FUTURE CONDITIONS

Research was conducted of approved planned developments and improvements in the North Kona and Kohala areas which might directly affect traffic levels on Queen Kaahumanu Highway. Such developments are included in land use values that yield long range traffic forecasts given in the Island of Hawaii Long Range Highway Plan (IHLRP) published in May 1991.

Future Land Uses

The major developments within the immediate area of the project are shown below in Table 1:

Table 1. Future Developments

Development	Land Use
Ainakea Village	Residential
Kohala Plantation	Residential, Golf Course
Mahukona Lodge	Hotel, Residential, Golf Course
Maliu Ridge II & III	Residential
Hawi Makai	Residential
State Dept. of Hawaiian Home Lands	Residential, Commercial, Industrial
Parker 2020	Residential, Commercial, Industrial, School
Sandalwood	Residential
Hapuna Beach Prince Hotel	Resort
Mauna Kea Resort	Resort
Puako Mauka	Residential, Commercial
Puako Residential Golf Community	Residential, Commercial
Waikoloa Village	Residential, Commercial, Industrial
Royal Vista Golf Course	Golf Course
Mauna Lani Resort	Resort, Residential, Commercial, Industrial, School, Golf Course
Waikoloa Beach Resort	Resort, Residential, Commercial
Kaupulehu Resort	Resort, Residential, Commercial, School
Kona Village	Resort
Kukio Resort	Resort, Residential, Commercial, School

The State Department of Transportation is completing work to update this Island-wide Highway Plan. At the time of this writing, the Plan is being prepared, and 2020 forecast results are not available. However, the 2010 forecasts contained in this traffic report are based on land use information prepared for the 2020 update study, as well as PP&E's research on available land use and project plans for the area.

Future Roadway Facilities

The State Department of Transportation and the County of Hawaii Department of Planning and Public Works prepared a report titled, Island of Hawaii Long Range Highway Plan (IHLRP) published in May 1991 to coordinate long term transportation planning issues for the island.

This IHLRP report included recommendations to widen Queen Kaahumanu Highway to a 4-lane, access controlled freeway from Kawaihae Road to Palani Road. Access to Queen Kaahumanu Highway would be limited to grade separated interchanges at locations to be determined by highway design criteria. Traffic between adjoining properties along the highway would be provided by a system of frontage roads that would also connect to the proposed grade separated interchanges.

The highway improvements are planned to be implemented by the year 2010, that coincides with the completion of the Hapuna Beach State Recreation Area Expansion. If these improvements are not completed by then, widening Queen Kaahumanu Highway to provide passing lanes in each direction is provided by the plan.

PROJECTED TRAFFIC CONDITIONS

Future traffic was forecasted for the year 2010 for traffic conditions without and with the proposed Hapuna Beach State Recreation Area Expansion. Traffic forecasts were estimated for the year 2010 when the project is expected to be completed.

Future Traffic Without Project

Future traffic without the project was forecasted by analyzing the following:

1) Year 2020 land use data for the current update study of the Island of Hawaii Long Range Highway Plan conducted by the State Department of Transportation. The forecasts from the study are not approved and were not available as of this writing. However, land uses were made available for analytical purposes.

2) Year 2010 land use data from the original Island of Hawaii Long Range Highway Plan completed in 1991.

3) Year 2010 average daily traffic forecasts from the original Island of Hawaii Long Range Highway Plan completed in 1991 for Queen Kaahumanu Highway on sections adjacent to the project access points.

4) 1994 State DOT traffic counts for Queen Kaahumanu Highway.

5) Directional and peak hour traffic factors derived from 1994 State DOT

traffic counts.

6) Trend analysis of State DOT counts on Queen Kaahumanu Highway since 1976.

Traffic Forecast From Island of Hawaii Long Range Highway Plan

The Island of Hawaii Long Range Highway Plan provided base year 1987 average daily traffic (ADT) volumes and forecasted ADT volumes for the year 2010. This information was used to extrapolate year 2010 forecast ADT volumes for this study from an estimated 2020 average daily traffic (ADT) forecast for Queen Kaahumanu Highway.

The 2020 ADT was estimated by forecasting the vehicle trips from the 2020 land uses that would be generated from traffic zones in the West Hawaii area, and added or subtracted from the Queen Kaahumanu Highway 2010 ADT forecasts contained in the IHLRP. The land use differences in the Table 2 below.

Table 2. Land Use Differences -- 2020 vs 2010 (West Hawaii)

Year	SFDU	MFDU	Condo Units	Hotel Units
2010	23,572	10,606	12,410	13,602
2020	24,999	9,277	2,817	8,979
Difference	1,427	-1,329	-9,593	-4,623

The results indicate that major development is forecast to be delayed or cancelled. For example, several major developments are not included such as the Hawaiian Home Lands Kawaihae planned development. This appears to be the current observation of the economic conditions for most major projects in the area. The effect on ADT on Queen Kaahumanu Highway should be a major reduction from previously forecasted values.

Vehicle trips were calculated based on rates used in the IHLRP. Condo and hotel rates were estimated based on previous studies of resort trip generation. The rate of 9.55 trips per day for single family dwelling units outweighs the other uses to the extent that the net difference of trips would be 510 trips in 2020 than predicted for 2010. Again this is due to the change in land use forecasts for the area.

The 2020 ADT is estimated to be 23,310 vehicles per day (vpd) on Queen Kaahumanu Highway in this area. This estimate is calculated by adding the 2010 IHLRP ADT forecast of 23,820 vpd with the calculated trip difference of -510 vpd.

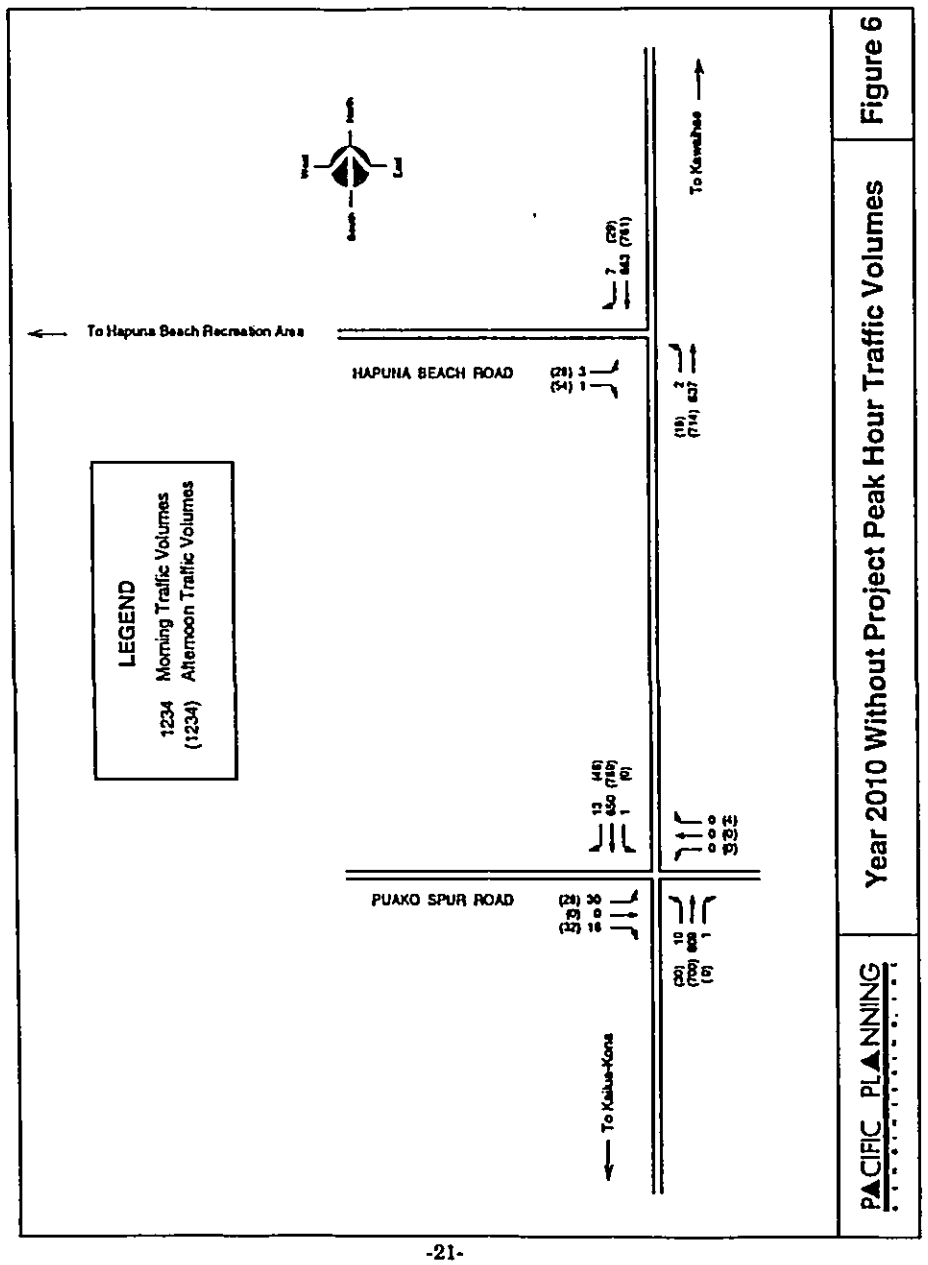
Trend analysis of daily counts was conducted as a check for the reasonableness of the 2010 forecast. Ten State DOT counts at Station 11-E, on Queen Kaahumanu Highway at Kawaihae-Waimea Road from 1976 to 1994 was used as the base for prediction. Only ten counts are available since the DOT collects volume data every other year at this location. The results of the trend analysis and other ADT results are given below.

COMPARISON OF FORECAST VALUES (Vehicles Per Day)			
	PP&E Estimate	Trend Estimate	Difference
2020 ADT	23,310	23,400	90
2010 ADT	17,680	18,120	440

To be conservative, the analysis assumes the higher trend value of 18,120 vpd for 2010 ADT on Queen Kaahumanu Highway. Based on this value, the two-direction peak hour volumes would be 1,260 vehicles per hour (vph) during the morning peak hour, and 1,480 vph in the afternoon.

Year 2010 Traffic Forecasts Without Project

The resulting weekday morning and afternoon peak hour traffic volume forecasts without the project in year 2010 are shown in Figure 6.



Future Traffic With Project

Future traffic with the project was forecasted by adding traffic generated by the proposed Hapuna Beach State Recreation Area Expansion to the forecasted traffic without the project. The standard three-step procedure of trip generation, trip distribution, and traffic assignment was used to estimate peak hour traffic from the proposed project.

The number of trips generated by the project was estimated based on two methods: the golf course traffic was generated based on data from the ITE Trip Generation Report, and the recreation area traffic was based on trip rates derived from manual traffic counts. The Hapuna Beach State Recreation Area Expansion report[1] indicates the proposed park expansion will have an increased park capacity of 54%. Future park expansion traffic was forecasted by increasing existing traffic by 54%. Trips generated by the Park Headquarters were estimated based on total employees.

Table 3. *Trip Generation for Hapuna Beach State Recreation Area Expansion*

Land Use	AM Peak		PM Peak	
	Enter	Exit	Enter	Exit
Park Expansion	17	28	66	76
Park Headquarters	18	2	2	18
Golf Course	48	10	31	29
Total	83	40	99	123

The trip distribution step estimates the distribution of vehicle trips to their predicted origins and destinations. The trip distribution for the beach park traffic was based on existing trip distribution at the study intersections. The trip distribution for the beach expansion project is shown below in Table 4. The trip distribution for the golf course was estimated at

1 Hapuna Beach State Recreation Area Expansion, by Harrison Associates, dated December 1993.

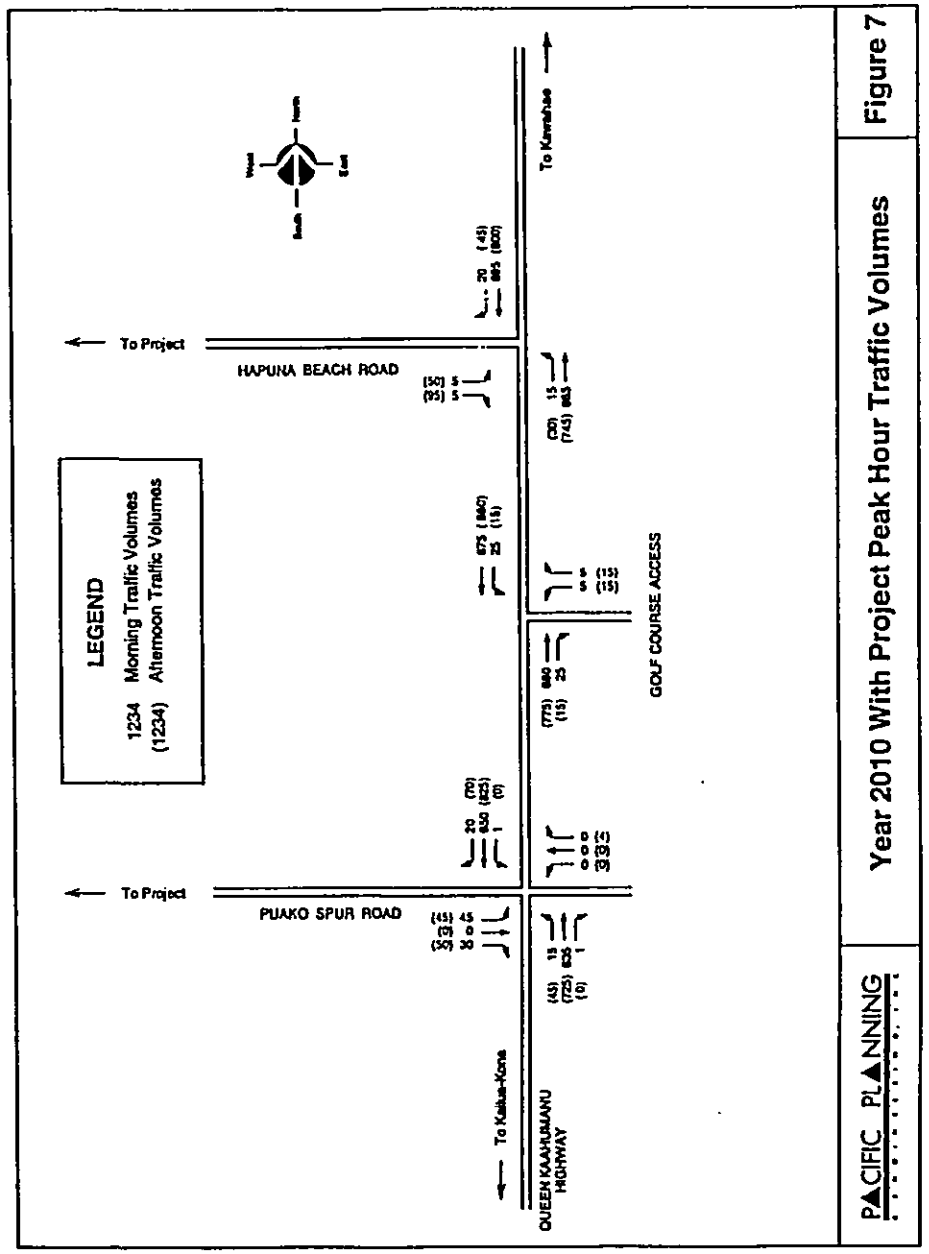
50% given the distances to major population areas.

Table 4. Trip Distribution for Proposed Project		
Morning Peak Hour		Distribution
To / From:	North	63%
	South	37%
Afternoon Peak Hour		Distribution
To:	North	39%
	South	61%
From:	North	61%
	South	39%

The traffic assignment step assigns vehicle trips to specific routes on the roadway network that will take the driver from origins to destinations. Since Queen Kaahumanu Highway is the only major roadway which carries north and southbound traffic in the immediate project area, all of the traffic entering and exiting the project was assigned to this roadway.

Year 2010 Traffic Forecasts With Project

The resulting weekday morning and afternoon peak hour traffic volume forecasts in year 2010 are shown in Figure 7.



TRAFFIC IMPACTS ANALYSIS

Analyses were conducted on the three project access intersections to determine the relative impact of the proposed Hapuna Beach State Recreation Area Expansion on the local roadway system and to determine improvements to mitigate the impact of the project, if necessary.

Analysis Methods

The analyses were conducted for the 1994, 2010 without project, and 2010 with project traffic conditions for the morning and afternoon peak periods. The roadway facilities were analyzed based on the existing roadway geometrics.

The study intersections were analyzed using methods outlined in the Highway Capacity Manual[2] for unsignalized intersections. The "level-of-service" (LOS) for unsignalized intersections is determined by the amount of reserve capacity for each turning movement. The reserve capacity is the amount of vehicles that could proceed through a conflicting traffic stream. LOS for unsignalized intersections is classified into six categories ranging from little or no delay (LOS A) to extreme delays (LOS F). These are described in the Appendix.

Project Impact Analysis

The results of the analysis for the study intersections are shown in Table 5, and are also described below.

[2] Highway Capacity Manual, Special Report 209, by the Transportation Research Board, National Research Council, 1985.

Table 5. Unsignalized Intersection Analysis

Roadway and Turn Movements		1994 Existing AM(PM)	2010 Without Project AM(PM)	2010 With Project AM(PM)
Intersection of Queen Kaahumanu Highway and Hapuna Beach Road				
Hapuna Beach Road				
Eastbound	LT	B (D)	E (E)	E (F)
	RT	A (A)	B (C)	B (C)
Queen Kaahumanu Highway				
Northbound	LT	A (A)	A (A)	A (B)
Intersection of Queen Kaahumanu Highway and Puako Spur Road				
Puako Spur Road				
Eastbound	LT/TH	B (D)	E (E)	E (F)
	RT	A (A)	B (C)	B (C)
Westbound	LT/TH/RT	A (A)	E (E)	E (E)
Queen Kaahumanu Highway				
Northbound	LT	A (A)	A (A)	A (A)
Southbound	LT	A (A)	A (A)	A (B)
Intersection of Queen Kaahumanu Highway and Golf Course Access Road				
Golf Course Access Road				
Westbound	LT/RT	n/a	n/a	E (E)
Queen Kaahumanu Highway				
Southbound	LT	n/a	n/a	A (A)

Notes:
AM - Morning Peak Period
(PM) - Afternoon Peak Period
LT - Left turn; TH - through; RT - Right turn

Existing Conditions

Intersection of Queen Kaahumanu Highway and Hapuna Beach Road

All movements currently operate at level-of-service (LOS) D or better during the morning and afternoon peak hours. Most movements operate at LOS A.

Intersection of Queen Kaahumanu Highway and Puako Spur Road

All movements currently operate at level-of-service (LOS) D or better during the morning and afternoon peak hours. Most movements operate at LOS A.

Year 2010 Without the Project

Intersection of Queen Kaahumanu Highway and Hapuna Beach Road

During the morning and afternoon peak hour, the left-turning traffic out of the project are expected to operate with long delays LOS E. The other movements will encounter few, if any, delays.

Intersection of Queen Kaahumanu Highway and Puako Spur Road

The same levels of service are expected for this intersection as for the Hapuna Beach Road intersection for the morning and afternoon peak hours. Again, the left-turning traffic out of the project are expected to operate with long delays LOS E.

Year 2010 With the Project

Intersection of Queen Kaahumanu Highway and Hapuna Beach Road

During the afternoon, the left-turn traffic out of the project are expected to operate with very long delays LOS F. The delays will worsen because of the increased traffic demand. The left turn movement into the project

on Queen Kaahumanu Highway will worsen to LOS B, but this is still a high LOS. No other turning movement is expected to worsen.

Intersection of Queen Kaahumanu Highway and Puako Spur Road

The same slight worsening will occur for the left-turn traffic out of the project to LOS F. Except for the slight worsening for the left turn into Puako Spur Road, no other turning movement is expected to worsen.

Intersection of Queen Kaahumanu Highway and Golf Course Access Road

The access does not exist so no comparison with existing or without project is possible. Drivers exiting the golf course are expected to experience very long delays at LOS E, similar to the above intersections.

Improvement Analysis

While the number of vehicles generated by the project is relatively low, the future traffic conditions on Queen Kaahumanu Highway will be such that the turn movements out of the project roads will incur delays, particularly during the afternoon peak period. A major issue in past forecasting studies was the need for a widened Queen Kaahumanu Highway, however the 2010 forecast level does not indicate widening is required by that year. Based on HCM data, assuming an ideal of 2,800 vph, Queen Kaahumanu Highway (at 1,625 vph) will operate at LOS D as a two-lane highway during the afternoon peak hour with the project. Pertinent data include: 4% trucks, level terrain, 12 foot wide lanes, paved shoulders.

Since Queen Kaahumanu Highway is at LOS D, the only movement that would require mitigation are the left turn movements out of the project. One means to provide better access to Queen Kaahumanu Highway would be signalization when warranted. The LOS results with signalization of the affected intersections are given in the table below.

Table 6. Signalized Intersection Analysis

Intersection and Approach	2010 With Project AM (PM)
Queen Kaahumanu Highway with Hapuna Beach Road:	
Queen Kaahumanu Highway	
Northbound Approach	A (A)
Southbound Approach	B (B)
Hapuna Beach Road	
Eastbound Approach	C (C)
Overall Intersection	B (B)
Ave. Delay per Vehicle (seconds)	9.32 (9.57)
Volume/Capacity	0.47 (0.52)
Queen Kaahumanu Highway with Puako Spur Road:	
Queen Kaahumanu Highway	
Northbound Approach	B (B)
Southbound Approach	A (B)
Puako Road	
Eastbound Approach	C (C)
Westbound Approach	C (C)
Overall Intersection	B (B)
Ave. Delay per Vehicle (seconds)	5.72 (8.35)
Volume/Capacity	0.50 (0.56)

Signalized Intersection Analysis Results

Intersection of Queen Kaahumanu Highway and Hapuna Beach Road

All movements will continue to operate at LOS C or better. The intersection will operate at a relatively high LOS B.

Intersection of Queen Kaahumanu Highway and Puako Spur Road

All movements will continue to operate LOS C or better. The intersection will operate at a relatively high LOS B.

CONCLUSIONS AND RECOMMENDATIONS

The proposed Hapuna Beach State Recreation Area Expansion project will not have a significant impact on traffic flow at the project access intersections of Queen Kaahumanu Highway with Puako Spur Road and Hapuna Beach Road, when the project is completed in year 2010.

Queen Kaahumanu Highway is estimated to operate at Level of Service D during the 2010 afternoon peak hour even with the addition of the project's traffic. Drivers entering or exiting the project access roads are expected to experience long to very long delays (LOS E or F) due to the increase in traffic volumes along Queen Kaahumanu Highway. Similar traffic conditions will be experienced by existing and future intersections along Queen Kaahumanu Highway, left turning vehicles will experience increasingly greater wait times before entering Queen Kaahumanu Highway traffic flows.

To provide a greater access to the park expansion project, the following actions might be taken:

- Signalize the intersections of Hapuna Beach Road and Puako Spur Road with Queen Kaahumanu Highway when warranted. If signalized, the intersections will operate at LOS B during the afternoon peak hour, and higher during lower traffic volume hours.
- For the intersection of Queen Kaahumanu Highway and the Golf Course Access Road, provide a fully channelized intersection with exclusive left turn lanes and acceleration and deceleration lanes.

The traffic volumes forecasted for year 2010 are based on future land

uses contemplated in the Year 2020 Update to the State DOT's Island of Hawaii Long Range Highway Plan. The 1991 plan called for expanding Queen Kaahumanu Highway to four lanes divided, with a possibility of frontage roads and requirements for an access-controlled type facility. Clearly, the reduction in land uses reflect the current economic situation on the Big Island and in the State. Major projects are not included in the 2020 update, that were included in previous forecast studies. As might be expected, the forecasts for 2010 are much lower than previous traffic forecasts estimated in other prior studies.

APPENDIX A

LEVEL-OF-SERVICE DEFINITIONS FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

DEFINITION OF LEVEL-OF-SERVICE
FOR
SIGNALIZED INTERSECTIONS

Level of service for signalized intersections is defined in terms of *delay*. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period.

Level-of service A describes operations with very low delay, i.e., less than 5.0 sec per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level-of-service B describes operations with delay in the range of 5.1 to 15.0 sec per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level-of-service C describes operations with delay in the range of 15.1 to 25.0 sec per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level-of-service D describes operations with delay in the range of 25.1 to 40.0 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or a high v/c ratios (volume of cars to capacity of intersection). Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level-of-service E describes operations with delay in the range of 40.1 to 60.0 sec per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle length, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level-of-service F describes operations with delay in excess of 60.0 sec per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

DEFINITION OF LEVEL-OF-SERVICE
FOR
UNSIGNALIZED INTERSECTIONS

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with Level-of-Service A representing the best operating conditions and Level-of-Service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-Service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-Service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-Service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-Service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-Service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such a maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level-of-Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow

which causes the queue to form, and Level-of-Service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

APPENDIX B

MANUAL TRAFFIC COUNT DATA

Project : 94-01-10
Date: Jan. 25 1994

	NB STREET Queen Kaahumanu Hwy					SB STREET Queen Kaahumanu Hwy				
Start Time	NB-LT	NB-TH	NB-RT	TRUCKS	BUSES	SB-LT	SB-TH	SB-RT	TRUCKS	BUSES
2:30 PM	6	103	0	3	0	0	70	4	4	0
2:45 PM	7	62	0	3	2	0	57	4	3	0
3:00 PM	4	75	0	3	0	0	80	7	4	1
3:15 PM	5	92	0	2	3	0	77	6	4	1
3:30 PM	4	93	0	2	3	0	116	11	3	1
3:45 PM	5	66	0	1	0	0	83	5	2	2
4:00 PM	3	68	0	2	0	0	75	4	1	1
4:15 PM	5	99	0	0	1	0	67	8	4	0
4:30 PM	1	63	0	1	3	0	58	2	1	0
4:45 PM	1	65	0	1	0	0	42	3	2	2
5:00 PM										
5:15 PM										
5:30 PM										
5:45 PM										
Totals	41	786	0			0	725	54		

PEAK HOUR	NB-LT	NB-TH	NB-RT			SB-LT	SB-TH	SB-RT		
3:00 PM	18	326	0	8	6	0	356	29	13	5
4:00 PM	TOTAL	344	%HV	4.07%		TOTAL	385	%HV	4.68%	

Project : 94-01-10
Date: Jan. 25 1994

	NB STREET Queen Kaahumanu Hwy					SB STREET Queen Kaahumanu Hwy				
Start Time	NB-LT	NB-TH	NB-RT	TRUCKS	BUSES	SB-LT	SB-TH	SB-RT	TRUCKS	BUSES
2:30 PM	5	89	0	1	1	0	67	14	4	0
2:45 PM	3	63	0	2	1	0	58	8	3	0
3:00 PM	10	79	0	3	0	0	85	9	4	1
3:15 PM	5	88	0	2	2	0	85	9	3	1
3:30 PM	9	77	0	2	1	0	108	14	3	1
3:45 PM	6	70	0	0	0	0	82	14	1	1
4:00 PM	7	58	0	2	0	0	77	11	0	1
4:15 PM	8	102	0	0	0	0	64	7	1	0
4:30 PM	3	53	0	1	3	0	52	12	1	0
4:45 PM	4	55	0	1	0	0	38	9	0	1
5:00 PM										
5:15 PM										
5:30 PM										
5:45 PM										
Totals	60	734	0			0	716	107		

PEAK HOUR	NB-LT	NB-TH	NB-RT			SB-LT	SB-TH	SB-RT		
3:00 PM	30	314	0	7	3	0	360	46	11	4
4:00 PM	TOTAL	344	%HV	2.91%		TOTAL	406	%HV	3.69%	

	EB STREET Hapuna Beach Road					WB STREET Hapuna Beach Road				
Start Time	EB-LT	EB-TH	EB-RT	TRUCKS	BUSES	WB-LT	WB-TH	WB-RT	TRUCKS	BUSES
2:30 PM	10	0	10	0	0	0	0	0	0	0
2:45 PM	7	0	11	0	0	0	0	0	0	0
3:00 PM	5	0	13	0	0	0	0	0	0	0
3:15 PM	9	0	11	0	2	0	0	0	0	0
3:30 PM	11	0	17	0	1	0	0	0	0	0
3:45 PM	3	0	13	0	0	0	0	0	0	0
4:00 PM	8	0	13	0	0	0	0	0	0	0
4:15 PM	7	0	12	0	0	0	0	0	0	0
4:30 PM	2	0	9	0	0	0	0	0	0	0
4:45 PM	7	0	11	0	0	0	0	0	0	0
5:00 PM										
5:15 PM										
5:30 PM										
5:45 PM										
Totals	69	0	120			0	0	0		

PEAK HOUR	EB-LT	EB-TH	EB-RT			WB-LT	WB-TH	WB-RT		
3:00 PM	28	0	54	0	3	0	0	0	0	0
4:00 PM	TOTAL	82	%HV	3.66%		TOTAL	0	%HV	#DIV/0!	

	EB STREET Puako Spur Road					WB STREET Puako Spur Road				
Start Time	EB-LT	EB-TH	EB-RT	TRUCKS	BUSES	WB-LT	WB-TH	WB-RT	TRUCKS	BUSES
2:30 PM	10	0	2	0	0	0	0	0	0	0
2:45 PM	9	0	11	0	0	0	0	0	0	0
3:00 PM	9	0	6	0	0	0	0	0	0	0
3:15 PM	7	0	7	0	2	0	0	0	0	0
3:30 PM	4	0	9	0	1	0	0	3	0	0
3:45 PM	8	0	10	0	0	0	0	1	0	0
4:00 PM	5	0	9	0	0	0	0	0	0	0
4:15 PM	6	0	6	0	0	0	0	0	0	0
4:30 PM	4	0	6	0	0	0	0	0	0	0
4:45 PM	6	0	10	0	0	0	0	0	0	0
5:00 PM										
5:15 PM										
5:30 PM										
5:45 PM										
Totals	68	0	76			0	0	4		

PEAK HOUR	EB-LT	EB-TH	EB-RT			WB-LT	WB-TH	WB-RT		
3:00 PM	28	0	32	0	3	0	0	4	0	0
4:00 PM	TOTAL	60	%HV	5.00%		TOTAL	4	%HV	0.00%	

Project : 94-01-10
Date: Jan. 26 1994

NB STREET
Queen Kaahumanu Hwy

SB STREET
Queen Kaahumanu Hwy

Start Time	NB-LT	NB-TH	NB-RT	TRUCKS	BUSES	SB-LT	SB-TH	SB-RT	TRUCKS	BUSES
6:00 AM	0	27	0	2	0	0	40	0	1	0
6:15 AM	1	63	0	2	1	0	59	0	2	0
6:30 AM	1	78	0	3	1	0	62	0	3	2
6:45 AM	0	63	0	3	0	0	69	3	4	2
7:00 AM	1	46	0	3	1	0	47	1	1	1
7:15 AM	0	61	0	6	0	0	85	3	2	3
7:30 AM	2	58	0	1	0	0	67	0	5	0
7:45 AM	1	53	0	3	1	0	58	1	5	0
8:00 AM	2	40	0	4	1	0	53	2	5	0
8:15 AM										
8:30 AM										
8:45 AM										
9:00 AM										
9:15 AM										
Totals	8	489	0			0	540	10		

PEAK HOUR	NB-LT	NB-TH	NB-RT			SB-LT	SB-TH	SB-RT		
6:30 AM	2	248	0	15	2	0	263	7	10	8
7:30 AM	TOTAL	250	%HV	6.80%		TOTAL	270	%HV	6.67%	

EB STREET
Hapuna Beach Road

WB STREET
Hapuna Beach Road

Start Time	EB-LT	EB-TH	EB-RT	TRUCKS	BUSES	WB-LT	WB-TH	WB-RT	TRUCKS	BUSES
6:00 AM	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0	0	0
6:45 AM	0	0	1	0	0	0	0	0	0	0
7:00 AM	2	0	0	0	0	0	0	0	0	0
7:15 AM	1	0	0	0	0	0	0	0	0	0
7:30 AM	1	0	1	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0
8:00 AM	2	0	0	0	0	0	0	0	0	0
8:15 AM										
8:30 AM										
8:45 AM										
9:00 AM										
9:15 AM										
Totals	6	0	2			0	0	0		

PEAK HOUR	EB-LT	EB-TH	EB-RT			WB-LT	WB-TH	WB-RT		
6:30 AM	3	0	1	0	0	0	0	0	0	0
7:30 AM	TOTAL	4	%HV	0.00%		TOTAL	0	%HV	#DIV/0!	

Project : 94-01-10
Date: Jan. 26 1994

NB STREET
Queen Kaahumanu Hwy

SB STREET
Queen Kaahumanu Hwy

Start Time	NB-LT	NB-TH	NB-RT	TRUCKS	BUSES	SB-LT	SB-TH	SB-RT	TRUCKS	BUSES
6:00 AM	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	68	0	2	1	0	50	1	1	1
6:30 AM	2	79	0	3	0	0	67	2	3	2
6:45 AM	3	47	1	1	0	1	61	7	5	2
7:00 AM	2	37	0	6	0	0	47	1	1	1
7:15 AM	3	48	0	5	0	0	74	3	0	2
7:30 AM	2	51	0	0	0	1	67	2	6	0
7:45 AM	3	41	0	4	1	0	50	3	3	0
8:00 AM	2	42	0	6	1	0	48	3	6	0
8:15 AM										
8:30 AM										
8:45 AM										
9:00 AM										
9:15 AM										
Totals	17	413	1			2	464	22		

PEAK HOUR	NB-LT	NB-TH	NB-RT			SB-LT	SB-TH	SB-RT		
6:30 AM	10	211	1	15	0	1	249	13	9	7
7:30 AM	TOTAL	222	%HV	6.76%		TOTAL	263	%HV	6.08%	

EB STREET
Puako Spur Road

WB STREET
Puako Spur Road

Start Time	EB-LT	EB-TH	EB-RT	TRUCKS	BUSES	WB-LT	WB-TH	WB-RT	TRUCKS	BUSES
6:00 AM	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	4	0	0	0	0	0	0	0
6:30 AM	4	0	6	0	1	0	0	0	0	0
6:45 AM	5	0	4	0	1	0	0	0	0	0
7:00 AM	14	0	3	0	0	0	0	0	0	0
7:15 AM	7	0	5	0	0	0	0	0	0	0
7:30 AM	8	0	7	0	0	0	0	0	0	0
7:45 AM	5	0	8	0	0	0	0	0	0	0
8:00 AM	2	0	3	0	0	0	0	0	0	0
8:15 AM										
8:30 AM										
8:45 AM										
9:00 AM										
9:15 AM										
Totals	45	0	40			0	0	0		

PEAK HOUR	EB-LT	EB-TH	EB-RT			WB-LT	WB-TH	WB-RT		
6:30 AM	30	0	18	0	2	0	0	0	0	0
7:30 AM	TOTAL	48	%HV	4.17%		TOTAL	0	%HV	#DIV/0!	