July 2000 (DEIS)
Keopuka Lands Vol. I

KEOPUKA LANDS

Kona Coast Island of Hawai'i

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Volume 1 of 2

Pacific Star LLC
July 2000

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

DATE DUE

~~Aug. 16, 2000~~
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KEOPUKA LANDS

Kona Coast Island of Hawai'i

DRAFT ENVIRONMENTAL IMPACT STATEMENT

This document is submitted pursuant to
Chapter 343, Hawaii Revised Statutes

Prepared for Pacific Star, LLC

Prepared by PBR HAWAII

This is to indicate that this statement and all ancillary documents were prepared under my direction or supervision and that the information submitted, to the best of my knowledge fully addresses document content requirements as set forth in sections 11-200-17 and 11-200-18, as appropriate.

Wm. Frank Brandt, FASLA, President
PBR HAWAII

for, and as authorized by Pacific Star, LLC

July 12, 2000

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1.0

Introduction and Summary

1.0 INTRODUCTION AND SUMMARY

This document serves as a Draft Environmental Impact Statement and is prepared in accordance with Chapter 343, *Hawaii Revised Statutes* (HRS), for the Keopuka Lands Project ("Project"), situated at South Kona, Island of Hawaii.

1.1 INTRODUCTION

1.1.1 Applicant and Project Profile

Applicant/Landowner:	Pacific Star, LLC, an Arizona Corporation
Project Name:	Keopuka Lands
Location:	Keopuka & Onouli, South Kona District, Island of Hawaii
Tax Map Key:	(3) 8-1-07: 1, 54, and 55
Project Area:	Approximately 660 acres
Existing Uses:	Thirty acres of orchards, 10 acres of which are currently utilized for commercial macadamia nut production. The historical Old Government Road and Old Cart Road laterally traverse the property. The remaining areas are vacant of any improved uses.
Proposed Use:	Master Planned Agricultural and Recreational Community including: Approximately 125 agricultural lots, 18-hole golf course and related uses, 100-unit members' hale, and open space recreational area.
Access:	Current access is from Mamalahoa Highway. Improved access will be from the proposed Mamalahoa Highway Bypass which would extend through the subject Project.
Land Use Designations:	·State Land Use: Agricultural (approximately 620 acres) Conservation (approximately 40 acres) ·General Plan: Orchard, Extensive Agricultural, Open ·Kona Regional Plan: A-5a, Unplanned, Open ·Zoning: Agricultural - 5 acre (A-5a) ·SMA: Area makai of Old Government Road
Permits/Approvals Required:	·Planned Unit Development (PUD) ·Special Management Area Use Permit ·Use Permit ·Special Permit

·Conservation District Use Permit
·Subdivision Approval
·Various Construction Related Permits

EIS Accepting Authority: County of Hawaii Planning Department/Planning Commission

1.1.2 Purpose and Content of this Document

This document has been prepared in accordance with the provisions of the *Hawaii Revised Statutes* Chapter 343 and Title 11, Department of Health, Chapter 200, Environmental Impact Rules, Section 11-200-6 through 11-200-13. Section 11-200-6(b) establishes certain categories of action which require compliance with these regulations. The categories of action, relate to the Keopuka Lands project, include, but are not necessarily limited to the following:

- Use of State or County lands or funds;
- Use within any land classified as Conservation District by State law;
- Use within the Shoreline Setback Area (usually 40 feet inland from the certified shoreline);
- Use within any Historic Site or District as designated in the National or Hawaii Register of Historic Sites.

Accordingly, the group of actions proposed by the Keopuka Lands project will trigger the requirement for Chapter 343 compliance.

1.2 PROJECT SUMMARY

Keopuka Lands (Project) is a master planned agricultural and recreational community consisting of approximately 125-lot agricultural subdivision with amenities which will include trails, an 18-hole golf course, clubhouse and related facilities, and a 100-unit members' hale and related facilities on approximately 660 acres of land. Supporting infrastructure will include an internal roadway and circulation system, a wastewater collection, treatment and disposal system, a drainage system, water system improvements, and electrical and communication utility systems and other related uses and facilities. Access to the Project is planned from the proposed Mamalahoa Bypass road with service and emergency access from Mamalahoa Highway.

The project area is zoned for agricultural uses with a minimum lot size of 5 acres (A-5a). Under this zoning classification, a total of approximately 125 5+-acre lots may be subdivided and developed on these lands.

The Keopuka Lands master plan concept includes a range of lot sizes between 1 and 5+ acres and open space elements to be developed in accordance with the requirements of the County regulations for a Planned Unit Development (PUD). The purpose of the PUD, as set forth in Section 25-6-1 of the County Code is to encourage comprehensive site planning that adapts the design of development to the land, by allowing diversification in the relationships of various uses, buildings, structures,

open spaces and yards, building heights, and lot sizes in planned building groups, while still insuring that the intent of the County Zoning Code is observed. Upon approval of the PUD, a subdivision application will be processed with the Planning Department to formally create the lot configuration approved in the PUD. Other approvals to be sought from the County of Hawaii to allow for the proposed uses include, among others, Use Permit, Special Permit, and Special Management Area (SMA) Use Permit.

As planned, the Keopuka Lands Project will trigger the requirement for Chapter 343, HRS, compliance based on, but not necessarily limited to the following actions: (1) the development of limited landscaping, shoreline access and recreational improvements within the Conservation District; (2) the restoration and improvement of the historical Old Government Road and Old Cart Road; (3) utilizing or acquiring access easements within or crossing Mamalahoa Highway and other County or State roads or trails; and (4) uses within the Kealakekua Bay Historical District which is designated on the National Register of Historic Places.

1.3 SUMMARY OF IMPACTS AND PROPOSED MITIGATION MEASURES

The construction of the proposed project will alter the natural landscape, and thus, impact the environment. For areas of environmental concern, appropriate mitigation measures have been planned as part of the project, such as the integration of appropriate design considerations, implementation of management plans, and use of appropriate plantings in landscape plans. For those areas of particular concern, the following summarizes the associated mitigation measures that are either recommended or planned to ensure that potential adverse impacts are minimized or mitigated.

1.3.1 Soil Erosion and Sedimentation

Potential Impacts

The erosion of soils from wind or stormwater runoff caused by disturbances to the vegetation and soil layer during project related construction, if unabated, can impact surrounding areas and the nearshore environment as a result of sedimentation.

The majority of the soils within the project area consists of lava land, therefore imported soils will be required to construct the golf course and areas to be landscaped.

Mitigation Measures

To protect nearshore waters from the impacts of erosion and sedimentation during construction, in addition to meeting the State's National Pollution Discharge Elimination System (NPDES) permitting requirements, an erosion and sedimentation control plan will be prepared for review and approval by the Department of Public Works as part of the permitting procedure for grading work. Mitigation measures include limiting exposed graded areas and employing dust control measures such as frequent sprinkling and seeding of exposed finished areas. The retention basins that will form part of the eventual irrigation lakes and drainage system for the project may be established at the start of construction.

Mitigation measures for imported soils include covering of transported loads, ensuring that soils are free of contaminants, and employing erosion and onsite sedimentation controls at soil storage areas.

1.3.2 Nearshore Marine Environment

Potential Impacts

Potential impacts to the nearshore marine environment could result from erosion and sedimentation due to storm water runoff or wind borne soil or dust. These impacts and the proposed mitigation measures related to these are covered above (Section 1.3.1) pertaining to soils. Additionally, there is a potential threat that chemicals applied as a part of the landscape and golf course maintenance programs, if persistently and/or improperly applied, could potentially leach into the groundwater and eventually migrate to affect the nearshore waters.

Mitigation Measures

Several measures are being proposed by the developer as part of the golf course planning, design, and operation to mitigate, to the extent practicable, the potential for nutrients or chemicals associated with the golf course maintenance from impacting groundwater or coastal waters fronting the proposed project. These measures include:

- Engineering the golf course with a subsurface drainage system at appropriate locations in areas below 100 ft elevation. This system would be designed to collect stormwater runoff or excess irrigation water and conduct it to the irrigation pond for reuse on the course;
- Implementing an Integrated Golf Course Management Program aimed at minimizing the use of chemicals for golf course maintenance and ensuring safe handling and storage of all chemicals;
- Adopting Hawaii proven biorational pest control methods when appropriate; and
- Implementing a Water Quality Monitoring and Mitigation Program to ensure monitoring of soil and coastal water conditions for chemicals used in golf course landscaping and, if indicated, implementing appropriate mitigation measures.

1.3.3 Agricultural Potential

Potential Impacts

In general, the soil conditions on the project site are marginally suited for agricultural purposes. The soils are rated as Class E soils by the Land Study Bureau's *Detailed Land Classification Report for the Island of Hawaii*. This is the LSB's lowest rating and indicates that the soils are "very poor" for agricultural activities. Similarly, no area of the project site has been rated "Prime" or "Unique" by the Agricultural Lands of Importance to the State of Hawaii (ALISH) system. However, limited areas within the mauka (eastern) portion of the project area are identified as "Other Important" lands by this system. The entire property will remain as agricultural zoned lands and appropriate permits

will be requested to implement the Master Plan.

The mauka portion of the property contains approximately 30 acres of avocado, macadamia, mango, and coffee. Of the 30 acres, only 10 acres of macadamia are presently under commercial cultivation. The lands below the macadamia orchards are thick with brush, primarily Christmas berry. As the elevation declines, rainfall diminishes, and the soils change to 'a'a and pahoehoe lava, the vegetation thins to primarily bare lava. Only through the expenditure of approximately $3 million for grading, importing of soils, and the addition of irrigation could the property be used for agriculture. If solely used for agriculture, the property cannot produce enough capital for establishing a profitable agricultural venture.

Mitigation Measures

Although the subject lands are, in general, marginally suited for agricultural use, mitigation measures appear warranted in order to offset the potential loss of those areas that may show potential for agricultural use.

Accordingly, the portion of the property between Mamalahoa Highway and the proposed Mamalahoa Highway Bypass, is proposed to be improved with orchards and other commercial agricultural crops. This area includes approximately 75 acres of land, including the areas that have been or are currently in commercial macadamia nut production. This area will provide agricultural uses and income to the owners of lots on the makai portions of the property which have more limited agricultural opportunities based on the existing soils and topographic conditions. The program will allow an efficient management operation for select crops and/or orchard uses through proper planning and by providing the necessary capital, infrastructure and site preparation needed to support agricultural activity in this area. The proposed uses and activities would be implemented in a manner that is compliant with the requirements for the State Agricultural District as contained in Chapter 205, HRS.

The program would allow for commercially viable agricultural activities that are compatible with the agricultural lot uses to be integrated in the areas of the project most suited to agricultural use. The select agricultural orchards and crops could provide a significant landscape and open space element within the project. Conversely, the resources from the associated development would provide the needed capital to support the agricultural use on an ongoing basis. The proposed program offers advantages to the owner/resident and grower alike, and thus, commercially viable agricultural activity, on a modest scale, could be supported as part of the large lot development.

1.3.4 Roadway Traffic

Potential Impacts

Access to the project site is currently from Mamalahoa Highway. Access to the Keopuka Lands development will be from the proposed Mamalahoa Highway Bypass, which would bisect the project site into a large makai parcel and a smaller mauka parcel. Access onto Mamalahoa Highway would be reserved for emergency purposes and as an alternate service entrance.

The proposed Mamalahoa Highway Bypass alignment is to begin at Alii Drive in Keauhou and terminate at Napoopoo Road intersection by tying back to the existing highway, and has been planned to remove part of the through traffic from Mamalahoa Highway, thus relieving the current congestion that occurs during peak times within the villages of Honalo, Kainaliu, and Kealakekua.

A detailed traffic impact study addressing project related traffic impacts and intersection roadway improvement requirements was prepared by M&E Pacific and is described in Section 5.3. The traffic study forecasts that the bypass road will reduce volumes along Mamalahoa Highway. Accordingly, the Keopuka Lands project is not expected to have an adverse traffic impact on the adjacent roadway system and would not require mitigating actions beyond certain intersection improvements.

Mitigation Measures

The Traffic Impact Analysis Report (TIAR) (Appendix J) for the project has indicated the phased Keopuka Lands development following the completion of the Bypass road will result in few, if any, negative impacts, therefore, no mitigation measures are warranted at this time.

1.3.5 Air Quality

Potential Impacts

Based on an Air Quality Study prepared by B.D. Neal & Associates (Appendix L), the impacts to air quality from the forecasted project related traffic are projected to be minimal. In the short term, fugitive dust from construction activities could impact air quality in the immediate area. Over the long term, indirect impacts to air quality are possible due to indirect impacts associated with the development's electric power requirements. However, based upon the estimated emission rates involved and the relative changes in demand, the attendant impacts are expected to be small. Pesticides used to maintain the landscaped areas and golf course grasses, if not properly applied, could also impact areas downwind as a result of airborne drift.

Mitigation Measures

Due to the minimal air quality impacts from projected project related traffic, no measures are recommended to mitigate these emissions other than the construction improvements recommended by the air quality consultant. State air pollution control regulations require that there be no visible fugitive dust emissions at the property line. Hence, during project construction, an effective dust control plan would be implemented to ensure compliance with State regulations. Fugitive dust emissions can be controlled to a large extent by watering active work areas, keeping adjacent paved roads clean, covering open bodied trucks. Other dust control measures could include mulching or chemically stabilizing inactive exposed areas. Paving and landscaping of project areas as early as practicable in the construction schedule will also reduce dust emissions.

Although pesticides used on the golf course, if properly applied, should not pose a problem to downwind areas, if properly applied, measures that would provide an added level of protection include:

- Use of shrouded spray equipment fitted with computerized flow controllers;
- Maintenance practices that prohibit application of sprayed materials in windy periods.

1.3.6 Archaeological Resources

Potential Impacts

Archaeological sites which are recommended for preservation will be protected in situ as required by the State Historic Preservation Division. Direct impacts to sites located within the project boundaries would primarily be a loss of some of those features not recommended for preservation uses and would be disturbed only after approval and implementation of a Data Recovery and Mitigation Plan. Preservation sites may be affected by increased exposure due to new accessability provided by project development.

Mitigation Measures

To mitigate potential impacts to historical/archaeological resources, the recommendations of the consulting archaeologist, which are subject to the approval of the Department of Land and Natural Resources, State Historic Preservation Division (DLNR-SHPD), would be followed by the developer. Burials identified in the survey within the project area are planned to be preserved in situ. In the event that relocation is required, the procedures of Section 43 of Chapter 6E (Historic Preservation, HRS) will be followed. Buildings, roads, infrastructure, along with the proposed golf course, have been planned to avoid the sites noted for preservation, including provisions for appropriate buffer zones. It is the developer's intent to incorporate these features into the proposed project. A surveyed map of the archaeological sites will be prepared prior to detailed site planning.

1.3.7 Visual Impacts

Potential Impacts

The Keopuka Lands project on currently vacant property will transform the landscape from a natural undeveloped landscape to a low density master planned agricultural and recreational community. New buildings (including dwellings, bungalow guest accommodations, golf clubhouse, and associated structures), a golf course, landscape plantings, and roads will be designed to seamlessly integrate into the lava landscape. Although the project may be seen from various points on land, the major views of the project will be from the ocean fronting Keopuka, from Kaawaloa Road below the Pali Kapu o Keoua 450 feet contour, and from the Old Court Road at the State Park boundary at Kaawaloa.

At Keopuka Lands, emphasis will be directed towards developing in harmony with the land with sensitivity for the preservation of significant terrain features and the protection of historic sites. The design of structures will be tailored to the unique features of each parcel in an effort to achieve a synthesis of nature and building. To preserve the natural features of each lot, buildings will be sited to reasonably minimize disruption of the existing environment.

Roadways will, to a large degree, be winding and will follow the natural terrain. Natural drainage swales will, to the extent practicable, be left unimpeded. Surface runoff will be held in lakes to serve a dual drainage and irrigation function. Natural terrain features such as slopes, ridges, knolls and significant lava rock formations will be carefully considered, and if practical, will be integrated into the overall form of the Project. Landscaping will be controlled, utilizing a combination of existing native tree clusters (ohia and kukui) and introduced landscape plants. Development will be carefully controlled to help preserve substantial open space and view corridors. Project development will alter the landscape, however, the goal is for the appearance and character of the improvements to harmonize with and enhance their natural settings and seamlessly blend the built and natural environments.

Mitigation Measures

The project design will retain natural areas with resource values (e.g., native tree clusters including kukui, and ohia) and follow the existing topography of the land. Design Guidelines will be implemented which are intended to achieve a blending of the built and natural environments to achieve a visual cohesion throughout the project. Landscaping plans using native trees and shrubs when appropriate, will be proposed, for review and approval.

1.4 SUMMARY OF ALTERNATIVES CONSIDERED

The alternatives that have been considered are the "no action" alternative, a 5-acre lot project, a higher density/no golf alternative, alternate use and alternative combinations of the amenities to be provided and/or different configurations of the proposed project. None of the development alternatives, however, were found to be capable of fulfilling the project objectives. The alternatives that have been considered were found to be cost prohibitive or would present greater potential environmental impacts than the proposed project. The alternatives that have been considered and the reasons for their rejection are fully described within Section 7.

1.5 SUMMARY OF UNRESOLVED ISSUES

Planning and technical studies for the project have addressed the issues, however, some issues require further study and will be resolved as part of the regulatory approval process. These are discussed in detail within Section 8, and include:

- Specific measures for archaeological site preservation and buffer treatments, which will be determined as part of the regulatory approval process in conjunction with the recommendations of the Department of Land and Natural Resources State Historic Preservation Division, Hawaii Island Burial Council and County Planning Department; and

- The preservation and interpretive development of the historical Old Government Road and Old Cart Road, which, due to their historic use, would require discussions and collaboration with pertinent State agencies.

1.6 SUMMARY OF COMPATIBILITY WITH LAND USE PLANS & POLICIES

As covered in detail within Section 6, the proposed project is generally consistent with the policies and objectives of State and County land use plans, including the Hawaii State Plan, State Functional Plans, State Land Use Commission rules, the Coastal Zone Management Act, and the Hawaii County General Plan. Land use approvals required to implement the project include: Special Management Area Use Permit, Planned Unit Development approval, Use Permit for the proposed golf course, Special Permit for the members' hale and wastewater treatment facility, and a Conservation District Use Permit for public access, recreational, and limited landscaping and trail improvements within the State Conservation District. Each of the abovementioned approvals would require evidence of consistency with appropriate State and County land use policies and objectives. Upon acceptance of the Final EIS and approval of the requested land use changes, the proposed project would be consistent with all State and County plans and policies.

1.7 REQUIRED APPROVALS AND PERMITS

A number of permits and approvals will be required to implement the proposed project, to include, without limitation, those listed below with the related agencies. Other permits will be requested, to include approvals such as subdivision, grading, building and other construction permits, and those listed in Table 2.

- Special Management Area Use Permit
  Portions of Golf Course, Clubhouse, Driving Range, Maintenance Facility, Public Access & other related uses
  Members' Hale and related uses
  Wastewater Treatment Plant and related uses
  Irrigation Lakes
  Agricultural Lots (1 to 2 acre) and related uses
  Conservation District uses - Public access, recreation, & landscaping improvements

  Agency: County of Hawaii Planning Commission

- Planned Unit Development and Subdivision
  Agricultural Lot Subdivision and related improvements

  Agency: County of Hawaii Planning Department

- Use Permit
  Golf Course, Clubhouse, Driving Range, Maintenance Facility and related uses

  Agency: County of Hawaii Planning Commission

- Special Permit
  Waste Water Treatment Plant and related uses
  Members' Hale and related improvements

Agency: County of Hawaii Planning Commission

- Conservation District Use Permit
  Shoreline access and landscape improvements
  Agency: State of Hawaii Board of Land and Natural Resources

- Water Resource Development
  Non-Potable Water Wells and related facilities

  Agency: State of Hawaii Commission on Water Resource Management

1.8 PREPARERS AND CONTRIBUTORS TO THIS EIS

This Environmental Impact Statement has been prepared by the planners and environmental analysts at PBR HAWAII, located at offices in Hilo and Honolulu, Hawaii under the overall project management of William L. Moore Planning and supported by technical consultants to provide specific studies in several disciplines to assess the environmental effects of the project. The project team is listed in Section 10.

2.0

Project Description

2.0 PROJECT DESCRIPTION

The description of the proposed Keopuka Lands project components, preliminary development timetable, and approximate development costs are described in this section.

2.1 REGIONAL SETTING

The Project site is at Keopuka and Onouli, South Kona District, within the County of Hawaii (Figure 1). The linear pie-shaped property extends from Mamalahoa Highway (near the town of Captain Cook) down to the shore. The village of Kealakekua is approximately one mile north along Mamalahoa Highway and Kailua-Kona is approximately sixteen miles further to the north.

The Keopuka Lands project area consists of approximately 660 acres. It is bounded on the west by the Pacific Ocean, on the east by Mamalahoa Highway and a few single family homes, on the north by the generally vacant Land of Onouli 1st and additional land in Onouli 2nd, and on the south by the lands of Kaawaloa. The western portion of Kaawaloa encompasses the Kealakekua Bay State Historical Park which features the Captain Cook Monument along the northwestern flange of the bay which commemorates the site of the slaying of the British adventurer in 1779. Kealakekua Bay is designated a Marine Life Conservation District.

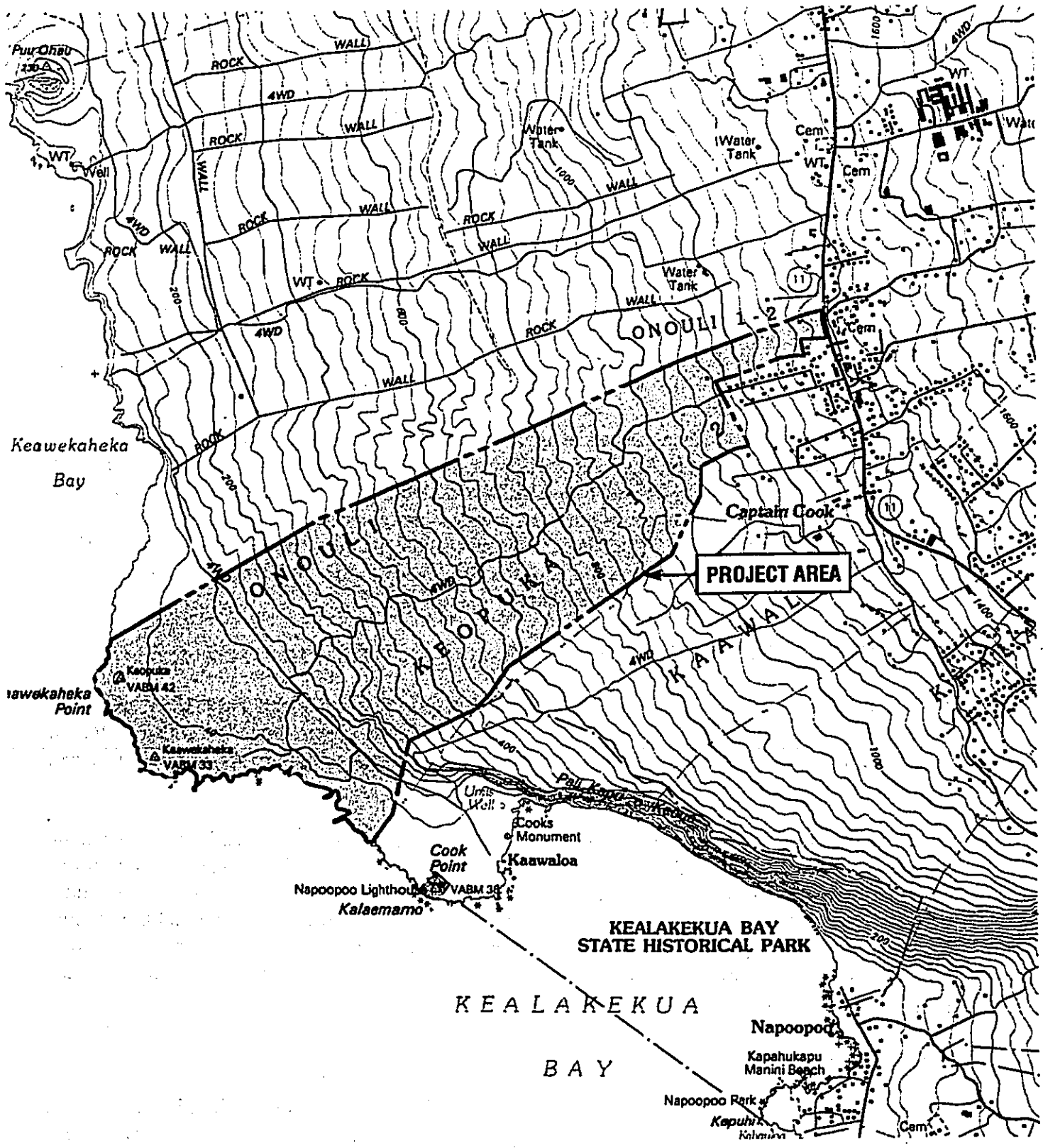
2.2 DESCRIPTION OF THE PROPERTY

The Keopuka Lands project area, consisting of the Tax Map Key parcels: 8-1-07: 1, 54, and 55, is a long and narrow pie-shaped property approximately 11,750 feet (approximately 2 miles) in length from the coast to Mamahaloa Highway, 4,750 feet (approximately 0.8 mile) wide at the shoreline, and approximately 600 feet wide at the highway (Figure 2).

The elevations range from sea level to approximately 1,400 feet above mean sea level (MSL) at the highway. The terrain is undulating and consists of predominantly lava land. The mauka portions of the property contain Kaimu and Kainaliu soils and support approximately 30 acres of agricultural uses and macadamia nut orchard including 10 acres which are currently in commercial production. The majority of the parcel is vacant of any improvements. Current vehicular access is from Mamalahoa Highway through a 4 wheel-drive jeep road, with pedestrian access available across the property via the historic Old Government Road and Old Cart Road.

2.3 PROJECT OBJECTIVES

The landowner, Pacific Star, LLC, an Arizona-based Limited Liability Corporation, is the applicant and developer of the project. Pacific Star principal Mr. Lyle Anderson, is noted for quality planned developments such as the award winning Desert Mountain and Desert Highlands in Scottsdale, Arizona and Las Campanas in Santa Fe. Similar to those developments, the objective of Keopuka Lands is to develop a high quality agricultural estate subdivision with recreational and member amenities that will maintain the rural character and the natural beauty of the area within the context of the historically significant South Kona Coast.



LEGEND

Project Area

Source: USGS Topographical Map

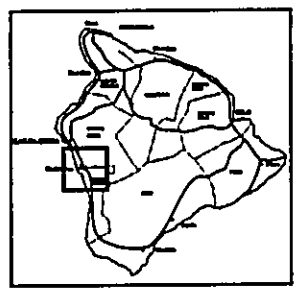


FIGURE 1

Location Map

KEOPUKA LANDS

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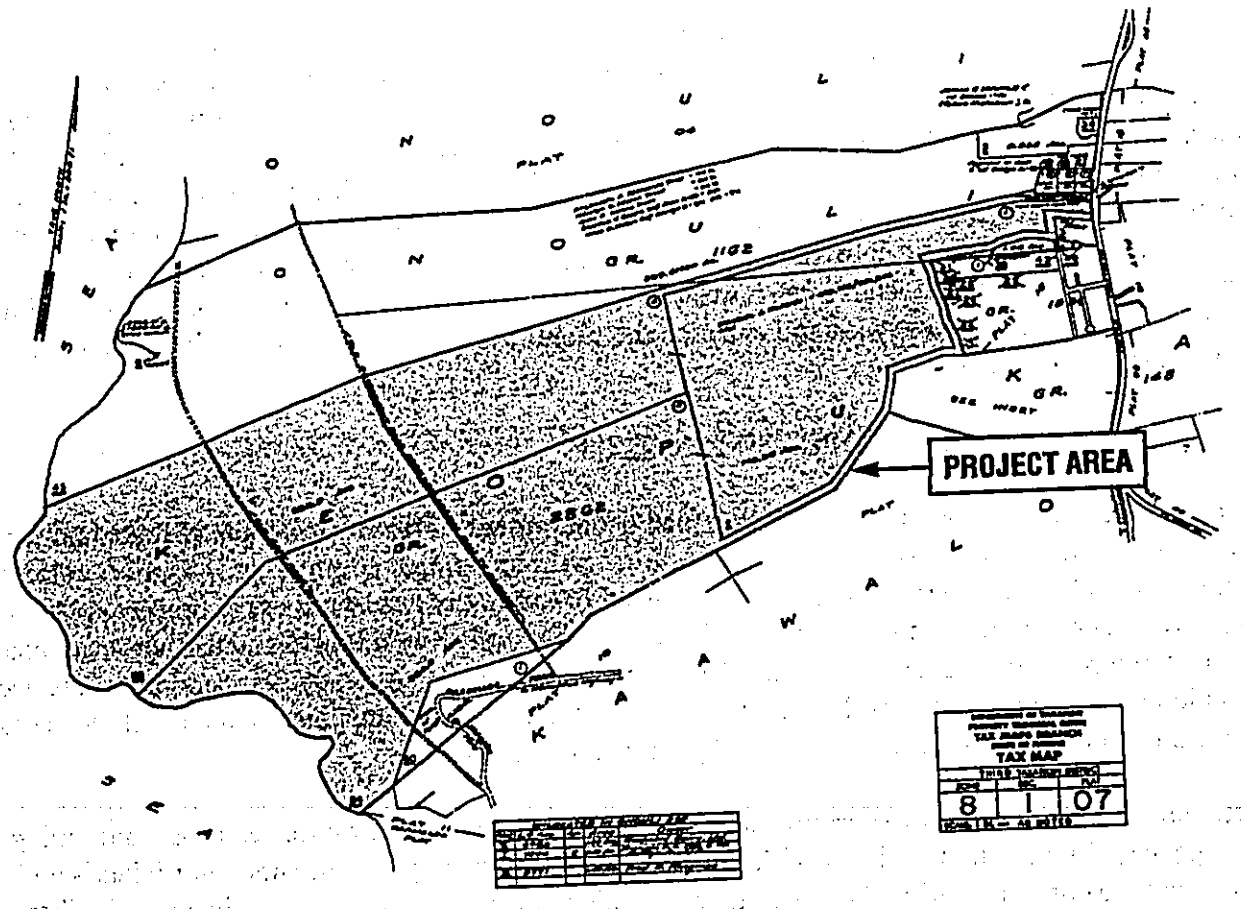

LEGEND

Project Area

Source: Tax Map Key

FIGURE 2

Tax Map Key / Land Ownership Map

KEOPUKA LANDS

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June 2000

At Keopuka Lands, emphasis will be directed towards developing in harmony with the land with sensitivity for the preservation of significant terrain features and the protection of historic sites. The design of structures will be tailored to the unique features of each parcel in an effort to achieve a seamless synthesis of nature and building. To preserve the natural features of each lot, buildings will be sited to reasonably minimize disruption of the existing environment.

Roadways will, to a large degree, be winding and will follow the natural terrain. Natural drainage swales will, to the extent practicable, be left unimpeded. Some surface runoff may be held in lakes to serve a dual drainage and irrigation function. Natural terrain features such as slopes, ridges, knolls and significant lava rock formations will be carefully considered and if practical, will be integrated into the overall form of the Project. Landscaping will be controlled, utilizing a combination of existing native tree clusters (ohia and kukui) and introduced landscape plants. Development will be carefully controlled to help preserve substantial open space and view corridors. Project development will alter the landscape, however, the goal is for the appearance and character of the improvements to harmonize with and enhance their natural settings and seamlessly blend the built and natural environments.

2.4 NEED FOR THE PROPOSED PROJECT

Keopuka is a superior location for the proposed development. The views, slope, climate and rural setting is attractive for a master planned agricultural and recreational community. Ocean panoramas will be available from every lot, the area is consistently warm, dry and wind-less (a problem plaguing many West Hawaii areas), and the surrounding area has a rural agricultural character that sets it apart from alternative developments. The added amenities of the golf course and members' hale enhances its uniqueness and increases its desirability along with the physical attributes which include access to the coastline, a gently sloping topography, and calm winds.

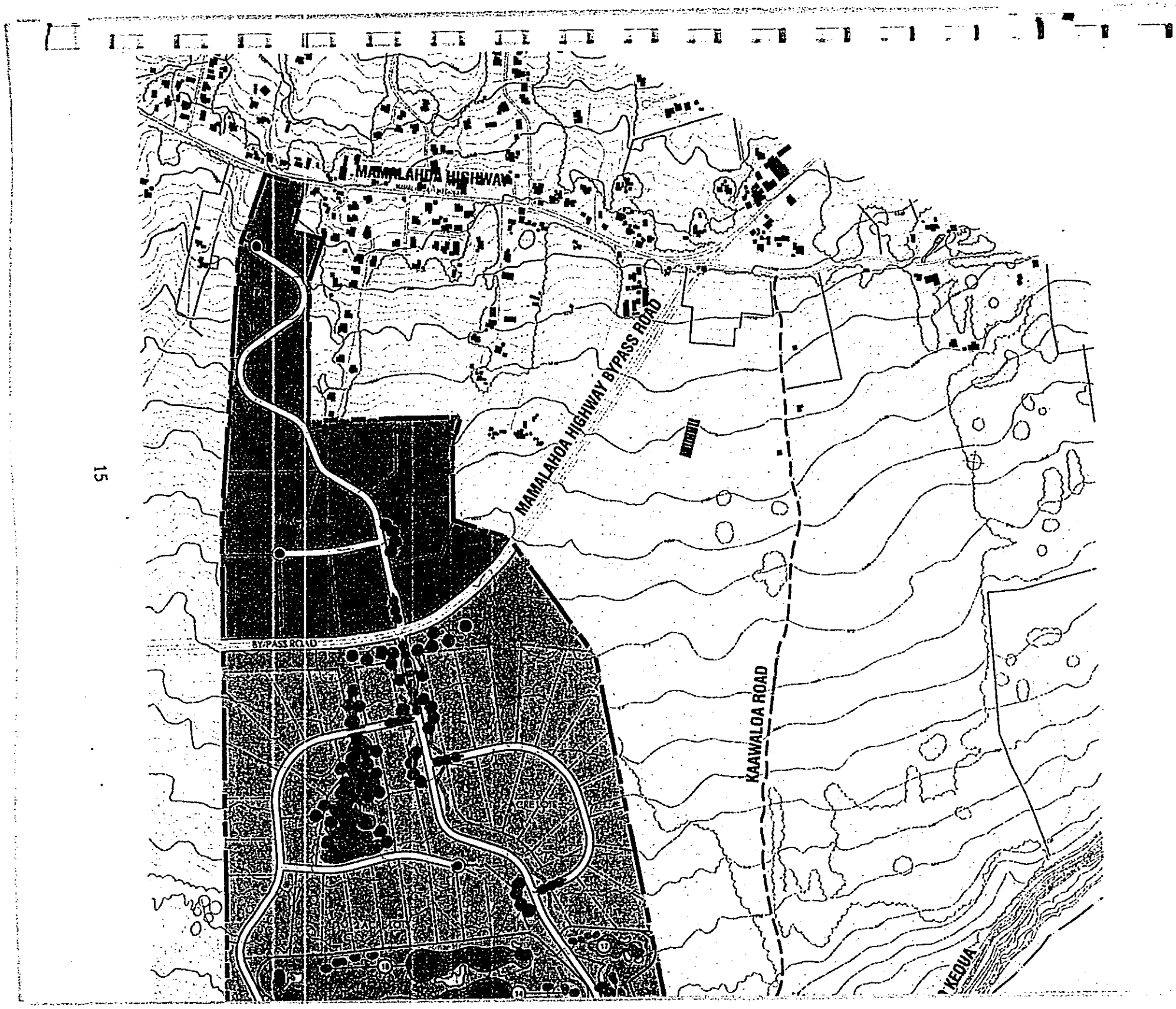
After an extended period of slumping activity, the West Hawaii real estate sector is undergoing a resurgence of demand. This level of demand is being seen throughout the neighbor islands and is anticipated to continue during the emerging economic upcycle according to a study by the Hallstrom Appraisal Group, Inc.

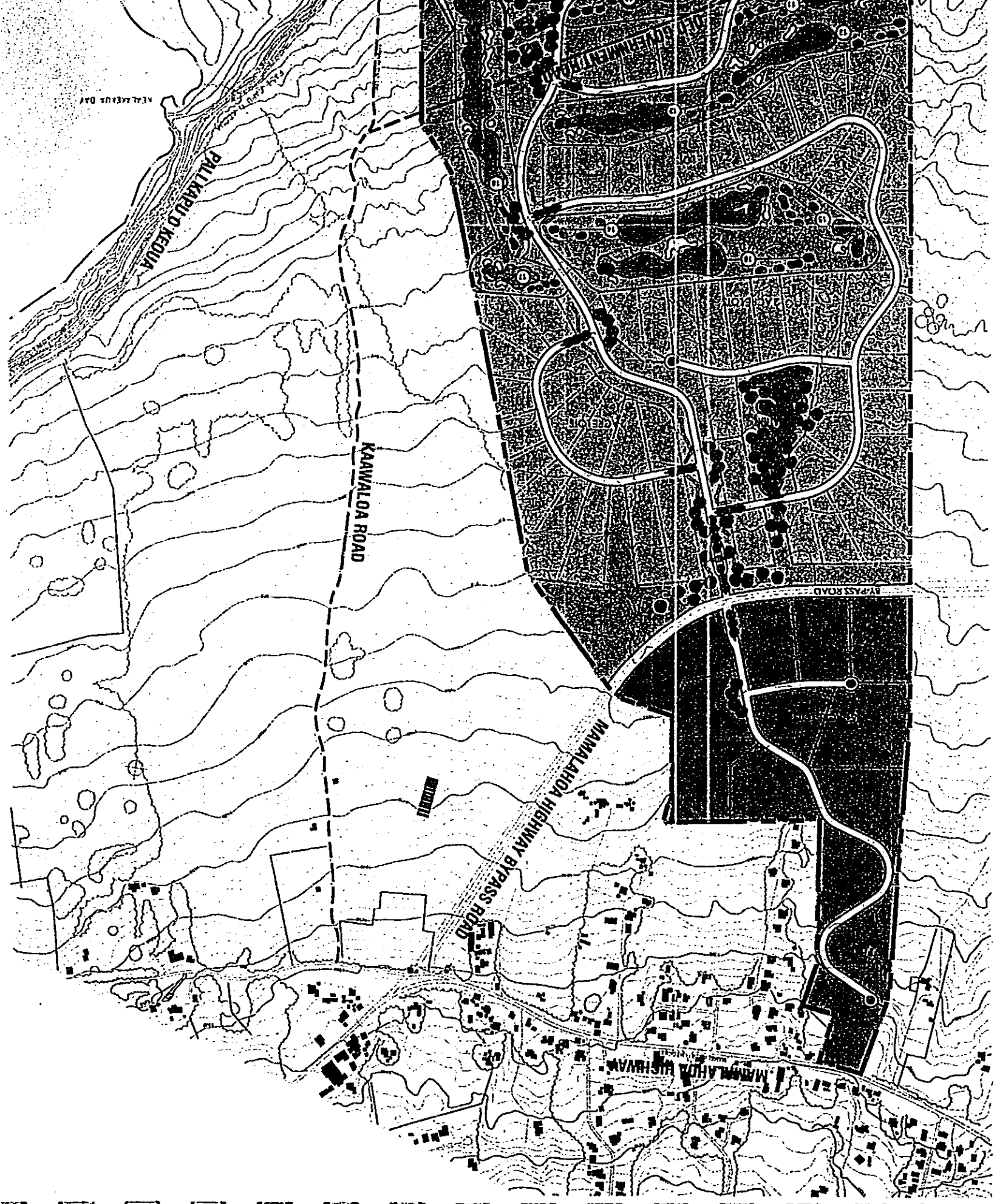
Keopuka Lands is expected to attract many potential owners who seek the privacy available in a non-resort development. The Keopuka Lands project would allow residents a sense of community and seclusion. The project would be phased to respond to market demand, and has been master planned to ensure that there is an orderly and timely development that is planned and coordinated with the provisions of public services and facilities in the region.

2.5 PROJECT DESCRIPTION

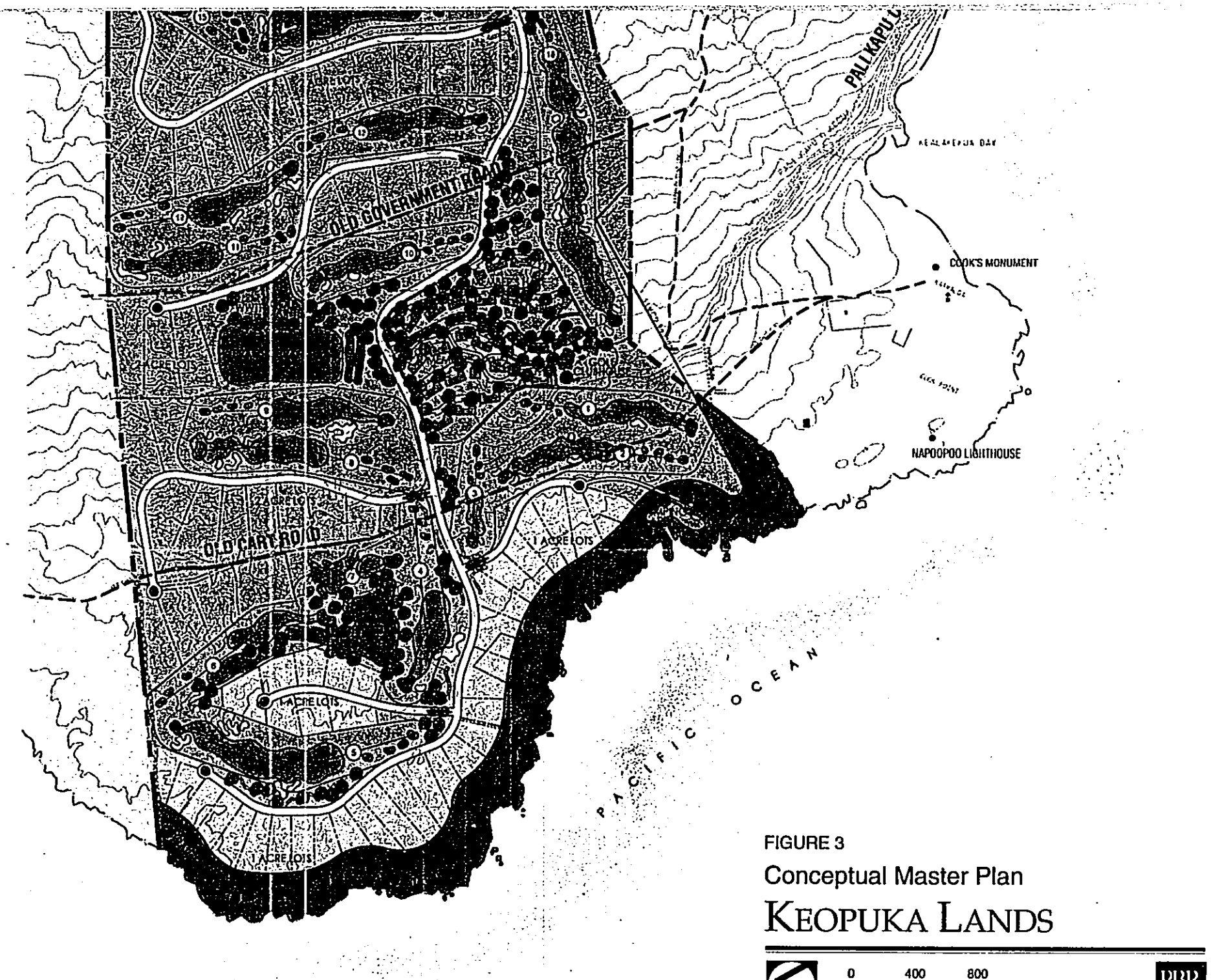
Conceptual Master Plan

Keopuka Lands is being master planned as an agricultural and recreational community. The project components would include approximately 125 agricultural lots surrounding an 18-hole private golf course, clubhouse and related facilities, and a 100-unit members' hale and related improvements as depicted on the Conceptual Master Plan (Figure 3).


MAMALAHOA HIGHWAY
MAMALAHOA HIGHWAY BYPASS ROAD
BY-PASS ROAD
KAAWALOA ROAD



PALIKAPU O KEOUA
KEALAKEKUA BAY
KAAWALOA ROAD
MAMALAHOA HIGHWAY BYPASS ROAD
MAMALAHOA HIGHWAY



Source: Gage Davis Associates

FIGURE 3

Conceptual Master Plan

KEOPUKA LANDS

0 400 800 FEET

July 2000

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The 660-acre master plan is conceptual at this time and is subject to change through the planning process. A conceptual land utilization schedule has been developed for planning purposes and is shown in Table 1.

Table 1. Preliminary Development Concept Land Utilization Schedule

USE	AREA (Acres)*	UNITS**
Agricultural Lots		
- Five+ acre mauka lots	75.0	13
- Two+ acre lots	182.0	75
- One+ acre lots	43.0	37
SUBTOTAL	300.0	125
Members' Hale	13.5	100
18-Hole Golf Course	190.5	
Golf Clubhouse	5.0	
Golf Maintenance Yard	1.5	
Waste Water Treatment Plant	1.0	
Irrigation Lakes (3)	12.5	
Bypass Road	4.5	
Project Roads	38.5	
Open Space / Buffer Areas	53.0	
Coastal Open Space	40.0	
TOTAL	**660.0**	**225**

* The areas are approximate and subject to change
** The unit counts are preliminary and are subject to change

The project includes provisions for public and resident access to and along the shoreline from existing trails and roads. In addition the necessary internal and external infrastructure to serve the project will include a potable water transmission and distribution system, non-potable water transmission and distribution system (for golf course and landscape irrigation purposes), a wastewater collection, transmission, treatment and disposal system, and internal roadway system.

Overall, the development plan seeks to achieve a rural character and preserve the unique site characteristics of the area by maintaining a low density community integrated with generous open space areas. Additionally, design standards and controls will be implemented, aimed at maintaining cohesion throughout the project while maintaining visual integrity with the surrounding area.

2.5.1 Agricultural Lots

The conceptual master plan includes approximately 125 lots on approximately 300 acres, or 45 percent of the project site. The lot sizes will range from one to five+ acres, thus allowing generous open space around dwellings. In addition, the golf course and common buffer areas surrounding roadways will also provide additional open space.

Large agricultural lots of 5+ acres are planned in the mauka area between Mamalahoa Highway and the proposed Bypass road where arable soils consisting of Kaimu and Kainaliu soils can support crops. The 75-acre area currently supports approximately 30 acres of agricultural uses including 10 acres of macadamia orchard which are in commercial production, with the remaining 20 acres currently fallow.

The 5+-acre lots will provide agricultural uses and income to the owners of lots on the makai portions of the property which have more limited agricultural opportunities due to the lava based soils. The agricultural program includes growing select crops and/or orchard uses through the provision of necessary capital, infrastructure and site preparation to support viable agriculture in this area. Agricultural activities will be planned to be compatible with the agricultural lot uses with orchards and crops providing a rural landscape and a sense of open space.

Thirteen 5+-acre lots are proposed to be improved with orchards and other commercial agricultural crops. The program would allow commercially viable agricultural activities that are compatible with the agricultural lot uses to be integrated in the areas of the project most suited to agricultural use. The select agricultural orchards and crops could provide a significant landscape and open space element within the project. Conversely, the resources from the associated development would provide the needed capital to support the agricultural use on an ongoing basis. Thus the proposed program offers advantages to the owner/resident and grower alike. In this way, it is felt that commercially viable agricultural activity, on a modest scale, could be supported as part of the large lot development.

In the area makai of the Mamalahoa Highway Bypass, between the elevations of 100 feet to 900 feet, are planned approximately 75 two-acre lots on approximately 182 acres. Further makai are 28 coastal lots planned on approximately 34 acres adjacent to the Conservation District. These lots will be a minimum of one acre in size.

The lots are designed within the densities permitted under the existing Agricultural zoning with Planned Unit Development approval.

2.5.2 Golf Course and Clubhouse

The planned 18-hole private golf course would include a clubhouse, practice range, maintenance facility, and related uses. These uses are permitted within the Agricultural District under Chapter 205, HRS. A Use Permit approval from the County Planning Commission is required pursuant to the Hawaii County Zoning Code.

The planned golf club at Keopuka Lands is an 18-hole golf course with related facilities, including a golf clubhouse, practice range, maintenance center, and other golf service functions. The golf course and these related facilities are proposed to be sited on approximately 190 acres. The proposed clubhouse would include a reception and check-in area, pro shop, restaurant and bar, locker rooms, and facilities for cart storage and maintenance. The golf course has been carefully sited to help blend with existing land forms, protect significant historical and cultural sites, and integrate existing vegetation into the layout.

An analysis for water source development indicates that an onsite irrigation well below the proposed Bypass road could provide brackish water sufficient to meet irrigation demands. In addition, project consultants are studying alternative types of turf that are viable in this unique climate and might provide further water savings. Irrigation water would be collected in a series of lakes and would also serve as a drainage feature to collect surface runoff and subsurface drainage for reuse on the course.

2.5.3 Members' Hale

Accommodations for Project residents, golf club members, and guests with up to 100-units, lobby, administration offices, dining/kitchen and related amenities for related uses are planned on approximately 13.5+ acres with Special Permit approval from the County Planning Commission.

The members' hale site is adjacent to the golf clubhouse (as shown on the Conceptual Master Plan, Figure 3). The members' hale is anticipated to accommodate up to 100 units in the main pavilion and within detached suite and bungalow buildings. The members' hale will also accommodate hospitality, reception, dining, recreational (pool, spa, tennis) and other amenities, as well as administrative and service functions. This pavilion will be designed to complement the style used in the golf clubhouse and each would share a common garden area set between the golf clubhouse and main pavilion. The members' hale is envisioned as a hospitality center for member and guest activities and is not intended to offer public accommodations. Other events related to organized member activities may take place at the hospitality center. These might include dinner parties and private weddings and other social gatherings.

2.5.4 Supporting Infrastructure

The development of supporting infrastructure for the implementation of the project will include a new on site wastewater treatment system, non-potable water wells, water transmission system, internal roadways, utilities, and other necessary infrastructure and facilities. In addition, potable water source development and storage and transmission systems are planned to be coordinated with the County Department of Water Supply.

2.5.5 Open Space / Public Access

Open space uses planned within the Project area include the golf course, common areas, coastal area (Conservation District) and open spaces within the low density agricultural lots. The majority (50 percent or more) of the Project would remain in open space, golf course or agricultural use.

2.5.5.1 Public Shoreline Access

The Old Government Road and the Old Cart Path (see Figure 3), are currently utilized for access across the project area. The Old Government Road has been identified by the State's Na Ala Hele Program, as being part of the Ala Loa Trail system that is proposed to eventually extend from North Kohala to the Hawaii Volcanoes National Park. According to the archaeological reconnaisance survey the Old Cart Road is a historic trail identified as a road built by Governor John Adams Kuakini in 1836. It is described as being "*bordered by the smooth steppingstones of a still older trail.*" Over time, the Cart Road has been enlarged as a jeep road to provide vehicular access across Keopuka and connecting to the coastal Kaawaloa portion of the State's Kealakekua Bay State Historical Park.

In addition to the lateral access across the project, access to the Keopuka shoreline is available through the project area on a permit basis. Through this method, camping and fishing access has been allowed on a "first come, first served" basis to the public. The number of campers and fishermen has been limited to minimize the impacts on the coastal resources, as well as to the Kaawaloa area.

The Keopuka Lands project is proposing to maintain appropriate public access to and along the shoreline as well as lateral access through the project area. The location and type of access and improvements in the coastal area will be defined as part of the ongoing discussions with the appropriate State and County agencies and through the permitting process.

Elements of the public access plan and shoreline improvements include the following and are shown on the conceptual master plan (see Figure 3):

- The project is proposing to maintain and enhance the current managed access to the shoreline area including limited camping, parking, and public restroom improvements. This area is envisioned to be located near the camping area . Access would be managed in the same way as current handled through a permit system on a first come, first served system administered by the owner or its representative.

- Subject to the approval of the appropriate State and County agencies, the Old Government Road is proposed to be restored and maintained, including restoration to its original condition and clearing and control of vegetative overgrowth.;

- Subject to approval of appropriate State and County agencies, the Old Cart Road is proposed to be reconstructed in appropriate locations as the original steppingstone trail and established as a preservation site.

- A new trail is proposed to be constructed within the Conservation District lands to provide lateral access across the makai portions of the property which will serve as the primary access to the coastal areas as well as to the Kaawaloa area. At the northern end, the shoreline trail will reconnect to the Old Cart Road along the northwestern property boundary

2.5.5.2 Improvements in the Shoreline Open Space Area

The shoreline open space area extends laterally along the coastline and approximately 300 feet inland and includes an approximate area of 40 acres, and thus provides a significant buffer between the shoreline and the coastal one-acre lots. The stretch of coastline encompasses approximately 4,750 feet (0.8 mile) of lava cliffs and does not support any beaches. This area is within the State Land Use Conservation District.

Proposed improvements within the shoreline open space area is limited to access, recreational and limited landscaping uses. No dwellings or other structures associated with the Keopuka Land master planned community are proposed within this area. The cultural and archaeological sites will be preserved as recommended by the project archaeologist and in accordance with the requirements of the State Historic Preservation Division. In addition, areas with existing native vegetation will be preserved in its natural state to the extent practicable.

Proposed improvements within the shoreline open space area include the construction of a trail to provide access to the shoreline as well as to the Kaawaloa portion of the Kealakekekua Bay State Historical Park. Camping, restrooms and other park facilities are also proposed (see Figure 3).

As appropriate, landscaping improvements are proposed in this area. These improvements include hand clearing of trees and or removal or trimming of exotic vegetation (e.g. kiawe trees) and the establishment of coastal strand vegetation consisting of native plants (endemic and indigenous) and other trees, shrubs, and grasses that are adapted to the coastal conditions. The shoreline area will generally be kept in its natural state for cultural, recreational and public access uses (such as fishing). Native species of shade trees will be planted at appropriate locations.

The Conservation District land will blend with the adjacent Kealakekua Bay State Historical Park land. Coastal shoreline areas with historic sites identified for preservation will not be disturbed except for removal of noxious plant species and other actions as provided in an archaeological preservation plan which will be prepared in accordance with the State Historic Preservation Division.

2.6 DEVELOPMENT TIMETABLE AND PRELIMINARY COSTS

The development schedule is contingent on a number of factors, including funding and market demand. The following is a conceptual development schedule and cost which are subject to change.

The golf course, related roadways, and facilities are planned for development in 2001-2002. The agricultural lots and the clubhouse would be developed soon thereafter, or, as market demand dictates. Dwelling construction would start in 2005 and is expected to be built out within 15 years. The 100-unit members' hale would be built in two phases: Fifty units in 2006 - 2007 and the remaining 50 in 2009 - 2010.

The costs to develop the Project are preliminary and will be better defined during the design planning process. Order of magnitude costs for the development of on-site infrastructure is expected to range from $20 to $25 million and the construction of the golf course, clubhouse and related facilities would cost approximately $25 million.

3.0

Required Permits and Approvals

3.0 REQUIRED PERMITS AND APPROVALS

The processing of various permits and approvals are prerequisites to implementation of the Keopuka Lands Project. Relevant State of Hawaii and County of Hawaii land use plans, policies, and ordinances are described below. Land use conformance to plans and policies of the State and the County is described in detail in Section 6.

3.1 STATE OF HAWAII

3.1.1 Chapter 343, Hawaii Revised Statutes

Compliance with Chapter 343, HRS is required as described earlier in Section 1.2.

3.1.2 State Land Use/Zoning

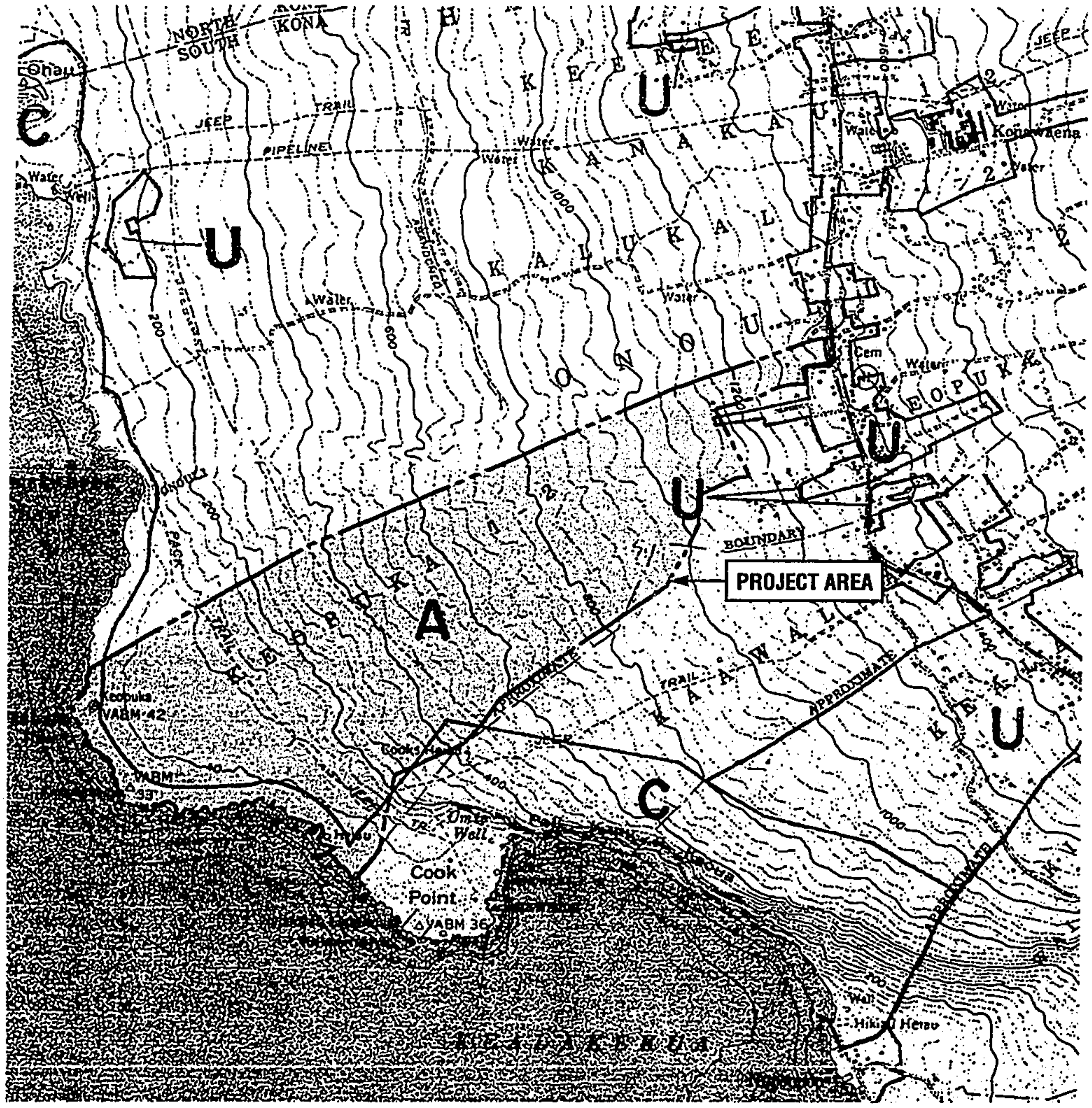
The 660-acre Project site is classified within the Agricultural District (approximately 620 acres) and Conservation District (approximately 40 acres) by the State Land Use Commission. The Conservation lands include a swath of land along the coastline and a portion of the southern boundary within the Kealakekua Bay Historical District (Figure 4).

The proposed members' hale and wastewater treatment system are not permitted uses within the State Land Use Agricultural District nor under the County's A-5a zoning designation. However, Chapter 205, *Hawaii Revised Statutes* (HRS), pursuant to Section 205-6, HRS and Section 15-15-95(b), Hawaii Administrative Rules (HAR), authorizes the County of Hawaii Planning Commission to permit "certain unusual and reasonable uses within [the State's] agricultural ... districts other than for those which the district is classified." In addition, Section 205-6(d), HRS and Section 15-15-95(b), HAR delegate the authority to grant special permits to the County Planning Commission for proposals involving less than 15 acres of land.

In addition, Chapter 205-2, HRS permits golf courses in State Agricultural Districts where soils are not classified by the Land Study Bureau as Class A or B. Soils within the Project site are classified E and are generally poorly suited for agricultural use.

3.1.3 Conservation District

A Conservation District Use Permit is required for certain public access and other development improvements within areas designated as State Conservation lands. There is a band of Conservation land along the coastline and along a portion of the Project's southern property line as shown on Figures 3 and 4.



LEGEND

(shaded)	Project Area
A	Agricultural
C	Conservation
U	Urban

Source: State Land Use Commission

FIGURE 4

State Land Use Designations

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PBR HAWAII

3.2 COUNTY OF HAWAII

Relevant land use plans of the County of Hawaii which pertain to the Project include the General Plan, The Hawaii County Code, the Kona Regional Plan, and Rules 6, 7 and 9 of the Planning Commission Rules of Practice and Procedure related to Special Permits, Use Permits and the Special Management Area (SMA). Applications to the County Planning Commission for Special Permit Use Permit and SMA Use Permit approvals are anticipated to allow the proposed Members' Hale, waste water treatment facility, golf course and golf club house.

An application for Planned Unit Development (PUD) is anticipated to allow certain variances of the district standards to encourage comprehensive site planning that adapts the design of development to the land, by allowing diversification in the relationships of various uses, buildings, structures, open spaces and yards, building heights, and lot sizes in planned building groups, while still insuring that the intent of the County Zoning Code is observed. Upon approval of the PUD, a Subdivision application will be processed with the Planning Department to formally create the agricultural lot configuration approved in the PUD.

3.2.1 General Plan

The Hawaii County General Plan is the policy document for the long-range development of the Island of Hawaii. The General Plan provides direction for balanced growth in the County. The plan contains goals, policies and standards concerning thirteen functional areas as well as a series of land use maps referred to as General Plan Land Use Pattern Allocation Guide (LUPAG) Maps. The proposed uses are consistent with the General Plan LUPAG designations for the project site and goals and policies of the General Plan as described in Section 6.

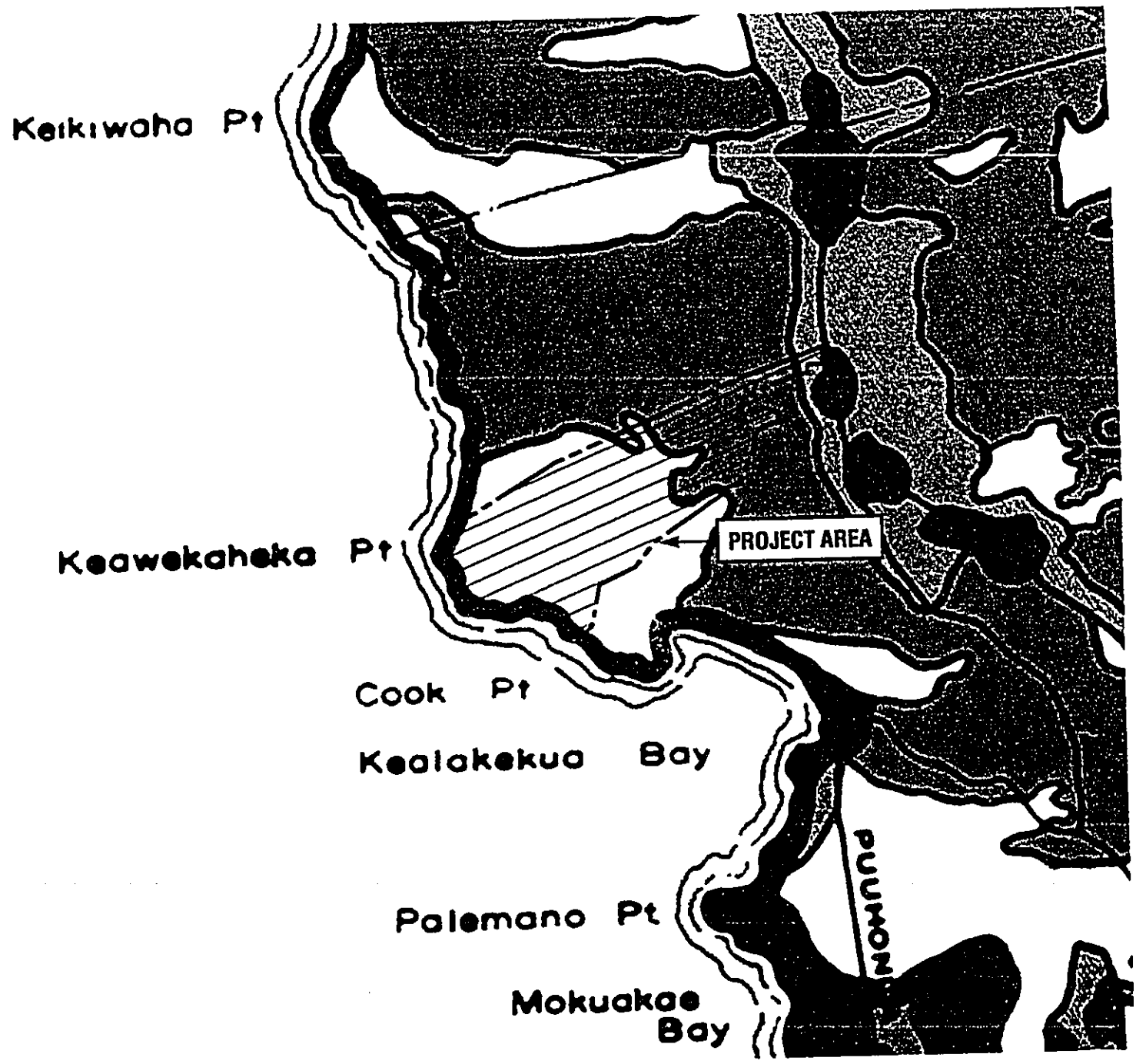
The LUPAG map designations for the Project site are Extensive Agriculture (EA) and Orchards (OR), while the area along the coastline is designated Open Area (O) (Figure 5).

3.2.2 Kona Regional Plan

The Kona Regional Plan designations for the project area include Agricultural-5a, Unplanned, and Open which is consistent with the existing zoning designations for the project lands (Figure 6).

3.2.3 County Zoning

The Project property is zoned Agriculture - 5 acre (A-5a). Surrounding zoning includes the Agriculture (A-5a) District to the north and south. Mauka of the property, the surrounding zoning includes Agriculture (A-5a), Residential-Agriculture (RA -1a), Single Family Residential (RS-10 and RS-15) and Commercial (CV-7.5 and CV-10) designations (Figure 7). The existing agricultural zoning allows for agricultural uses with a minimum lot size of five acres. Accordingly, up to a maximum of 132 agricultural lots could be developed within the Project area under the current zoning. In addition, golf courses and member accommodations are conditionally permitted uses within the Agricultural District.



Source: The General Plan, Hawaii County Land Use Pattern Allocation Guide Map

FIGURE 5

County General Plan
(Land Use Pattern Allocation Guide Map)

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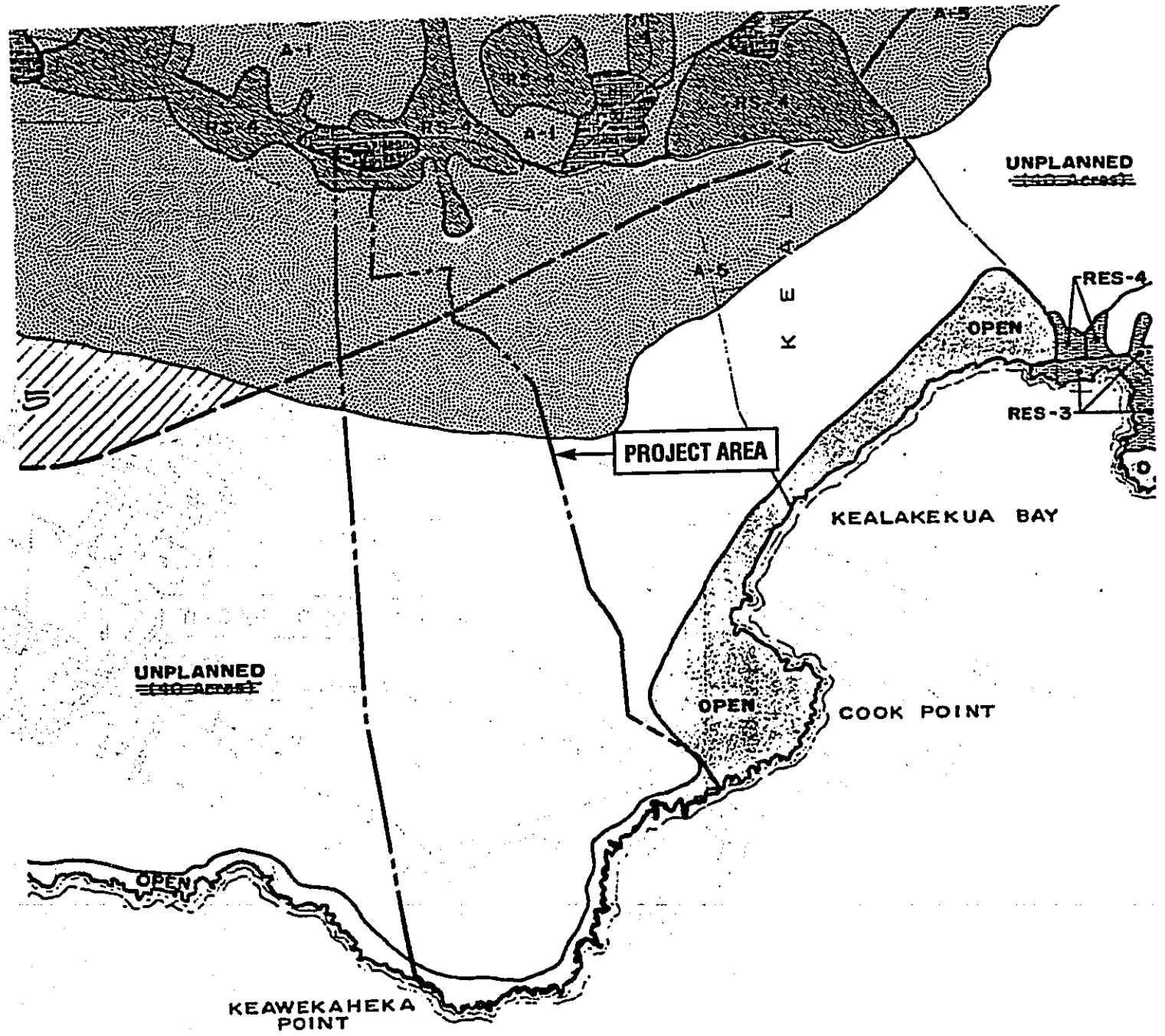

LEGEND

Use
- Residential
- Agriculture
- Open, Park & Recreation
- Unplanned
- Proposed Roads

Density

Units Per Net Acre (Example: RS-4 = Residential - 4 Units/Acre)

Minimum Lot Size (Acres) (Example: A-5 = Agriculture - 5 Acres (Minimum)

Source: County of Hawaii, Kona Regional Plan

FIGURE 6

Kona Regional Plan

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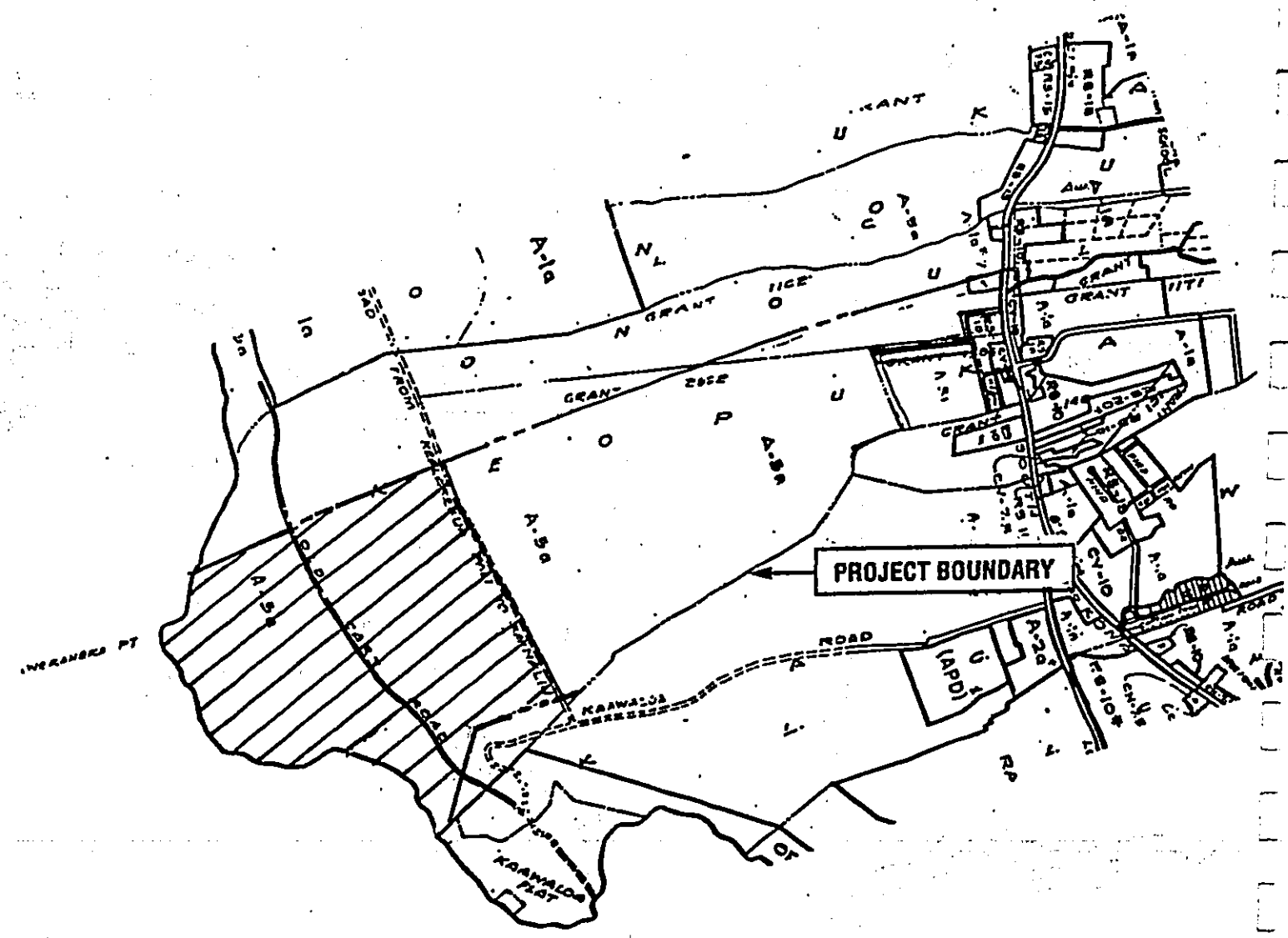

FIGURE 7

Existing County Zoning / Special Management Area

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3.2.4 Special Management Area

The Special Management Area (SMA) lands extend inland from the shoreline as delineated on maps filed with the County. Properties within the SMA are subject to special controls to avoid permanent losses and to protect valuable resources.

The makai portion of the site located below the lateral Old Government Road to the shoreline is within the County Special Management Area (SMA) (shown on Figure 7), and is subject to the provisions of Chapter 205A, Hawaii Revised Statutes (HRS) and Rule 9 of the County of Hawaii Planning Commission Rules of Practice and Procedure. The overall Project will be generally consistent with the Objectives and Policies set forth in Chapter 205A, HRS. A full discussion of the Project's relationship to the SMA is described in Section 6.

3.3 APPROVALS AND PERMITS

During the implementation stages of the Project, the applicant will be working with State and County agencies in the review and approval of Project plans and specifications. The required permits for the project include, without limitation, those listed in Table 2.

Table 2. Required Permits and Approvals

Permit/Approval	Responsible Agency
Chapter 343, HRS compliance	County of Hawaii Planning Department Office of Environmental Quality Control
Special Permit (15 acres or less)	County of Hawaii Planning Commission
Planned Unit Development (PUD)	County of Hawaii Planning Department
Use Permit	County of Hawaii Planning Commission
Special Management Area Use Permit	County of Hawaii Planning Commission
Conservation District Use Permit	State of Hawaii Board of Land and Natural Resources
Water Well Development	State DLNR Commission on Water Resource Management
Grading/Building Permits	County of Hawaii Department of Public Works
Wastewater Disposal System	Department of Health
Water System	Department of Water Supply
Subdivision	County of Hawaii Planning Department
Compliance w/ Chapter 6E, HRS	State Historic Preservation Division
ADA Accessibility	Commission on Persons with Disabilities
Shoreline Setback Variance	County of Hawaii Planning Commission

4.0

Description of the Existing Natural Environment,
Potential Impacts of the Proposed Action,
and Recommended Mitigative Measures

4.0 DESCRIPTION OF THE EXISTING NATURAL ENVIRONMENT, POTENTIAL IMPACTS OF THE PROPOSED ACTION, AND RECOMMENDED MITIGATIVE MEASURES

This section presents background information on the existing natural and physical environment of the project lands. Impact discussions are noted as short-term construction related impacts and long-term operational impacts. Mitigative measures are recommended where impacts cannot be avoided. The findings of technical studies which have been prepared for the EIS are summarized below; and the complete reports are enclosed in the Appendix.

4.1 LOCATION AND CLIMATE

Existing Conditions

Located on the western slopes of Mauna Loa, the site's environmental conditions are similar to other areas of Hawaii's leeward coast. Due to the wind shadow effect caused by Mauna Loa, winds in the region are often light and variable, dominated by local land-sea breezes. However, Kona storms in the winter season can bring strong winds from the south or south west for brief periods. Average daily temperatures range from 60°F to 80°F. The annual rainfall averages approximately 50 inches (ranges between 30 inches at the coastline to approximately 75 inches in the mauka portions of the Project area), with summer months receiving the majority of the rainfall, a unique characteristic of the Kona coast. For all other parts of the Hawaiian Islands, the winter months receive the higher average rainfall.

Hawaii lies well within the belt of northeasterly trade winds generated by the semi-permanent Pacific high pressure cell to the north and east. Nearly the entire western coast of the island of Hawaii, however, is sheltered from the trade winds by high mountains, except when unusually strong trade winds sweep through the saddle between the Kohala Mountains and Mauna Kea and reach some areas to the lee. Due to wind shadow effects caused by the terrain, winds in the project area are predominantly light and variable. Local winds such as land/sea breezes and/or upslope/downslope winds dominate the wind pattern for the area. During the daytime, winds typically move onshore because of seabreeze and/or upslope effects. At night, winds generally are land breezes and/or drainage winds that move downslope and out to sea. During winter, occasional strong winds from the south or southwest occur in association with the passage of winter storm systems.

Potential Impacts and Mitigative Measures

One of the objectives of the proposed golf course layout is to respond to the natural conditions with as little alternation to the existing site topography, as practical. Grading will therefore, maintain the contours of the lava lands, to the extent practicable, but transform it to a vegetated and built landscape. Similarly, within the agricultural dwelling lots, building envelopes will establish the limits of construction, taking into consideration the topography of each site. The areas within the State Conservation District would remain largely unaffected by the proposed project, except for

public access and limited landscaping activities. The members' hale and golf clubhouse, as well, will be designed in relation to the natural features of the land. As such, it is expected that the project will be constructed without major adverse impacts to the natural land forms. Likewise, the proposed project will have no effect on climatic conditions and, therefore, no mitigation measures are warranted.

4.2 GEOLOGY, TOPOGRAPHY, SOILS, AND AGRICULTURAL POTENTIAL

Existing Conditions

The 660-acre project site is a coastal property situated on the lower slopes of Mauna Loa with terrain that slopes from east to west and is composed of a mix of pahoehoe and 'a'a lava flows dating from the Holocene age (200 - 750 years ago). There is a small outcrop of much older flow close to the eastern boundary of the site dating from between 5,000 to 10,000 years ago (Holocene and Pleistocene ages).

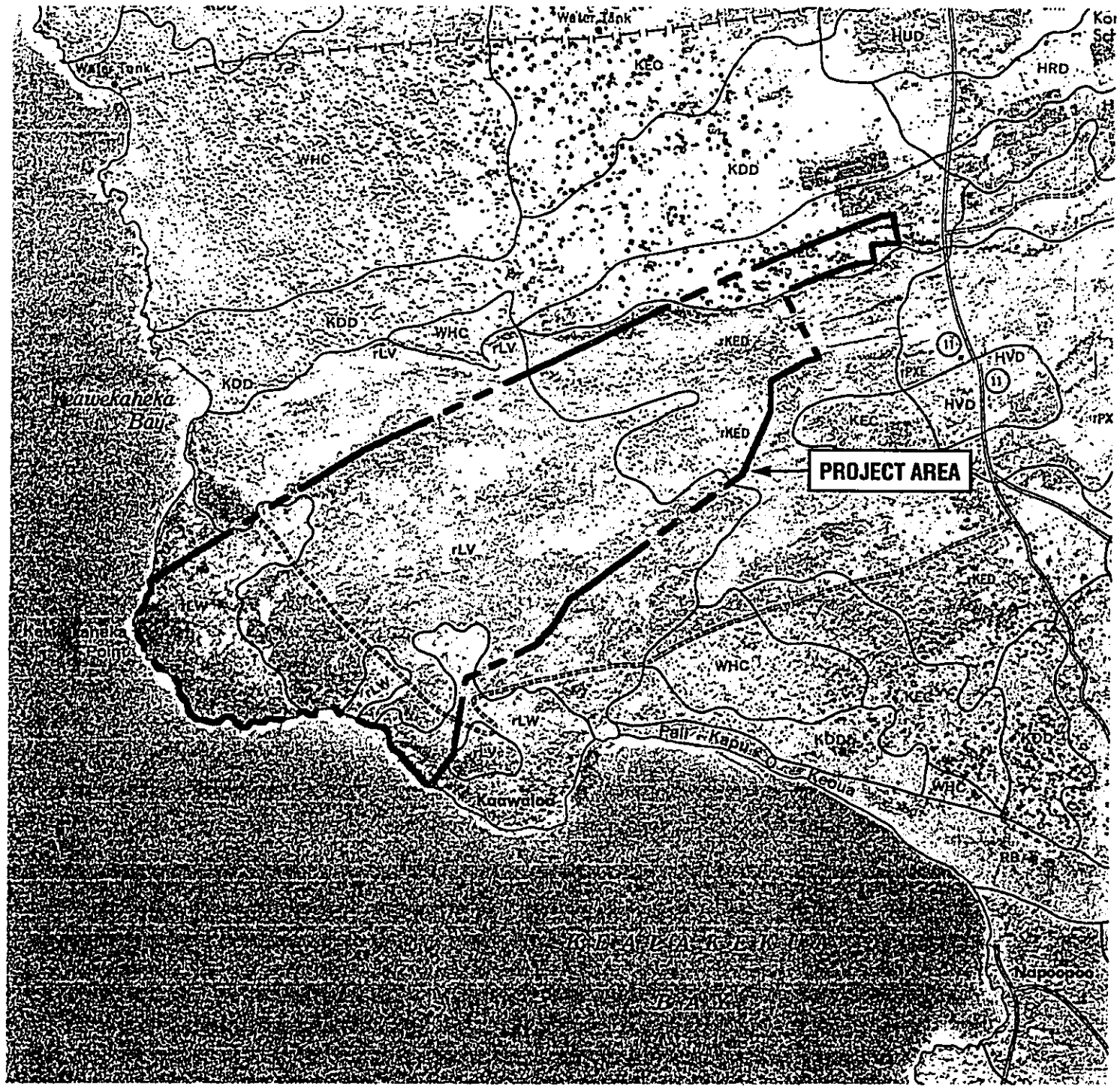
Typical of West Hawaii coastal land, the Project site and surrounding areas have relatively little soil cover, although pockets of soil are found throughout the site, generally following the patterns of lava flows. The pie-shaped parcel ranges from sea level to 1400 feet above MSL (mean sea level). The property is gently sloped with some steeper portions associated with gullies and rock outcroppings. There are no natural drainageways on site. The lower portions include large areas of rolling terrain with exposed pahoehoe and 'a'a lava flows and thin layers of soil in the flatter areas.

The vegetation on the site is composed of exotic and native species. Vegetation is thickest and most diverse on the eastern or mauka areas of the property, with plant density and diversity decreasing in the lower elevations. Further descriptions of the vegetation is included in Section 4.6.

Existing commercial agricultural use of the property includes 10 acres of macadamia orchard uses between the 1100 ft to 1400 ft elevation where deeper soils are present. Other agricultural plantings include avocado, mango and coffee. However, the majority of the property consist of 'a'a and pahoaehoe lava with limited or no soil. The soil types and classifications are described by the three available soil suitability studies which focus on the physical attributes of land and the relative productivity of different land types for agricultural purposes. These are: 1) the U.S. Department of Agriculture Soil Conservation Service (SCS) Soil Survey; 2) the University of Hawaii Land Study Bureau Detailed Land Classification; and 3) the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawaii (ALISH).

Soil Conservation Survey. According to the United States Department of Agriculture Soil Conservation Service, Soil Survey of the Island of Hawaii, State of Hawaii, 1972, the soils found on the subject property consist of four soil types (Figure 8). The description of soil characteristics on the subject property is as follows:

rLV Lava flows, 'a'a (rLV), has been mapped as a miscellaneous land type. This lava has practically no soil covering and is bare of vegetation, except for mosses, lichens, ferns, and a few small ohia trees. It is at an elevation ranging from near sea level to 13,000 feet and receives from 10 to 250 inches of rainfall annually. It is associated with pahoehoe lava flows



LEGEND

- Project Area
- rLW — Pahoehoe Lava
- rLV — Aa Lava
- KEC — Kainaliu extremely stony silty clay loam, 6-12% slopes
- rKED — Kaimu extremely stony peat, 6-20% slopes

FIGURE 8

SCS Soil Survey

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Source: USDA, Soil Conservation Service Soil Survey of Island of Hawaii, State of Hawaii

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and many soils.

rLW This soil type is also known as Pahoehoe lava, a miscellaneous land type. Although this lava often has a billowy, glassy surface, it can also be rough and broken. There is no soil covering and typically bare of vegetation except for mosses and lichens. Annual rainfall and elevation vary widely.

rKED Kaimu extremely stony peat, 6 to 20 percent slopes. This soil is generally found at low elevations. The surface layer is very dark brown extremely stony peat approximately 3 inches thick and underlain by 'a'a lava. Permeability is rapid, runoff is slow, and the erosion hazard slight. This soil is not suitable for cultivation, however, some small areas can be used for pasture, macadamia nuts, papaya, and citrus fruits.

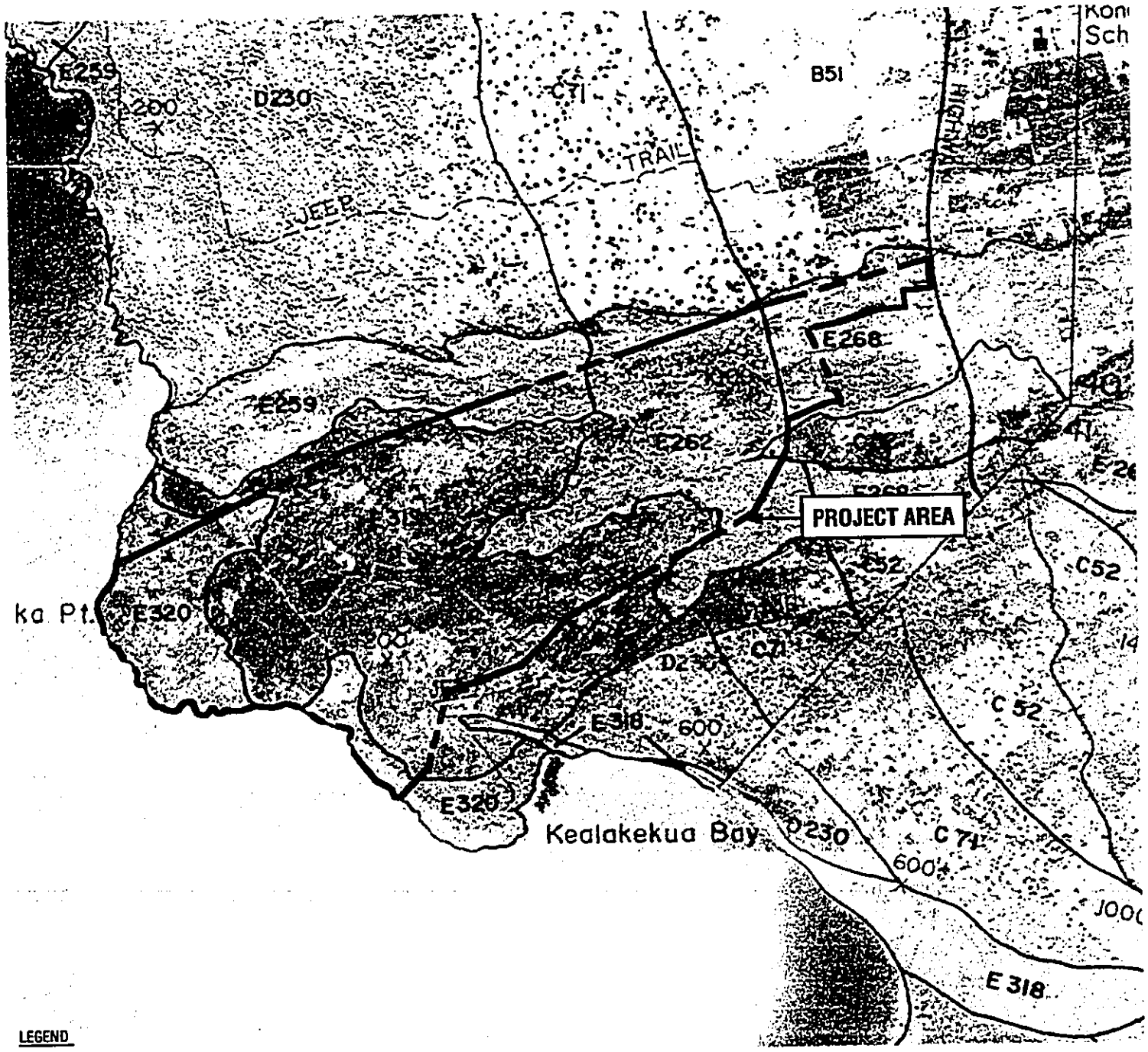
KEC Kainaliu extremely stony silty clay loam, 6 to 12 percent slopes. This soil generally follows the long narrow patterns of lava flows, but can be isolated and surrounded by more recent flows. On the subject property, these soils may be agriculturally suitable for macadamia nuts and pasture with proper irrigation.

Land Study Bureau Detailed Land Classification. The University of Hawaii's Land Study Bureau *Detailed Land Classification Report for the Island of Hawaii* (Figure 9) utilizes a five-class productivity rating using the letters A, B, C, D, and E with A representing the class of highest productivity and E the lowest. The physical characteristics of the soils of the Project lands are rated E and are unsuited for soil-based forms of agriculture.

The proposed golf course is an allowable use within the State Agricultural District on C, D, and E rated lands according to Section 205-2(d), HRS. From an agronomic perspective, these E rated soils are generally very poorly suited for agricultural use.

Agricultural Lands of Importance To The State of Hawaii. The State Department of Agriculture *Agricultural Lands of Importance to the State of Hawaii (ALISH)* system assesses lands through a rating system for agricultural suitability. No area of the Project site has been rated as "prime" or "unique" by the ALISH system, however, an approximately one third portion of the site is identified as "other important agricultural land" (Figure 10). This classification indicates that portions of the site can be used for agricultural purposes, however, as noted by the LSB classification, these soils are rated "E" or "very poor" for agricultural purposes.

Historically, approximately 30 acres of the subject property has been used for agricultural uses in the past. Currently, however, only approximately 10 acres of macadamia nut orchard remain in commercial production. Approximately 10 percent (60 to 70 acres) of the property supports Kaimu and Kainaliu soils which have agricultural potential if adequately provided with irrigation. The remaining 90 percent is not suited for agriculture without major improvements.



LEGEND

Project Area

LSB AGRICULTURAL SOIL RATINGS

A	Excellent	Prime Agricultural Soils
B	Good	
C	Fair	Marginal Agricultural Soils
D	Poor	
E	Very Poor	
U	Urban Lands	

Source: University of Hawaii
Detailed Land Classification, Island of Hawaii

FIGURE 9

LSB Detailed Land Classification

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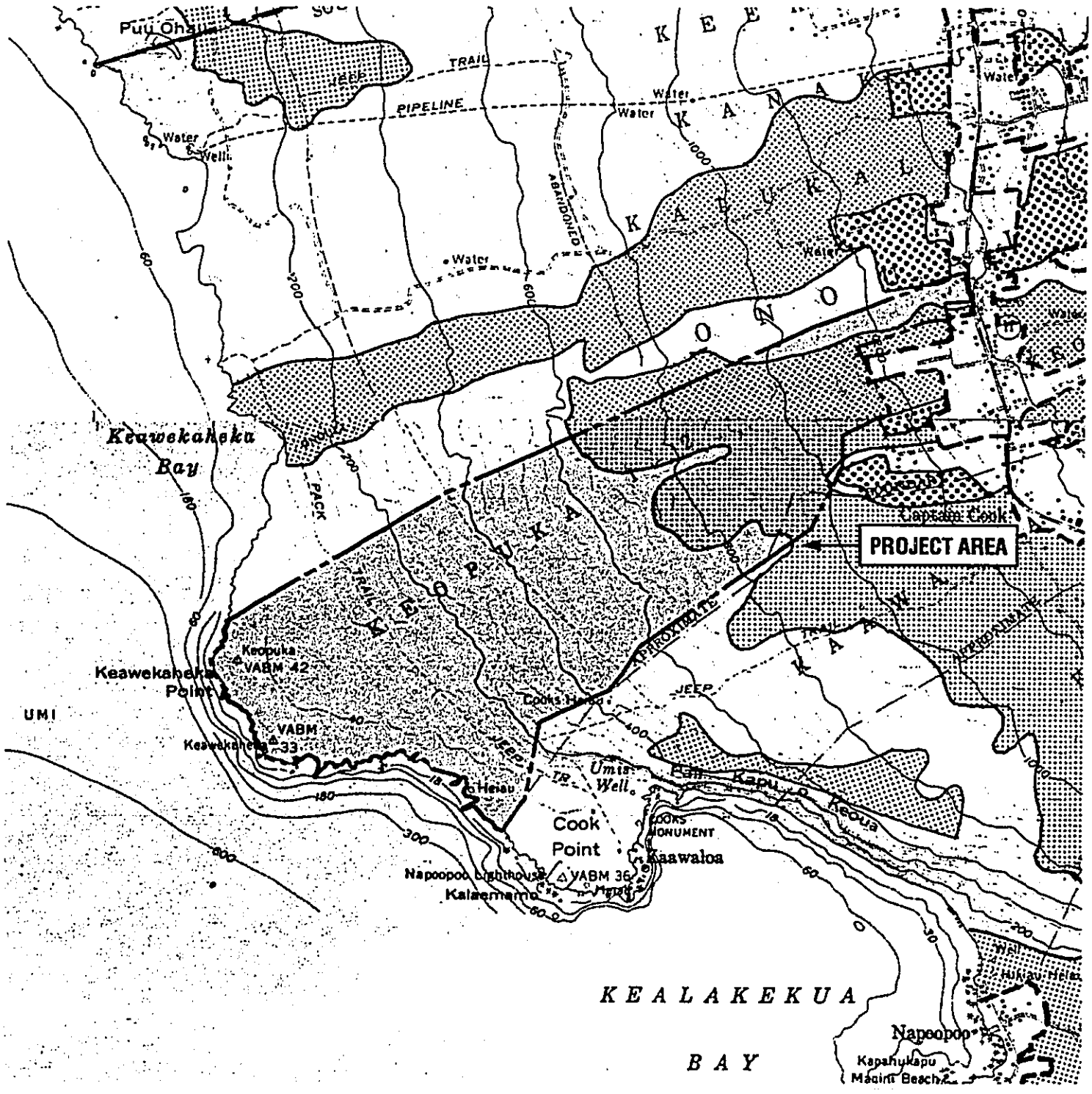

LEGEND

- Project Area
- Other Important Agricultural Land
- Unique Agricultural Land
- Not Classified

Source: State of Hawaii Department of Agriculture

FIGURE 10

Agricultural Lands of Importance to the State of Hawai'i (ALISH)

KEOPUKA LANDS

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Potential Impacts

The existing soils in the mauka portions of the property are marginally suited for orchards and similar crops. However, it is anticipated that the proposed golf course (turf areas) development and other landscaped areas will require soil to be imported. About six to eight inches of soil is required for golf course and residential landscaping. Of the approximately 190+ acres for the proposed golf course area, approximately 150 acres will be improved as turf areas and a portion will remain as a natural buffer at the edges of the golf course and between some agricultural lots and the golf course. The area along the coast within the State Conservation District, at specified archeological sites, and other open space and natural buffers are to remain largely unaffected by the proposed development. Clearing and grubbing activities during construction will temporarily disturb the soil retention values of the existing vegetation and expose soils to erosional forces. Some wind erosion of soils could occur without a proper watering and regrassing program. Heavy rainfall could also cause some erosion of soils within disturbed areas of land. Imported soil will be required and may pose potential siltation through runoff if stockpiled without adequate precaution. They also may impact air quality in the form of dust generated during off loading from trucks or if not properly stockpiled.

With regard to agricultural uses, the project may result in the loss of a few macadamia trees. However, the existing agriculture will continue and is planned to be expanded to other soil based open space areas and to the proposed agricultural lots which are currently uncultivated.

However, given the overall poor quality of the majority of the soil (e.g. lava lands) for agricultural purposes, the light rainfall and scrub nature of much of the vegetation over the project site, the loss of these lands for cultivation purposes does not constitute a significant adverse impact from an agricultural perspective. The value of these lands for agricultural use, however, needs to be evaluated in relation to potentially viable agricultural uses within these areas. Only a small portion of the land is arable and has historically been utilized for active agricultural purposes. Any potential agriculture uses, however, would be restricted by the limited usable areas (e.g. areas with sufficient soil area and suitable topography) and the need for supporting infrastructure, primarily irrigation and roads. Given the 'a'a and pahoehoe lava base conditions and lack of consistent rainfall, the potential for sustainable agricultural use is questionable without soil importation, extensive irrigation, land clearing, and site improvements.

Mitigation Measures

During construction, measures will need to be provided to protect nearshore waters from the impacts of sedimentation. In addition to meeting the State's NPDES permitting requirements, an erosion and sedimentation plan will need to be prepared and approved by the Department of Public Works as part of the permitting procedure for grading. Mitigation measures which could be employed include limited exposed areas, dust control measures (frequent sprinkling), and prompt seeding of exposed finished areas. As part of the construction phasing, retention basins could be established, which will form part of the eventual drainage system for the project.

Exploratory irrigation wells are planned just makai of the Bypass road for use on the agricultural lots, golf course and open space areas. In general, the suitability of brackish water for crop irrigation not only depends on the quality of the water but also on the adequacy of the drainage, method for

irrigation, physical properties of the soil, salt tolerance of chosen crops, and management and operation of the irrigation and drainage systems. All crops initially selected for the agricultural program are expected to be supportable within the quality parameters of the available brackish water. Generally, soil conditions on the property are marginally suited for agricultural uses, but by providing the necessary site preparation, access, and infrastructure improvements as part of the project development, limited agricultural uses can be supported on an ongoing basis. The developer has proposed an agricultural program that would integrate appropriate agricultural activities on portions of the agricultural lots in a manner that would not only benefit adjacent residential uses, but would allow efficient management and operations of select crop and/or orchards uses. As proposed, the agricultural program would place approximately 60 to 70 acres into commercially productive agricultural use as described below.

Agricultural Program Concept

Approximately 60 to 70 acres of the project area (10%) can support viable agricultural crops, based on the soil and rainfall conditions. These soils are in the mauka portions of the project, between Mamalahoa Highway and the Mamalahoa Highway Bypass alignment. The remaining 90% of the project area consists of lava lands with little or no natural soils.

This portion of the property mauka (east) of the Bypass, is proposed to be improved with orchards and other commercial agricultural crops. This area includes approximately 60 to 70 acres of land. Approximately 30 acres have been planted with macadamia, avocado, mango and coffee including 10 acres of macadamia currently being harvested commercially. These areas will be developed in a manner generally consistent with the program described by Agricon Hawaii (see Appendix A). These areas will provide agricultural uses and income to the owners of lots on the makai portions of the property which have more limited agricultural opportunities based on the existing soils and topographic conditions. In addressing this issue, a program will allow for an efficient management operation for select crops and/or orchard uses through proper planning and by providing the necessary capital, infrastructure and site preparation needed to support agricultural activity in this area. The proposed uses and activities would be implemented in a manner that is fully compliant with the requirements for the State Agricultural District as contained in Chapter 205, HRS.

The program would allow for commercially viable agricultural activities that are compatible with the agricultural lot uses to be integrated in the areas of the project most suited to agricultural use. The select agricultural orchards and crops could provide a significant landscape and open space element within the project. Conversely, the resources from the associated development would provide the needed capital to support the agricultural use on an ongoing basis. Thus the proposed program offers advantages to the owner/resident and grower alike. In this way, it is felt that commercially viable agricultural activity, on a modest scale, could be supported as part of the large lot development.

4.3 GROUNDWATER AND HYDROLOGY

Both potable water for dwelling units within the agricultural lots and non-potable irrigation water for the golf course and agricultural uses will be required. Potable water is anticipated to be provided from the existing County of Hawaii South Kona Water System.

Existing Conditions

Domestic water supply along the Kona coast is derived from two sources: direct rainfall catchment and the basal groundwater lens. At the higher elevations above 1,500 feet the rainfall is normally adequate to furnish a limited catchment supply, however, groundwater provides the only reliable water supply. There are no perennial streams in the project area.

A complete assessment of the existing hydrological conditions in the area of the project site was conducted by Waimea Water Services and is contained in Appendix B. Initial hydrological studies (Bowles, 1992) projected that the groundwater recharge for the study areas (bounded by the ocean, the 5,000 foot elevation and lines drawn parallel to the district boundary, one mile to the south and 2.75 miles to the north) may total approximately 60 MGD (million gallons per day). This recharge percolates downward into the high level water, mauka of the project area into the basal lens at sea level, and then to the sea. Fresh groundwater floats on the underlying salt water at a ratio of about 1 to 40, so that for every one foot to fresh water head (water level of the lens above sea level) there is approximately 40 feet of fresh water below the sea level. The equation is modified by tidal and recharge fluctuations, which produce a thick brackish or transition zone between the fresh water and salt water. The head increases upward away from the shore (inland) at rates normally from one to two feet per mile.

Since 1990, discoveries of high level groundwater have been made in the area mauka of Mamalahoa Highway. High level groundwater has been found in several wells scattered from Kalaoa in North Kona to Kealakekua Bay in South Kona with water levels in excess of the 350 foot elevation verified by pumping wells at Keei and above Higashihara Park at Honalo. At the observation well mauka of Kona Hospital, a water level of over 490 feet has been reported. A well is presently under construction at Kona Hospital.

Based on the Waimea Water Services study, initial estimated recharge, the seaward flow of groundwater through the property was calculated to be approximately 11 mgd per mile of shoreline. Recent discoveries made at the onsite exploration well at the 810 foot elevation, however, indicate that this groundwater flow may have been overestimated. Based on estimates from the water level at the exploration well (3.8 feet) and on preliminary water quality data which shows total chlorides of about 340 mg/l, the groundwater flow through the property to the sea is estimated to be in the range of 4 to 6 MGD. The estimated groundwater flow and quality, however, appears to be more than adequate to support the irrigation water needs of the project.

Drilling of the exploration well has suggested the existence of a major domestic water hydrological boundary between the Hokukano exploration well at an elevation of 810 feet and the Department of Water Supply (DWS) production well at 1,780 foot elevation near Kona Hospital. Based on the water quality and water level data, it appears that the majority of the groundwater recharge is diverted away from the subject property. The high water level differential between the two wells in a distance of 1.5 miles indicates a geologic structures(s) of relatively low permeability.

Recent offshore bottom surveys along the Kona coast (J.G. Moore, et. al, 1989) have indicated that massive submarine landslides are in evidence along the Kona coast. With the completion of the Hokukano well and the DWS Kealakekua well in 1992, it now appears that not only does onshore

faulting exist, more than likely these faults in some way impede or divert the groundwater flow.

There is also a possibility that the high level groundwater, which is present at the wells mauka of Mamalahoa Highway, extends makai of the highway at the upper elevations of the project. On the project lands, the best site for a potable well would be at an elevation of 1,200 feet or approximately 1.75 mile from the shore. At this location, the basal water level should stand at an elevation in excess of 4 feet above sea level. A more precise determination, however, can only be made following completion of the Kealakekua Well and other wells planned in the area.

Potential Impacts

The estimated water requirements for the project has been analyzed for potable water and irrigation water demand as shown on Table 3. Based on the expected development of 125 dwelling units, 100-Members' Hale units, 18-hole golf course, clubhouse, and related uses, the average daily water demand for the full development is projected to be 117,000 GPD (gallons per day) of potable water and 1,130,000 GPD of irrigation water.

Table 3. *Estimated Average Daily Water Demand at Buildout*

POTABLE WATER	UNITS (Average)	TOTAL
125 Dwelling Units	400 GPD*	50,000 GPD
1 Golf Clubhouse	20,000 GPD	20,000 GPD
1 Golf Maintenance Building	2,000 GPD	2,000 GPD
1 Sewage Treatment Building	5,000 GPD	5,000 GPD
100 Members' Hale Units	400 GPD	40,000 GPD
SUB-TOTAL		**117,000 GPD**
IRRIGATION WATER		
150 Acres Golf Course	6,000 GPAD**	900,000 GPD
20 Acres Common Landscape	4,000 GPAD	80,000 GPD
75 Acres Agricultural Land	2,000 GPAD	150,000 GPD
SUB-TOTAL		**1,130,000 GPD**
TOTAL WATER DEMAND (DAILY)		**1,247,000 GPD**

* GPD: Gallons per day
** GPAD: Gallons per acre daily

The maximum daily potable water demand is estimated to be 175,500 GPD, which is based on the average daily demand multiplied by 1.5. This figure would also be used to determine the installed pumping capacity for potable wells.

Two onsite course irrigation wells at 900 ft MSL are expected to produce water with chlorides ranging from 250 to 1,000 mg/l. Water quality will be effected primarily by the elevation of well sites. Well production at Hokukano located to the north of Keopuka at a similar elevation as proposed for the Keopuka wells is generating water quality of about 340 mg/l chloride.

The conceptual plan for the project includes the development of a wastewater treatment system that would reuse effluent mixed with the low salinity brackish water as a supplemental source of irrigation water, thus reducing the amount of brackish groundwater.

Potential impacts to the groundwater hydrology of the project area could result from increased withdrawal of water resources, through the introduction of potential contaminants from the treated effluent, or leaching of golf course and landscaping fertilizers or biocides to the groundwater supply.

Impacts to the groundwater resources are not anticipated. The adequacy of the ground water resources to meet the brackish water requirements has been analyzed through an Evaluation of Water Resources (Waimea Water Services, Appendix B). Use of the onsite brackish water source would not impact the availability of potable water resources in the area as there is a considerable distance (approximately 1.5 miles) and geological separation, as noted above, between the onsite brackish well and existing and planned County potable well sources located mauka of Mamalahoa Highway.

The potable water requirements for the proposed project are proposed to be provided through the County Water System. Those sources developed with the County as stand alone wells would be turned over to the County for operation and would use the DWS transmission lines to transmit water to the project site. Should additional well sources be required either onsite or in the general area, the location and sizing of wells would be regulated through State well permitting procedures to insure that the proposed well development does not adversely impact existing or planned regional water sources.

Significant impact to the groundwater resources due to the use of treated effluent of golf course irrigation and/or the use of fertilizers and biocides are similarly not expected.

Mitigation Measures

Development of the onsite brackish water system and increased usage of potable water from the County water system is not expected to have an adverse impact of the potable or groundwater resources of the area due to the predicted usage requirements versus the projected quantity available in the basal water resource. Any future well development will need to meet the State DLNR well permitting requirements. In compliance with DLNR, Commission on Water Resource Management permitting requirements, brackish water sources developed onsite will require ongoing monitoring and should significant changes to water quality parameters occur, appropriate mitigation measure, including altering or reduction of pumpage rates, would be required. As described in Section 4.4, a groundwater monitoring program with near-shore monitor wells would be established.

4.4 MARINE RESOURCES

A baseline survey to establish water quality and marine communities in the nearshore waters offshore of Keopuka has been conducted by Richard E. Brock, Ph.D. (Appendix C) who has monitored the West Hawaii shoreline for more than twenty years. In addition, a draft water quality monitoring program has been prepared (Appendix D).

Existing Conditions

A pre-construction baseline marine study was undertaken to establish baseline conditions for the marine communities and water quality characteristics along a 1.6 km section of coastline fronting the Keopuka Lands property. The proximity of Kealakekua Bay and its' designation as a State Marine Life Conservation District (MLCD) heightens the need for a baseline of the existing conditions.

The study identified environmental concerns include the potential impact of changes in (1) runoff and sedimentation during construction, and (2) water quality due to the subsequent operation of the facilities on the adjacent marine communities and waters fronting the project site.

Marine Benthic Resources

The marine resource study has established baseline conditions in the waters fronting the project site (from just north of Keawekaheka Point on the north to the shoreline heiau near Cook Point on the south) from shore to the 20 meter (60-foot) isobath. In total more than 26.8 ha (66 acres) of nearshore waters were encompassed in the study; four zones or biotopes were identified. These zones include: 1) the biotope of sand which lies principally seaward of the project's study area, 2) the biotope of *Porites compressa* at depths from 10 to 30 m, 3) the biotope of *Porites lobata* found at depths between 6 to 15 m, and 4) the biotope of boulders usually in water from 4 to 10 m of depth directly adjacent to the shoreline. Six permanently marked stations were established to sample benthic (primarily coral) and fish communities in these zones. Qualitative observations on the benthic and fish communities were initially carried out in December 1991 (Brock 1991). Subsequently, in September 1992, the force of Hurricane Iniki impacted the marine communities along this coast. In April 2000, a quantitative survey by Brock was completed and provides the baseline data on the status of marine communities prior to any construction on the project site.

In general the marine communities resident to the waters fronting the Keopuka project site are diverse and the fish communities do not show the declines in abundance to the degree often seen elsewhere along this coast in recent years. No unusual marine species or communities were noted in the study area. A major parameter in structuring Hawaiian coral and benthic communities is wave impact. Coral community development is greatest where exposure to occasional high energy (i.e., storm generated surf) is least. Much of the storm generated surf impinges on the West Hawaii coast from a NNW to WNW direction as occurred during Hurricane Iniki. Thus stations that sample communities exposed to these directions usually show poorer coral community development. Similarly, fish community development is greatest where shelter and food resources are best developed. The development of shelter is frequently correlated with the growth of coral; hence, where coral development is poor, fish community development may mirror this. The results from

some of the stations in this study reflect this.

No endangered species were encountered in the study area, however humpback whales have been seen well-offshore of the site during previous (winter) field visits. Despite the fact that only one green sea turtle (a threatened species) was seen in the study area in the April 2000 survey, it is expected that turtles and spinner dolphins must, at a minimum, pass through the waters fronting the project site.

Water Quality

The water quality baseline survey is planned at two episodes, once during the "dry" season and again during the "wet" season. The dry period survey in April 2000 has been completed and is described in Appendix C. The wet period season will be undertaken prior to construction when a high rainfall event occurs (i.e., 1.25 inches in 24 hours, or greater).

In the study area 28 sites were established to quantitatively assess water quality characteristics including a "control" site at Kealakekua Bay. All of these sites sampled marine waters. Nine of these sites were sampled in December 1991 and all were sampled in April 2000; both of these sample efforts were during dry or low rainfall periods.

Water quality in the nearshore marine environment is influenced by groundwater effluxing along the shoreline which results in gradients of concentrations for certain dissolved nutrients. Because some nutrient species occur in relatively high concentration in groundwater and are near-absent in oceanic waters, a concentration gradient is established. Among the constituents showing these concentration gradients are nitrate nitrogen and silica. On the other hand, high biological activity in the shallow waters fronting the project site is probably the mechanism creating relatively high concentrations of ammonia nitrogen (which is a product of animal metabolism) encountered here. The waters fronting the Keopuka project site are typical of well-flushed, undeveloped West Hawaii coastal settings.

Potential Impacts

The potential for impacts to the nearshore waters and marine communities off of Keopuka is greatest during the construction phase of the project when soils are potentially exposed to rainfall events. If prudent construction techniques are used to mitigate potential soil erosion, the potential for negative impact to the marine community due to sedimentation should be low during the construction phase. After construction, the environmental concern will focus on the potential impact that could occur during normal golf course operations which could result in pollutants (inorganic nutrients, pesticides and herbicides) leaching through the soils or as surface runoff to the marine environment.

Studies offshore on Maui and this island have identified only one instance where groundwater chemistry related to coastal development has been detected, but no detectable or quantifiable changes noted in the aquatic biota. However, these changes only involve the concentration of inorganic nutrients. Pesticides and/or herbicides have not been detected in water, sediments or organisms at any of the studied sites. In addition, the changes in inorganic nutrients all fall within the range of concentrations encountered at other Hawaiian coastal localities that have no surrounding

development.

In addition, products that are effective on application now have reduced half-lives compared to long-lived products used years ago (i.e., chlordane, DDT). Thus, products used today carry considerably less risk of contamination to the environment.

The porous nature of the substratum and relatively low rainfall characteristics of the Project site suggest that if prudent construction techniques are used, the potential impact to the marine communities due to sedimentation is low during the construction phase. Mitigation measures during the subsequent operation of the development will be required to ensure that changes to groundwater chemistry that could also impact the marine biota do not occur.

The nearshore waters off the West Hawaii coast has been monitored over the past 20+ years to assess the impact of golf course and other development by Dr. Brock and other marine scientists. In general, the results of these studies indicate that with prudent construction precautions and best management measures during grading and the implementation of integrated pest management and careful use of fertilizers and biocides during golf course operations, nearshore water quality and the marine benthic resources are not negatively affected.

Mitigative Measures

Implementation of the integrated golf course management plan (Berndt 2000, Appendix E) in the construction and operation of the proposed golf course along with the implementation of the water quality monitoring plan in concert with the baseline marine resources plan would insure the environmental integrity of these resources. Dr. Brock's marine resources study provides the quantitative baseline against which the results of future monitoring will be compared. The approach is to focus monitoring on groundwater and nearshore marine water quality because most anthropogenic or human generated pollutants that may compromise water quality and impact aquatic biota are from sources on land. If changes are noted in water chemistry, studies then focus on the aquatic biota to determine if impact is being or has occurred. If impact has occurred, a mitigation plan is put into action. Through the annual cycle, routine monitoring will assess the status of both water quality and marine communities in the ocean fronting the project site.

Best Management Practices (BMP) would include construction management techniques for sediment and erosion control. The erosion and storm water runoff controls would include the following elements:

- Minimization of area that is disturbed at any one time. Phasing of grading to the maximum extent possible to minimize exposure of soil at any time.
- Provide temporary and permanent grassing of graded areas as well as utilize other means of holding soil in place.
- Install cutoff ditches to minimize the runoff through graded areas and to route runoff and sediment to retention ditches and basins.

- Develop an approved water quality program to insure that any runoff from the site does not violate applicable state standards of the receiving waters.

- Designate individuals responsible for the management and implementation of the BMP plan.

Monitoring actions would include the following elements:

- Monitor at two coastal monitoring wells and one inland control well

- Monitor nearshore waters (28 stations and one control at Kealakekua Bay)

4.5 NATURAL HAZARDS

Natural hazards are events such as tsunami, earthquakes, floods, hurricanes, soil slippage and volcanic eruptions.

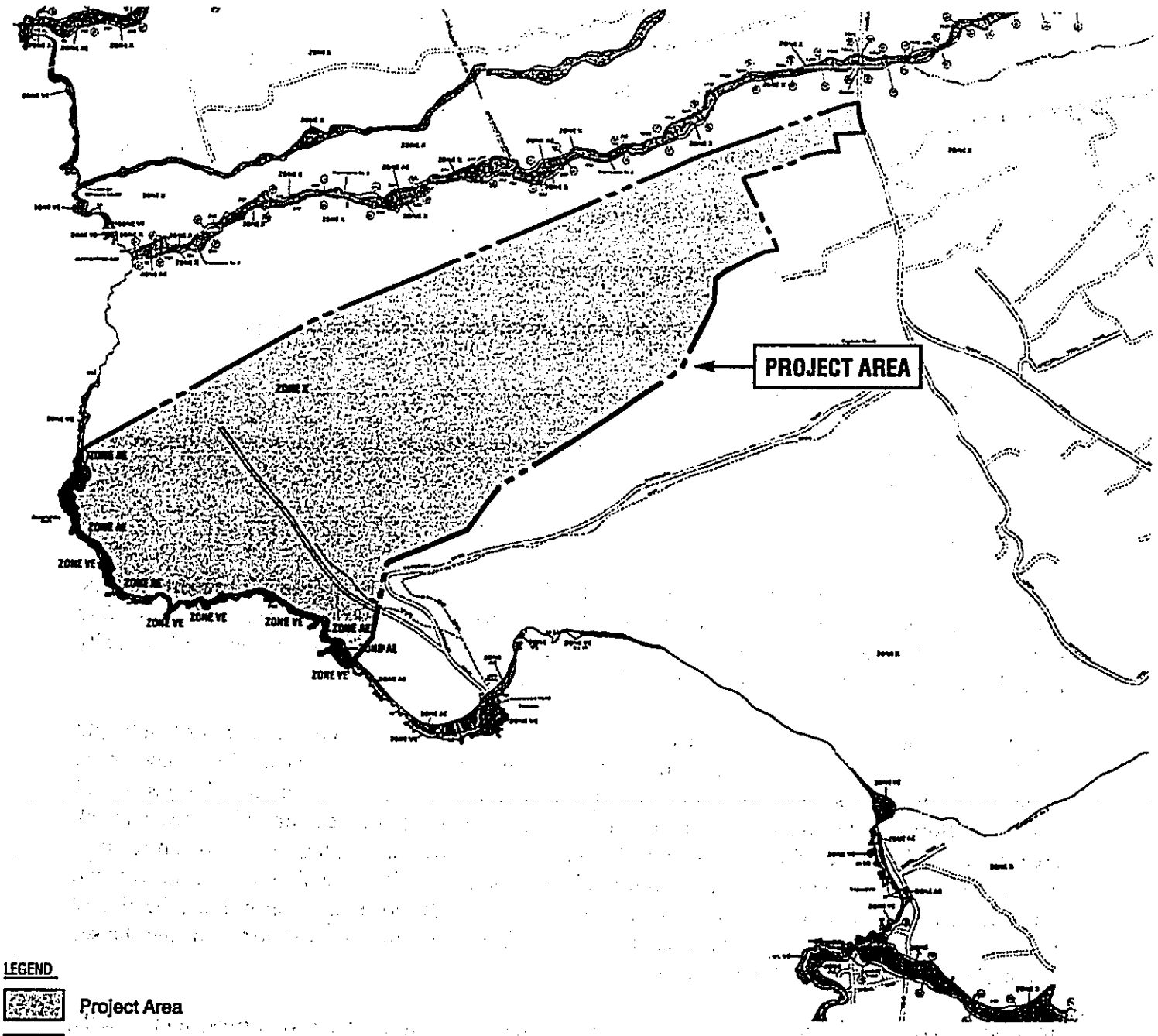
Existing Conditions

Flood hazards are primarily identified by the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA), National Flood Insurance Program. According to the FIRM, the coastal band of Keopuka is in the "VE" zone where coastal flood with velocity hazard (wave action) has been determined (Figure 11).

The proposed project is located on the western slope of Mauna Loa volcano, which rises to a height of 13,679 feet above sea level. The project site is located about 22 miles west of Mokuaweoweo Crater, the volcano's summit, on lava flows primarily from the Holocene age (200-750 years ago) and some flows dating from between 5,000 to 10,000 years ago (Holocene and Pleistocene ages). According to the United States Geological Survey, Mauna Loa has erupted thirty-two times since 1832. Seven of those eruptions have occurred in the southwest rift zone, that area of the volcano with the greatest potential exposure to the South Kona area. Of those, seven eruptions, the closest to the project site occurred in 1950 when a lava flow from the southwest rift zone reached the sea about eight miles south of Kealakekua Bay.

Hazards associated with eruptions can be categorized in four types: lava flows, tephra falls, pyroclastic surges, and volcanic gasses. Volcanic hazard zones have been established for the entire Island of Hawaii, including the South Kona region (Mulleneaux, et. al., 1987). The area surrounding the project site is designated as lava flow Hazard Zone 3 (with Zone 1 being the highest and Zone 9 being the lowest risk), and is characterized by lava coverage of about 5 percent in the past 40 years, and 20 percent during historic times.

Tephra consists of volcanic ash and coarser fragments produced by lava fountaining or explosive eruptions. The project area is located in Tephra Hazard Zone 2. Hazard zones for volcanic gases are the same as for tephra. The project site is located in Volcanic Gas Hazard Zone 2. No threat from pyroclastic surges, which are clouds of ash, rock fragments, and gases that move at high speeds outward from a source vent has been identified for the project area. Pyroclastic surges are presently associated only adjacent to Kilauea Caldera, although they could conceivably be initiated at other



LEGEND

- Project Area
- Special Flood Hazard Areas Inundated by 100-Year Flood
- AE — Base Flood Elevations Determined
- VE — Coastal Flood with Velocity Hazard (Wave Action); Base Flood Elevations Determined
- X — Areas of 500-Year Flood; Areas of 100-Year Flood with Average Depths of Less than 1 Foot or With Drainage Areas Less Than 1 Square Mile; and Areas Protected by Levees From 100-Year Flood

Source: Flood Insurance Rate Map, State of Hawaii
Map # 155166 0939 C
155166 0943 C
155166 1152 C
155166 1156 C

FIGURE 11

Flood Insurance Rate Map

KEOPUKA LANDS

0 1000 2000 FEET

June 2000

places where groundwater or sea water interact with magma.

The Island of Hawaii experiences thousands of earthquakes every year, usually associated with volcanic activity or the movement of magma at shallow depths. Earthquakes endanger people and property by shaking structures and generating ground fractures, settling, and landslides. Sudden subsidence along the shoreline associated with an earthquake can also generate a tsunami. The two most severe earthquakes during historical times occurred in 1868 and 1975, the magnitude of both quakes exceeded 7 on the open-ended Richter scale and resulted in local major damage in the Ka'u and Kilauea areas respectively. Both events generated a tsunami, with the 1975 quake creating a tsunami that sank boats in Keauhou Bay.

The most likely threat to the North and South Kona Regions would come from a large earthquake (magnitude of 6 or greater) occurring at Mauna Loa or Kilauea. In 1951, an earthquake occurred about one mile offshore of the project area caused by movement on the Kealakekua Fault which is proximate in the region of the project. In 1983, a landslide at Kealakekua Bay occurred shortly after a magnitude 6.6 earthquake occurred at a depth of seven miles, approximately midway between Kilauea and Mauna Loa. The most recent large earthquake on Kilauea's south flank occurred in June 1989, with a magnitude of 6.1. This quake, however, caused much less damage than the 1975 event.

Potential Impacts

Those natural hazards which could have the greatest potential impact upon the physical character of the project lands, aside from storms and strong winds, are volcanic eruptions and earthquakes. High wave action and tsunami may also be potential threats to the low lying areas of the project site as designated by the "VE" zone on the FEMA Flood Insurance Rate Map.

Natural hazards, such as lava flows and earthquakes, could have a direct impact on the proposed project. Based on information developed by the United States Geological Survey (USGS) and published in its Professional Paper 1350 (1987), the likelihood of volcanic eruption at Mauna Loa is remote. One to three percent of the land surface in Lava Flow Zone 3 has been covered by lava during historic times. An eruption at Mauna Loa could also result in thin layers of tephra impacting the project site. Volcanic gases from an eruption might also impact the project site. However, both of these latter occurrences would depend in great part on the size of the eruption, associated fountaining of lava, and wind direction.

Buildings, including dwellings, as well as roadways, sewer, and water lines could be damaged by an earthquake of sufficient magnitude or landslides triggered by earthquakes which are a possibility along the steeper slopes of the project site. The Hawaii County Code relating to the Uniform Building Code was amended in 1999 to upgrade the seismic zone for the Island of Hawaii from Zone 3 to Zone 4. The rating system is based on a scale of 1 to 4, with a rating of 4 having the highest risk associated with seismic activity. The Hawaii County Building Code requires that all new structures be designed to resist forces to seismic Zone 4 standards.

Mitigation Measures

The impact of lava flows upon the project site can only be mitigated with the intention of protecting life. The protection of property from lava inundation has proven to be relatively ineffective on a regional scale. Therefore, mitigation of lava flow hazards is limited to the provision of adequate evacuation routes and a civil defense warning system designed to provide area residents with as much advance notice of a threatening lava flow as possible.

Mitigation of hazards associated with earthquakes include adherence to County building codes and standards in order to minimize potential damage to structures. All buildings and structures within the proposed project would be designed and constructed in compliance with applicable building codes and standards.

Inundation by high surf and tsunami is mitigated by the 300 feet development setback above the Conservation District line. Improvements within the coastal Conservation lands will be restricted vegetation clearing and minimal landscaping, the creation of a coastal trail, and an improved camping area consisting of a comfort facility and packing for four vehicles.

4.6 *BOTANICAL RESOURCES*

A botanical survey of the project site was undertaken by Ron Terry, Ph.D and Patrick Hart, M.S.. The objectives of the survey were to 1) describe the vegetation; 2) list all species encountered; 3) identify threatened or endangered species; 4) assess the value of the vegetation for native vertebrate habitat; and 5) list the presence or absence of and provide distributional information for important native and Polynesian plants. Consequently, the survey paid special attention to identifying any relict native forests or shrublands, areas containing Hawaiian ethnobotanical species, and areas within the 300 feet of the coast, which are contained in the Conservation District. The results of the study are summarized below, and the complete study is included in Appendix G.

Existing Conditions

Most of the surface is a barely weathered `a`a flow. A 50-70 acre kipuka of lava about 5,000 years old is enclosed by this flow at elevations 320-500 feet above sea level. Annual rainfall at the coast is about 50 inches, increasing to about 75 inches at the mauka end. Evapotranspiration is high, especially in the lower elevations, where hot and sunny conditions prevail. The flow is only lightly vegetated between sea level and 900 feet in elevation, but mauka of this, it quickly becomes covered with a dense canopy.

Based on rainfall and geologic substrate, the mauka half of the area probably supported a Lowland Mesic Forest (Gagne and Cuddihy 1990) before human alteration, with `ohi`a (*Metrosideros polymorpha*) and lama (*Diospyros sandwicensis*) as co-dominants. The lower half is vegetated very sparsely where the `a`a lava flow occurs.

Humans have substantially altered the vegetation, either directly (e.g., clearing for ranching) or indirectly (alien plant introduction). The coastal area appears to have been the site of traditional Hawaiian settlement and possibly agriculture. Ranching and macadamia nut farming occurred in the

past in the upper quarter of the property. Other than a few unpaved roads, little direct human alteration of the vegetation has taken place over most of the property, but alien plants have come to dominate the vegetation anyway.

Current Vegetation and Flora of the Area. A macadamia nut orchard occupies much of the land from the Mamalahoa Highway down to approximately 1,100 feet in elevation. This topmost quarter of the property is dominated by agriculture and a dense cover of introduced shrubs and trees, with few natives. All land from this orchard to approximately 900 feet in elevation is dominated by small trees and shrubs such as Christmas berry (*Schinus terebinthifolius)*, ʻopiuma (*Pithecellobium dulce*), and koa haole (*Leucaena leucocephala*), interspersed with large ʻohiʻa trees. The understory is comprised largely of lantana, (*Lantana camara*), and grasses such as Natal red top (*Rhynchelytrum repens*), molasses grass (*Melinus minutiflora*), and Guinea grass (*Panicum maximum*). Also common are the introduced love-in–mist (*Passiflora foetida*) and huehue haole (*Passiflora suberosa*) vines. With the exception of large, emergent ʻohiʻa trees, few native Hawaiian plant species are found in this area.

From approximately 900 feet in elevation to sea-level, Christmas berry, ʻopiuma, koa haole, lantana, and the introduced grasses thin out significantly and become more patchy, and the abundance of many native plant species increases. Most of the coastal area is very sparsely vegetated. However, the southern end consists of a pahoehoe shelf averaging a hundred feet wide. Behind this is an area of ʻaʻa covered with a veneer of littoral deposits, including sand and coral chunks, which is densely vegetated, probably as a result of tapped groundwater.

Threatened and Endangered Species. No State of Hawaii or federally listed threatened or endangered plant species were found on the site (USFWS 2000).

Value of Area for Native Vertebrate Habitat. Native shorebirds, hawks and a native owl were observed on the site, and bats are probably present. Some native forest birds may also use the area. However, the area in general appears to have limited value as habitat for native vertebrate fauna. The alien-dominated vegetation at higher elevations does not offer high-value habitat and the lower elevations are sparsely vegetated and offer few resources for food or nesting.

Important Native and Polynesian Plants. The following is a summary of the important endemic, indigenous, and Polynesian introduced plants encountered during this survey.

- *Capparis sandwichiana* (Maiapilo). Endemic. Found from sea-level to approximately 250 m (820 feet) The abundance of patches of Maiapilo is a notable aspect of the vegetation of this area. Maiapilo was used as a poultice applied to joints to cure broken bones.

- *Erythrina sandwicensis* (Wiliwili). Endemic. The light-weight wood of this species was used for building canoes and surfboards. A single individual was located in a Kukui grove at approximately 200 m (660 feet) elevation. This tree is a last remnant of the dry forest that once dominated this area.

- *Metrosideros polymorpha* (Ohia). Endemic. Used primarily in house construction. Large trees up to 70 cm dbh (diameter at breast height) were common above approximately 175 m

(575 feet) elevation.

- *Wikstroemia sandwicensis* (Akia). Endemic. Used for cordage and fish poison. Found from 175 m (575 feet) to approximately 275 m (900 feet) elevation.

- *Cocculus trilobus* (Huehue). Indigenous. Used for cordage in house construction. Found from 125 m (410 feet) to approximately 300 m (985 feet).

- *Heteropogon contortus* (Pili grass). Indigenous. Used to thatch the roof and sides of houses. Locally abundant from sea-level to approximately 100 m (330 feet).

- *Osteomeles anthyllidifolia.* (Ulei). Indigenous. The long, slender branches of this shrub were bent into hoops for fish nets. Ulei was occasionally encountered between 200 m (660 feet) and 275 m (900 feet) elevation.

- *Pandanus tectorius* (Hala). Indigenous. This tree is of great cultural value and its leaves are still used for weaving mats and other items. A one-half acre Hala grove was found near a lava tube at approximately 275 m (900 feet) elevation north of the jeep road.

- *Peperomia leptostachya* (Alaala wai nui). Indigenous. Certain species of this genus were used in traditional medicine. Found from approximately 50 to 275 m (165 to 900 feet).

- *Plectranthus parviflorus* (Ala ala wai nui). Indigenous. Found in patches from 75 m (250 ft) to approximately 275 m (900 feet), often in association with Peperomia.

- *Plumbago zeylanica* (Iliee). Indigenous. Used as a traditional "baby medicine" and to blacken tattoos. Primarily found in the shade of Kukui groves, from 200 to 300 m (660 feet to 985 feet) elevation.

- *Sida fallax* (Ilima). Indigenous. The orange flowers of this species are important in lei-making. Like Noni, Ilima was scattered from sea-level to approximately 275 m (900 feet).

- *Waltheria indica* (Uhaloa). Indigenous. This plant is used in traditional Hawaiian medicine. It was one of the most abundant native plants at Keopuka, occurring from sea-level to approximately 300 m (985 feet) elevation.

- *Aleurites moluccana* (Kukui). Polynesian introduction. This tree has a wide variety of traditional uses including canoe making, fire building, and medicinal uses. Kukui was found in scattered groves from 200 to 300 m (660 ft to 985 feet) elevation.

- *Morinda citrifolia* (Noni). Polynesian introduction. Used as a dye plant. Fruit may be eaten or taken medicinally. Noni was scattered from sea-level to at least 300 m (985 feet).

- *Tephrosia purpurea* (Auhuhu) – Polynesian introduction. Its leaves were ground up to poison tide-pool fish. Locally abundant from sea-level to approximately 200 m (660 feet).

Potential Impacts

Development of the project will involve transforming portions of the site to accommodate the project elements including the golf course, members' hale, and agricultural lots. Several plant communities will be cleared to allow development of the project, primarily the exotic Christmas berry, koa haole and other invasive plants. The important clusters of native trees and shrubs would be preserved and integrated into the project landscaping to the extent practical.

Mitigative Measures

The property in general is dominated by areas that have little value in terms of conservation of native plants or species with important traditional uses. However, patches of native plants are present in certain areas. The following mitigative measures are proposed:

(1) Preservation of Native Tree and Shrub Clusters. Preserve as part of open-space planning several large patches in the middle elevations of the project that contain kukui, wiliwili, and `ohi`a, along with various native shrubs and herbs; Preserve `ohi`a trees, as practical, in the context of the project's design;

(2) Conservation District. During any landscaping activities in the coastal Conservation District, identify and preserve native species;

(3) Preserve Important Natural Lava Terrain. Preserve at least some areas of natural terrain in the sparsely vegetated `a`a, especially those that contain native species;

(4) Landscape with Native Plant Species. Select native species that occur naturally on the property as landscaping elements in areas that are disturbed;

(5) Control of Fountain Grass. The African alien pyrophitic grass could represent a severe fire hazard to natural habitats, and following development to physical property constructed. The small number of plants currently established on the site are planned to be removed before they spread beyond control and present a threat to natural and developed assets.

4.7 WILDLIFE RESOURCES

A wildlife survey of the project site was undertaken by Philip L. Bruner as a follow-up to a previous survey undertaken in 1992. The objectives of the survey were to record all species on the property and identify rare, threatened or endangered wildlife resources on the property. The results of the study are summarized below. The surveys are attached as Appendix F-1 and F-2.

Existing Conditions

The results of the survey identified and environment largely dominated by introduced vegetation species with clusters of native remnant trees, including Ohia, kukui, and wiliwili, in the mauka areas. The following wildlife resources were identified:

Resident Endemic (Native) Birds: Four Hawaii Amakihi (*Hemignathus virens virens*) were recorded in the mauka Ohia forest of the project site. The Hawaii Amakihi is not endangered or threatened and is one of the most common *Drepanidinae* remaining. The major limiting factors on native forest birds are introduced diseases spread by mosquitoes. Amakihi may have developed some immunity to these diseases in recent years since they are frequently recorded in lower elevation habitats where mosquitoes and presumably bird diseases are present. In 1992 two Pueo or Short-eared Owls (*Asio flammeus sandwichensis*) were observed. None were noted on the 2000 survey. Pueo and the endemic and endangered Hawaiian Hawk or Io (*Buteo solitarius*) could forage in this area. They hunt over a wide variety of habitats from sea level to upland forest.

Migratory Indigenous (Native) Birds: One Pacific Golden Plover (*Pluvialis fulva*) was heard flying over the coastal lava flows on April 25, 2000. This species typically departs for its summer breeding grounds in western Alaska around the 25th of April 2000. The lowland habitat could support a few plover. The forested areas do not contain appropriate habitat for this species. Plover are not threatened or endangered.

Seabirds: A pair of Red-tailed Tropicbirds (*Phaethon rubricauda*) were observed flying and occasionally landing in the lava along the coast. This species is not endangered or threatened.

Resident Introduced (Non-native) Birds: A total of 16 introduced species were recorded on this survey including Gray Francolin (*Francolinua pondiceranus*), Kalij Pheasant (*Lophura leucomelana*), Ringed-necked Pheasant (Phasianus colchicus), Common peafowl (Pavo cristatus), Spotted Dove (*Stretopelia chinensis*), Zebra Dove (*Geopelia striata*), Red-billed Leiothrix (*Leiothrix lutea*), Northern Mockingbird (*Mimus polyglottos*), Common Myna (*Acridotheres tristis*), Japanese White-eye (*Zosterops japonicus*), Northern Cardinal (*Cardinalis cardinalis*), Yellow-billed Cardinal (*Paroaria capitata*), Saffron Finch (*Sicalis* flaveola), House Finch (*Carpodacus mexicanus*), Lavender Waxbill (*Estrilda caerulescens*), and Nutmeg Mannikin (*Lonchura punctulata*). None of these species are threatened or endangered.

Feral Mammals: A total of eight Small Indian Mongoose (*Herpestes auropunctatus*) were seen. Two pigs (*Sus scrofa*) were seen on the upper (mauka) portion of the property. The endemic and endangered Hawaiian Hoary Bat was not observed. This species utilizes a variety of habitats at all elevations. They are frequently seen along the Kona coast. Four bats were recorded on the nearby Hokukano property on a 1991 survey (Bruner 1991). It is likely that this species also forages and roots on the Keopuka property.

Potential Impacts

None of the birds found in the project area is considered to be a rare, threatened, or endangered species. The dominance of exotic vegetation on the site helps to support the array of introduced birds on the property. However, the recent survey (Bruner 2000) recorded the Hawaii Amakihi, a native bird species that is not considered to be rare, threatened or endangered. None of the feral mammals (i.e., pigs and mongoose) on the property is a native species and are often regarded as pests.

The Project at buildout will alter the faunal character of the area. The native trees, including ohia, wiliwili and kukui are planned to be preserved, as practical, and integrated into the project landscaping. In addition, new landscaping will include ohia, kukui and other native trees to augment the foraging range for amakihi at Keopuka.

The improvements to the makai shoreline will include the creation of a new coastal trail and landscape improvements . The improvements are low impact and therefore, impact to the Red-tailed Tropicbird is not anticipated.

The operation of the golf course and the use of fertilizers and pesticides in grounds maintenance pose little or no hazard to birds frequenting the property. Fertilizers are relatively non-toxic unless ingested in large amounts, and herbicides and fungicides used in ground maintenance in Hawaii are of low to moderate toxicity.

Mitigation Measures

No significant impact is expected to occur to any wildlife species on the property; however, several measures will be implemented that will minimize effects on wildlife due to the project development.

(1) Preservation of Native Tree and Shrub Clusters. The presence of Hawaii Amakihi in this forest will be enhanced by preserving existing native ohia trees as well as kukui and wiliwili trees. The understory around the Ohia is dominated by alien species (i.e., vines which entangle valuable trees) and their removal would improve the habitat. Native plants would be used to replace alien understory vegetation to the extent practicable.

(2) Project Design. The mauka area macadamia orchard, when supplemented by the Project's more formal open landscape, lawns, and irrigations ponds, will contribute to increased habitat diversity. The greater diversity in plant materials, creation of lawns and water features may actually increase the available habitat for several species, including endemic shorebirds such as the Golden Plover and Ruddy Turnstone.

(3) Landscape with Native Plant Species. Select native species that occur naturally on the property as landscaping elements in areas that are disturbed.

(4) Pesticides Controls. Use of pesticides will be controlled on the site to avoid impacts to wildlife. Only those pesticides that are allowed by law will be applied on the golf course under the supervision of a trained grounds manager.

4.8 ARTHROPOD RESOURCES

Steven Lee Montgomery, Ph.D., conducted the field surveys with assistance from Reginald E. David for any arthropod species currently listed as endangered, threatened, proposed, or candidate which may be utilizing either surface or sub-surface resources within the proposed development site. Special attention was given to searching for the endangered Blackburn's hawk moth (*Manduca blackburni*) and it's requisite host plants. Their findings are summarized below and the full report is included in Appendix H.

Existing Conditions

The lava tubes visited are in relatively young pahoehoe lava flows, situated in an extremely dry environment which has been extensively impacted by man and feral ungulates. Neither is there sufficient moisture on the project site for a lava tube ecosystem to support the development of native arthropod species. Such a subterranean ecosystem requires as it's foundation, the nutrients contained in plant roots, and attendant moisture that enter the tube from vegetation growing above them. The lava tubes inspected contained very few roots; consequently the low numbers of arthropods recorded is not surprising. Additionally, the presence of predatory ant species which prey on other arthropod species, contributed to the low number and densities of native arthropod species detected. The interior of the lava tubes were dry, with very little evidence of water run-off or collection.

The subterranean habitat inspected, with it's minimal root growth supports a few common scavenging sow bugs. The habitat currently present above ground also supports a few native arthropods. Areas in North Kona and Kohala have historically supported Blackburn's hawk moth larvae on solonaceous host plants *Nicotiana glauca* and *Nothocestrum* sp. Both plants are absent on the subject property.

No arthropod species protected under either State of Hawaii or federal statutes were detected on the property (Federal Register 1998, DLNR 1986). The relatively dry conditions found within the lava tube complexes, coupled with the young age of the flow and the paucity of native vegetation root systems within the lava tubes makes it unlikely that the subterranean habitat present on site supports any endangered or rare native arthropod species.

Potential Impacts and Mitigative Measures

The survey results did not indicate the presence of rare, threatened or endangered arthropod species, hence no mitigative measures are warranted. If additional lava tubes are identified during the archaeological inventory phase of the project, the consulting entomologist will be contacted to determine whether baiting should be conducted during the wet season to assess if arthropod resources are present.

5.0

Assessment of the Existing Human Environment, Potential Impacts, and Recommended Mitigative Measures

5.0 ASSESSMENT OF THE EXISTING HUMAN ENVIRONMENT, POTENTIAL IMPACTS, AND RECOMMENDED MITIGATIVE MEASURES

This section presents background information on the existing human environment of the project lands. Impact discussions are noted as short-term construction related impacts and long-term operational impacts. Mitigative measures are recommended where impacts cannot be avoided. The findings of technical studies which have been prepared for the EIS are summarized below; and the complete reports are enclosed in the Appendix.

5.1 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Investigations of historical resources were conducted on two adjoining areas by Cultural Surveys Hawaii, Inc. (CSH) (Hammatt et al. 1995), and Paul H. Rosendahl, Inc (PHRI) (Rosendahl and Jensen 1989) during the period from January 22, 1992 and March 9, 1992 and December 21, 1987 through January 12, 1988. The studies are attached as Appendix I-1 and I-2. The two inventory surveys were conducted to identify and evaluate historic and archaeological resources on properties known as Keopuka, and were designed to meet the requirements of the State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR) review process. The quality of significance was evaluated on a per site basis, utilizing criteria established by both the Hawaii and National Registers of Historic Places. The archaeological survey study areas by PHRI and CSH are shown in Figures 12 and 13, respectively.

Section 7 of Chapter 6E, HRS, established a State historic preservation program to preserve, restore and maintain historic properties in Hawaii in a spirit of stewardship and trusteeship for future generations. The SHPD/DLNR keeps an inventory of known sites in the State of Hawai`i, and has the responsibility to serve as the technical and administrative point of contact for all historic preservation issues within the State. For this project, the developer has submitted the survey reports to the SHPD/DLNR for their review and approval. In doing so, the SHPD/DLNR may request additional information to be added to the reports and may recommend future action to the developer regarding the treatment of potential historic resources.

Existing Conditions

Historical Background of the Project Area

The project area is situated within the *ahupuaa* of Keopuka, which has gone through a number of different phases of occupation and land use. Prehistorically, settlement was focused mainly along the coast. There are no precise population estimates for the prehistoric period in the Kona region, however a population census for the shoreline area between Keauhou and Kaawaloa in 1825, inclusive of the project area, was estimated at approximately 3,400 people. The majority of the site clusters within the coastal zone of the project area are situated in areas where access to the ocean is

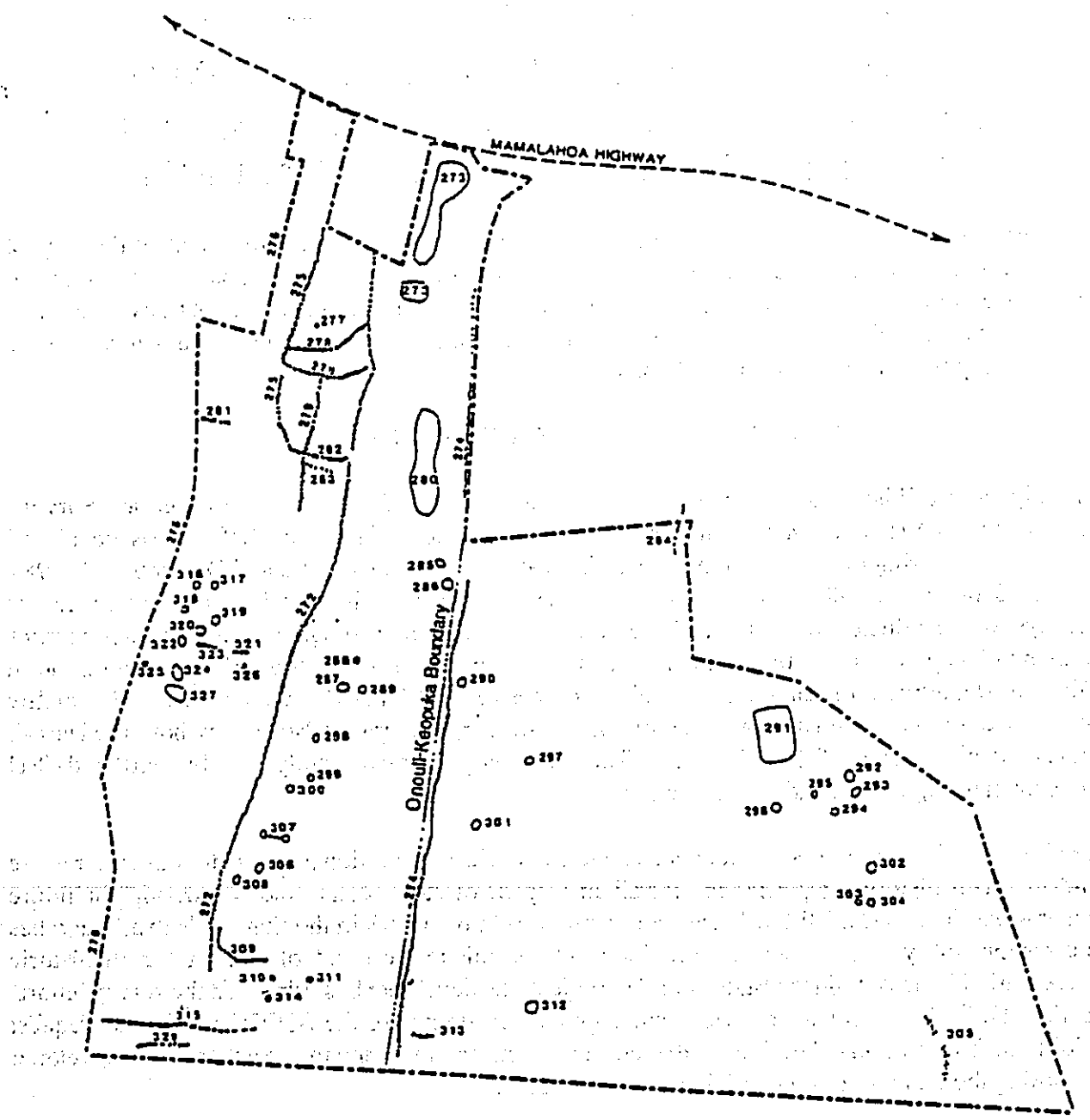


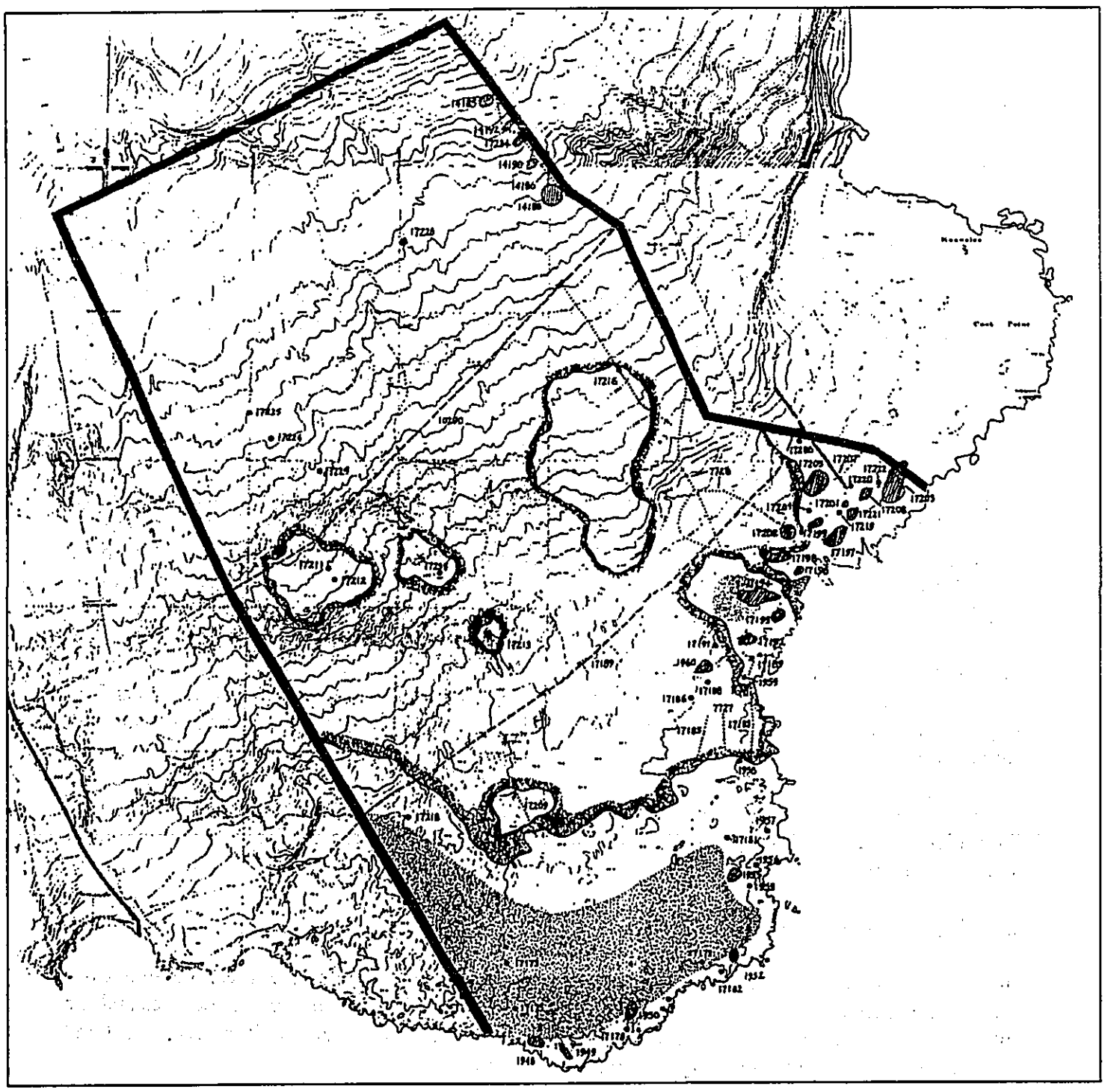
FIGURE 12

PHRI Archaeological Survey Study Area

KEOPUKA LANDS

Source: Paul H. Rosendahl, Inc.

June 2000



LEGEND

- SITE 17172 LAVA EXCAVATIONS
- EDGE OF A'A FLOW
- SITE LOCATION
- HISTORIC ROAD
- TRAIL
- PROJECT BOUNDARY

Source: Cultural Surveys Hawaii

FIGURE 13

Cultural Surveys Hawaii
Archaeological Survey Study Area

KEOPUKA LANDS

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easily obtained. The majority of the upland areas of the project area, prehistorically, appear to have been utilized for agriculture, as evidenced by the remnants of the Kona Field System. Common agricultural crops cultivated prehistorically and during the early historic period include: within the coastal zone (0 to 500 feet above MSL.) coconuts, sweet potatoes, and wauke (paper mulberry); and within the upper elevations of the project area (500 to 1000 feet above MSL.) crops probably consisted mainly of breadfruit, with wauke and sweet potato planted in between the breadfruit.

During the early historic period the project area still had a substantial population situated along the coast with agricultural practices continuing in the upland areas of the project. In the mid-1800's, habitation was still situated mainly within the coastal zone. The Land Commission Award (LCA) Testimony and Register information reflects the coastal habitation and upland agriculture uses. The general pattern of *kuleana* (LCA) awards was multiple parcels with a house lot at the coast and one or more parcels inland for subsistence crops.

At the end of the 19th century the population within the project area began to decline as families began to move upland along the Mamalahoa Highway corridor. The economy of the area was shifting from a subsistence-based economy to a market-based and export economy. This accounted for the shift of families from the coastal region to the upland area along the new highway corridor. The decline in population was also a reflection of the numerous epidemics that were sweeping through the native populations at this time. This decline continued into the early 20th century, at which point the project area was completely abandoned as a habitation site.

In conjunction with the decline of the population within the project area and surrounding lands, there was an increase in cattle ranching in the later half of the 1800s and extending to the mid-1900s. The majority of the project area is rough `a`a terrains with little soil development, thus it was not suitable for pasture land except for the most inland portion.

The proximity of Keopuka to Kaawaloa and Kealakekua Bay, where a landing was established, made the project area integral to the ranching and other Kona industries as part of transportation routes, such as sites 50-10-47-10290 (Old Government Road) and -17189 (cart road).

Existing Conditions and Methodology

In order to research the historic and archaeological background of the project area, previous work located at the SHPD/DLNR, State and University of Hawaii libraries, historical societies and the internet was perused, and this included searches for historic maps, written records, Land Commission Award and Boundary Commission documents.

For the archaeological study, CSH and PHRI staffs reviewed other archaeological surveys and site records on file from SHPD/DLNR. Aerial photographs and relevant archaeological publications and reports were also examined.

For the field surveys, CSH and PHRI staffs completed 100% pedestrian surveys of the two adjoining areas to determine whether historic properties were present and, if so, to establish their nature and locations. The field archaeologists examined the project areas using parallel pedestrian transects spaced at no more than 30 meters apart. Utilizing the pedestrian surveys, all archaeological sites were

located, described, and mapped. Field documentation included photographs and drawings to scale of the majority of sites. In accordance with SHPD/DLNR guidelines, all sites were assigned State site numbers, and per site interpretive evaluations including the archaeological significance and recommended treatment were conducted.

Site Distribution

The site distribution within the project area has been broken down into three main zones, the coastal, intermediate and upland. The majority of the 95 recorded sites in the project area (76%) are located in the coastal zone, with the most compact clustering of sites occurring in the southern portion of the coastal zone in proximity to the known Royal Center of Kaawaloa. Inland to a maximum elevation of 1150 feet above mean sea level, sites are distributed sporadically - some at deliberate locations among pahoehoe lava *kipuka*.

Site distribution in the coastal and intermediate zones of the project area is predicted mostly by the topography and lava type of the landscape and the functional site types generally reflect their proximity to acquirable subsistence resources. The sites are distributed among three particular areas characterized by differing natural landscapes: (1) the shoreline terrace (beach) on the south coast; (2) the steep-sided sea cliff on the north coast and; (3) inland among lava tubes and *kipuka* in pahoehoe lava surrounded by the dominant a`a flow. A low site density occurs at the center of the coastline and almost no sites are located on the a`a flow encompassing much of the central portion of the project area. The south coast clustering constitutes the northern fringe of the Kaawaloa settlement.

In the coastal zone, permanent habitation sites are clustered along the south bay area, where the coastline provides suitable access to the ocean and perhaps most importantly canoe landings. Other functional sites types occur in association with the south coast cluster of permanent habitation sites, such as complexes of burial monuments (*e.g.*, Site 50-10-47-1960); a Holua slide (-17207); the *makai* end of the main *mauka-makai* trail in Keopuka (-7728); and intermittent occurrences of lava excavations (probable agriculture pits). Temporary and recurrent habitation sites also occur behind the coastal sites.

The north portion of the coast, being dominated by a sea cliff, has limited areas where ocean access can be gained. Seemingly as a response to this restricted landscape, only two permanent habitation sites are located there among prominent niches in the sea cliff that provide access to the sea. A scattering of short-term habitation shelters predominate along the sea cliff and immediately inland among a large concentration of lava excavations (Site 50-10-47-17172) (interpreted as agricultural pits). The agricultural features cover most of the pahoehoe lava terrain that essentially constitutes the point of Keopuka land (Keawekaheka Point) that forms the sea cliff of the north coast.

The distribution of sites inland within the intermediate zone form a distinct linear, *mauka-makai* pattern that follows the natural course of lava tube formations and pahoehoe lava *kipuka*. Lava tubes utilized for both short-term (temporary and recurrent) and permanent occupation, and burial placement, comprise roughly 60 percent of the intermediate zone site types, with the remaining types associated with *mauka-makai* travel (trails, *ahu* and temporary shelters), and only one site is

attributable to agricultural activities - an endeavor that appeared to be restricted to a single gully formation made up of older a`a lava material.

In the upland portion of the project area a predominance of agricultural sites, associated with a few habitation sites, were identified (Rosendahl and Jensen 1989). As in the Intermediate Zone, this upland portion of Keopuka is dominated by the a`a flow, and as a result the agricultural landscape differs greatly from the classic field system "type" (*e.g.*, Kona Field System) identified in more expansive soil areas in Kaawaloa *Ahupuaa* to the south and Onouli to the north. The agricultural sites are characterized by "agricultural pits", terraces, and mounds most of which seem to be clustered near the south boundary of Keopuka. Rosendahl and Jensen describe the upland landscape of Keopuka (the southeastern portion of the actual project area) as "an uneven a`a substrate". A trail section (Site 50-10-47-11305) oriented east-west was also identified near the south boundary of Keopuka and likely represents the upland extension of the *mauka-makai* trail recorded between the coast and Intermediate Zone (Site 50-10-47-17216).

The Upland Zone of the project area contains evidence of intensive, dryland agriculture that is distinctive when cultivating in predominantly lava landscapes. But the number of agricultural features and proportion of the landscape modified is clearly meager in comparison to other agricultural landscapes at this elevation, such as the extensive field complexes and apparently sizable upland settlements identified in the neighboring Kaawaloa and Onouli *Ahupuaa*. Thus, it may be posited that Keopuka, as an independent land division, did not have the natural resources, mainly productive agricultural lands to sustain a large populace at the coast. This may explain why a relatively small permanent settlement developed at the coast and why only a few permanent residences in the Upland Zone were necessitated to maintain the limited crop lands.

Significance and Recommendations

An important aspect of the survey was to provide functional interpretations and to apply an initial assessment of significance. The functional interpretations were established on the basis of structural characteristic and in some cases associated artifacts, in conjunction with external correlations with other archaeological studies and interpretations in the general region. Additionally, limited subsurface testing was performed to provide important information regarding the likely function of the sites and chronological information. All collected artifacts and midden underwent laboratory analysis to assess age with dating results. Artifacts collected from the project area were placed in temporary curation until a location is chosen for permanent curation by the landowner in agreement with the SHPD/DLNR.

Significance Assessments

The initial significance assessments are based on criteria established by both the Hawaii and the National Registers. To be significant, an historic property shall through design, construction materials, workmanship, feeling and association meet one or more of the following criterion:

a) Be associated with events that have made an important contribution to the broad patterns of our history;

b) Be associated with the lives of persons important in our past;

c) Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

d) Have yielded, or be likely to yield, information important for research on prehistory or history;

e) Have an important traditional cultural contribution or value to the native Hawaiian people or to other ethnic groups of the State.

Appropriate procedures have been followed to identify and gather sufficient inventory information to make an initial assessments regarding a site significance, the report have been prepared and submitted to SHPD/DLNR for its "consensus determination." The complete report of the archaeological studies, which include general background information, archival research, analysis, site descriptions, and significance evaluations, and selected site maps is included as Appendix I-1 and I-2.

During the inventory surveys, 95 archaeological sites were identified in the Keopuka project area. With exception to two historic roads (Site 10290 and 17189), the identified sites are believed to be associated primarily with prehistoric and maybe early historic use. These sites include a range of functional types: habitation (short-term and permanent), recreation, agricultural, *heiau*, burial, and trails. From this list of 95 sites, 26 sites were recommended for preservation, 44 are recommended for Data Recovery, and 11 sites recommended for Data Recovery with any burial components discovered recommended for preservation; and 14 sites are recommended for no further work.

By way of preservation within the project area, the following general recommendations were presented by the consulting archaeologists:

Preservation of all burial sites. Those sites listed as probable burials should be favored for preservation if burials are found during testing.

Preservation of all heiau and sites cited as possible heiau.

Preservation of all lava tube sites with archaeological features, those containing burials.

Preservation of selected examples of multi-component habitation sites mauka of the Conservation Area

Selective preservation for Old Government Road (site -10290) and the *ahupuaa* boundary walls.

Recommended treatment of sites may change as a result of further study through data recovery. For example, burials may be uncovered during excavations. In this case, preservation would be the favored alternative. Information on functional associations may

also be generated in data recovery, which could change the presently recommended treatment.

Preservation treatment should be in accordance with a Preservation Plan submitted to the SHPD/DLNR and Hawaii County for review and approval. The plans should have arrangements for short-term and long-term preservation.

Only one site (1949) in the project area was identified as an agricultural *heiau* (Feature A) and an associated feature as a possible recreational *heiau* (Feature B), based on size, presence of formally structured surface area, elevated surface (suggesting altars), and internal features. All the *ahu* are identified as markers (i.e. for trails) and none were considered to be fishing or other shrines.

In the project area are five lava tubes (11302, 14190, 17217, 17225, & 17235) that had multiple functions, including burials, and one has refuge-related features.

Potential Impacts

Direct impact to archaeological sites located within the project boundaries would primary be a loss of those sites not designated for preservation due to excavation and construction, however, the proposed project facilities have been carefully sited to avoid significant archaeological sites and features.

The preparation of acceptable detailed treatment (mitigation) plans will be submitted for review and approval by SHPD/DLNR. The Hawaii Island Burial Council will also need to approve the proposed burial treatments. The proposed treatments will address in historic preservation plans which will include buffer zones, and both interim and long-term protection measures. It is considered that once SHPD agrees in writing with the plan(s), that the project would result in a "no adverse effect" to the significant historic sites.

Mitigation Measures

Mitigation of significant historic sites generally takes one of two forms: 1) preservation, or 2) data recovery. Preservation is accomplished either through site protection as is, or through the development of an interpretation program.

To mitigate potential impacts to the historical/archaeological resources of the project area, the recommendations of the consulting archaeologist which are subject to the approval of the SHPD/DLNR will be followed by the developer. All of the known burials are proposed to be preserved in place. Possible burials will be tested to determine if human material is present or preserved in place.

Buildings, road, and infrastructure have been planned to avoid all sites noted for preservation, including adequate buffer zones. Interpretive preservation would be determined as part of the regulatory approval process, in conjunction with the recommendations of the SHPD/DLNR, Hawaii Island Burial Council, the State Na Ala Hele Trials Advisory Group, and other resource groups. The Mitigation Program for archaeological sites, including plans for site preservation will require

approval by the County Planning Department in conjunction with the SHPD/DLNR prior to issuance of a grading permit for any portion of the proposed development. The developer and consulting archaeologist have been and will continue to work together with local historians, resource persons, and community groups in gaining a full appreciation of the historical and archaeological resources of the project area. It is the developer's intent to incorporate these features into the proposed project through historic parks and interpretive programs, linked with an extensive pedestrian trail system.

Among the sites that are recommended for selected preservation is the Old Government Road (Site -10290). Subject to the approval of the appropriate State and County agencies, the Old Government Road is proposed to be restored and maintained, including restoration to its original condition and clearing and control of vegetative overgrowth. At points where the re-created trail intersects the project roads, appropriate signage and alternate pavement treatment can be used to provide continuity through the project site. It is noted that although "King's Trail" is a common name used for this trail, it is perhaps more properly referred to as either *Ala Loa* (Long Trial) or *Ala Aupuni* (Government Road). Another site slated for selected preservation is a portion of the *ahupuaa* boundary walls (Sites 50-10-47-11272 and -11274).

In data recovery, sites have a reasonable amount of their significant information recovered through documentation. Many of the indirect impacts to the significant sites to be preserved can be mitigated to a great degree by access control related to the proposed trial system, which would provide access to the more durable and appropriate sites, as part of an overall interpretive program.

5.2 CULTURAL IMPACT ASSESSMENT

An assessment of cultural impacts for the Keopuka project was conducted by Scientific Consultant Services (SCS) and is included for reference in Appendix I-3 of this document. In evaluating and documenting the traditional cultural properties and assessing potential cultural impact, SCS used the following guidelines: 1) guidelines recommended by the Environmental Council and recently adopted by the State; 2) guidance from the State Historic Preservation Division in the form of the Draft Procedures for Ethnographic Inventory Surveys; and 3) several publications of the National Park Service pertaining to the identification and documentation of cultural resources, including National Register Bulletin No. 38, which was developed to aid in determining whether properties thought to have traditional cultural significance are eligible for inclusion in the National Register.

The scope of the Cultural Impact Assessment included archival, background and ethnographic research; a synthesis and assessment of the findings of applicable archaeological work; and identification and consultation with a number of informants who have specific knowledge about the historical individuals living in or associated with the ahupuaa of Keopuka, or of the historical land use in the Keopuka property. A summary of the finding of previous archaeological surveys conducted of the project site is provided in Section, 5.1, Archaeological and Historical Resources. The following provides a summary of the Cultural Impact Assessment and its findings.

5.2.1 Traditional and Historical Overview

The traditional Hawaiian subsistence economy was based on agricultural production, marine exploitation, as well as, animal husbandry, wild plant and bird collecting. Extended household

groups settled in various *ahupuaa*, smaller land divisions within a district, that customarily continued inland from the ocean. Within the *ahupuaa*, residents were able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupuaa* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111).

Traditional Land Use

Direct references to the *ahupuaa* of Keopuka are difficult to find. It is mentioned briefly in a legendary account by I'i describing the feats of an exceptional canoe paddler, Akalele, while racing down the Kona coast with the double canoe's of King Kamehameha. I'i says: "...After they passed Keopuka and reached Kalaemano at Kaawaloa, they again turned shoreward." (1959:131-2).

It can be assumed that settlement patterns and land use of Keopuka was the same as those of other South Kona *ahupuaa*. Much is known concerning the history and land use of Kaawaloa directly to the south and, in addition, extensive historical and ethnographic research has been conducted of *ahupuaa* to the north between Keauhou and Kaawaloa, providing a foundation for interpretation of cultural activities in Keopuka (Smith and Maly 1999).

Previously conducted archaeological, ethnographical and historical studies have confirmed the importance of Kona both religiously and politically (Kirch 1985:161). Attractive to the *alii*, Kona, and more specifically Kaawaloa, had become a place of residence of paramount chiefs of Hawaii long before the time of Umi (1400s). Its close association with the rituals and celebrations of Lono (who was associated with agriculture and fertility in Hawaii) and the Makahiki season brought, at least annually, a vast number of *alii* with their entourage to Kona (Handy, Handy and Pukui 1972:522). An immense field system, excellent fishing grounds, and fishponds, supported the large population centers along the Kona coast such as Honaunau, Kaawaloa, Kailua, and Keauhou, and produced one of the most complex societies and powerful cheifdoms in Polynesia (Newman 1970; Kelly 1983, Schilt 1984; Kirch 1985:167; 1994:321).

Several miles down the coast from Keopuka was the religious center of Honaunau. This sacred site was of the greatest significance containing three *heiau* within its walls, one of which contained the *iwi* of the paramount chiefs descended from Umi and Liloa (Kirch 1985:166). A *puuhonua* (place of refuge) in ancient times, it was associated with the residences of chiefs and priests. Areas outside the sacred wall of the *puuhonua* were densely settled.

The presence of four *luakini heiau*, constructed by paramount chiefs only, the sacred complex at Honaunau, and residences for a ruling chief and his followers at Kaawaloa, indicates strong economic power. This is evidenced in the Kona and Kealakekua Field Systems, which had to be supported by a large resident population (Kolb 1991:15, 18; Kirch 1985:167).

Land Tenure

Handy and Handy have described several traditional planting methods practiced in the Kona area (1972). They report:

> Kona, like eastern Maui, with its decomposing lava mixed with humus and with intermittent rainfall which soaks away quickly in the porous soil and rock, is ideal for sweet-potato cultivation. Sweet potatoes were the staple in lowland localities where there was sandy soil, as in Kailua, Honaunau, Kealia and Ho'okena (*ibid.*:526).

Higher elevations (1,000 to 3,000 feet above mean sea level) supported dryland taro which were still being cultivated in the 1930s. A resident of South Kona related a taro planting method that utilized the warmth of lower elevations for quick initial growth and then transplanting them in the higher forest zone for their second period of growth. The taro corms reportedly averaged 25 pounds each (*ibid.*:525).

Handy reported that South Kona's agriculture was determined by rainfall and moisture (1940:116). Sweet potato and coconuts were successfully grown in sand or soil among the lava near the shore where rainfall and moisture were the least. Small bananas and poor cane subsisted to approximately 1,000 feet becoming more prolific up to 3,000 feet, and breadfruit were planted between 1,000 and 2,000 feet.

Indeed, early historical records indicate that during the Mahele, four environmental zones were claimed necessary to support the traditional lifestyle (Kelly 1983:47-50, 52). While discussing central Kona settlement patterns, Cordy suggests the shoreline as an additional environmental zone (1995). This land section, extending from the ocean to approximately 600 feet, was previously not considered as part of the cultivated land. The immediate shoreline typically contained the majority of permanent house sites within the *ahupuaa*.

The Kona Field System

An important component of land use in Kona was the Kona Field System (50-10-37-6601). This "...extensive and monumental work of ancient Hawaii" (Soehren and Newman 1968, Newman 1970) originated north of Kailua and continued far south of Kealakekua, determined by environmental factors. It was this immense agricultural system that made large settlements tenable. Agricultural fields extending from the coastal region, up to three miles inland, supported villages and the frequent large parties of visiting *alii* (Kelly 1983; Schilt 1984).

The exact age of the field system is unknown, however, oral traditions and legends refer to the time when Pili-a-ka'aiea was sovereign chief of all of Kona (1300s) describing large, regional upland plantations among which are the agricultural features of Kuapehu, Nauluoweli, and Keomo, which extended from Maihi to Kealakekua including Keopuka, as well as features. trails, religious structures, coastal and upland occupation, and fishing zones of the region (The Heart Stirring Story of Ka-Miki, translated by Maly 1992-1993; 1993:16). These ancient gardens are undoubtedly the precursor to, and included in, what is now referred to as the Kona Field System.

While correlating aerial photography with various descriptions in historic accounts and journals, T. Stell Newman was able to identify and classify the planting areas of the Kona Field System into subzones based on elevation, rainfall and crop types (1970):

Kula/Coastal Area
Elevation: Sea level to 500 feet (0-150 m.)
Annual Rainfall: c. 30-35 in.
Sweet Potato, gourds, and *wauke*, grown in very rocky areas

Kaluulu/Seaward Slope
Elevation: 500-1000 feet (c. 150-300 m.)
Breadfruit, with sweet potato and *wauke* interspersed; mountain apple, and some taro

Apaa /Upland Slope
Elevation: 1000-2500 feet (300-750 m.)
Annual Rainfall: c. 55-80 in.
Taro in upper portion, sweet potato in lower portion, field boundaries planted with *ki*, and sugarcane

Amau /Upland Jungle
Elevation: 2500-4000 feet (750-1200 m.)
Annual Rainfall: c. 80 in
Banana and plantains planted just below and within the forest

The *ahupuaa* of Keopuka contained three of these subzones, the *kula*, *kauulu*, and *apaa* and identified archaeological remnants of the Kona Field System in the upper portion of the *ahupuaa* (Rosendahl and Jensen 1989; Walker and Rosendahl 1990).

Historic Land Use

Keopuka was set aside for the Government by Kamehameha III, allowing the fee simple sale of its land. No LCAs were claimed in the lands of Kepuka. A search of Ahupuaa Boundary Records resulted in no boundary description or documentation for Keopuka Ahupuaa (Waihonaaina Corporation, 1998, Mahele Database, Honolulu, Hi.). As government land, sections of Keopuka could be purchased outright. Four individuals bought and received five land grants in Keopuka: Awahua purchased Grant 2862 (145.50 acres), D. Barrett purchased Grants 1584 (38.5 acres) and 148 (83+ acres), J.D. Paris purchased Grant 1161, and P. Cummings purchased Grant 1171 (96 acres).. The balance of the *ahupuaa* remained with the government

In Kona throughout the first half of the 19th century, introduced food plants were cultivated mainly for provisioning the whaling and sandalwood ships, and to satisfy the newly acquired taste of the *alii* for such fare. Slowly, gardens previously planted with taro and sweet potato began to nurture foreign cultivars including cabbage, melons, onions, oranges, beans, coffee, corn, pineapple, Irish potatoes and pumpkin (Schilt 1984:24).

In addition, Kona lands were used for macadamia nuts, cotton, tobacco, and sisal. In fact, cotton was grown successfully in a`a with little or no soil. Areas that had formerly been in *wauke* and sweet potato were turned into thriving, albeit short-lived, cotton plantations. Sisal was cultivated before 1898 for its fiber. Coffee was a major cash crop starting as early as 1841 at Kealakekua. The plants were best in the same zone where upland *kalo* had previously grown, approximately 800 to 1,700

feet above sea level, the healthiest and most fruitful being those grown in the shade of *kukui* trees (Kelly 1983).

Land use in Keopuka reflected the same patterns. Henry Nicholas Greenwell settled in Kona in1850. Purchasing newly available land from the government, he farmed crops, was a coffee broker, sold hides of wild goats and cattle in Honolulu, and started dairies in the upland forests to produce butter. Eventually he was appointed School Agent for Kona and Collector for Customs at Kealakekua Bay. Extensive land purchases established him as the owner of the largest cattle and sheep ranch in Kona. Greenwell's journal entries and newspaper notices from the 1800s supply occasional references to activities and occupants in Keopuka (Kona Historical Society records). Much of this information is included below (pers. Comm. Jean Greenwell).

John Young, trusted advisor of Kamehameha I, referred to Awahua (Grant 2862) as an "overseer" or *konohiki* for Keohokalole, the mother of Kalakaua and Liliuokalani. In a notice published on May 3, 1862 in *Ka Nupepa Kuokoa*, Awahua warns others in Onouli and Keopuka to keep their animals off his land and not to take the crops he had been growing. Unfortunately, the type of cultivars and the location on his property are not known. Another notice in the same newspaper five months later from Charles Kanaina (father of the future king, Lunalilo), informed people of Awahua's death and, that as of July 1, 1862, he had leased Awahua's lands intending to use them. Awahua willed his land in Keopuka to Likelike (mother of Princess Kaiulani) and to his wife, who in turn sold the lands to Charles Kanaina in 1863. Kanaina then sold the land back to Likelike in 1871.

Awahua's land grant was sold by Likelike and her husband Archibald Cleghorn in 1875 to Mr. A. Todd, who, in 1896, sold portions of it to Renee Rodant. Mr. Rodant, in turn, sold to Kona Vineyard, suggesting a wine making enterprise for which no records have been located. Land sections from the original grant remained in the Todd family into the 20th century. After 1940, Grant 2862 and portions of Graint 1162 in Kaawaloa were acquired by the Greenwell Estate (Hammatt *et al.* 1995).

Born in Wiltshire England, Daniel Barrett arrived in Hawaii in 1835. He was described by Rev. Paris as "...a gypsy from old England that had been left in the Island sick, but was now well" (1926:13,16). He married twice and had his residence in Keopuka. Although his occupation had been a ships carpenter, he became a coffee farmer with his lands being located in the wetter *apaa* subzone, perfect for such crops. He died in 1893 at 90 years of age. Barretts's Keopuka land was later bought by a Joseph Conradt.

In 1840, Reverend John Davis Paris and his wife arrived in the Ninth Company of American Missionaries. They were the first missionaries to be assigned to the Kau District which was considered the most unaccessible station in the islands (Cahill 1996:41). By the 1852, he and his second wife Mary (the first wife having died earlier) had moved to Kona where he had purchased some land in Keopuka (Grant 1161). Reverend Paris remained in Kealakekua until his death in 1892.

P. Cummings (Grant 1171), born in 1811 (died in 1866), was from Massachusetts and had been a captain of a whaling ship before settling in Hawaii. He married and settled in Kona around 1845.

Cummings had quite a varied career including having been Deputy Sheriff of the province and a member of the House of Representatives from 1855 to 1856. He seems to be best known for engaging in "mercantile pursuits," having established a stone store at Kealakekua Bay. He was the "collector of the port," and the only foreigner living in Kaawaloa in 1861. He grew coffee on his lands as well as harvesting his upland trees. Several letters refer to the yearly fees for a person cutting timber and an 1854 letter to a Mr. Sheldon concerning stripping *koa* bark. It is known that J. Atkins who owned Grant 969 in Onouli adjoining Cummings woodland grant was engaged in harvesting timber from the *koa* and *ohia* trees and it would seem that Cummings also engaged in utilizing this important economic resource.

Another resident of Keopuka was Richard B. Neville, who purchased Grant 1171 from Cummings. He became sheriff but H. N. Greenwell, a resident of Kona since 1850, called him a "cane grower" (H. N. Greenwell Journal, 1869). Greenwell still referred to Neville's land on the *mauka* side of the government road as "woodland" and mentioned the use of a road from the woodlands to Kaawaloa from where materials were brought by mules for the building of a house for a shoemaker. Greenwell eventually purchased the *mauka* land, as well as Neville's house in 1884, two years before Neville was tragically killed in an uprising in Kona while performing his duties as sheriff (Greenwell 1987).

Thomas Jagger, a well-known Hawaiian volcanologist, owned a land parcel next to the Onouli boundary of Keopuka. Apparently, he purchased the land from the Henriques who did some ranching. The most recent activities within this *ahupuaa*, including portions of Keopuka has been cattle ranching in the upper sections by the Henriques Family .

The upper most section of Keopuka presently contains macadamia and some coffee cultivation. A narrow strip along Mamalahoa Highway, contains houses and shops. The lower section contains barren fields of ʻaʻa and pahoehoe with some vegetation in the higher elevations.

5.2.2 Informant Interviews

Six individuals agreed to participate in interviews contributing their knowledge of Keopuka Ahupuaa and its environs in an effort to identify any traditional cultural properties.

In general, although all the interviewees had been within the boundaries of Keopuka at one time or other, none had lived permanently within its borders with the exception of one family who rented a parcel of land for agriculture and to which they eventually moved.

The topography coupled with the dry, hot lava fields in the lowlands with little soil and no readily available water source is not conducive to cultivation or permanent year round habitation. Indeed, several participants stated that to their knowledge no one had lived in the coastal region. It was suggested that fishermen might camp for several days at a time, as they still do now, resulting in temporary structures. The fishing was good along the coast and several of the participants as children living upland, along the Mamalahoa Highway, would walk down to the cliffs to fish for the day and then hike home.

In the 1920s there were two families and one, lone Japanese fisherman living in nearby Kaawaloa where there was a brackish well to provide some water. The men and boys would venture along the

coast of Keopuka to fish for their families and the women would sell the excess to the plantations in the uplands along the highway. This, along with seasonal coffee picking (which included all able family members), provided the needed income to support a household.

From the 1920s into the 1950s, the old wagon road crossing Keopuka from north to south provided passage for people traveling to Kainaliu and beyond but was used most frequently for driving cattle from Onouli to Kaawaloa for shipment to Honolulu. The steep Kaawaloa road, improved upon in the 1850s, and that briefly intrudes into Keopuka, was and is the main pedestrian access to the coast. In the early 1900s, the daughters of J.D. Paris turned the family home near the highway into a little hotel- the first in Kona.

The uplands received more rain and was cooler, making it more conducive to a greater variety of activities. Coffee plantations along with other agricultural endeavors were located on the upper slopes and along the highway. Water was always difficult to obtain in Kona and the catchment system provided the only water supply until the 1950s. When droughts occurred it was necessary to ration water or bring it all the way from Waimea. Ranching on a small scale, or pasturing a few cows, was also conducted in some upland sections, although most of the best ranch land was situated above the highway on the slopes of Hualalai. Several dairies were established in the higher elevations where butter was made and then brought to the stores for sale. As the herds grew in size and the natural water holes in the mountains were not enough, a system of pumps were installed that brought water from coastal areas to a large catchment shed on the mountain. Gravity would then disperse the water through pipes, to the different paddocks located lower on the slopes of the mountain.

On the relatively fertile belt adjacent to either side of the Mamalahoa Highway, small plots of land were rented to individuals for cultivation of vegetables and other cultivars for family and commercial use. Crops not demanding a lot of water, such as orange trees, were planted in the early 1800s. Vineyards were established by a few of the Portugese families mainly for their personal use. Homes were Interspersed throughout the plantations and some shops were located adjacent to the road.

5.2.3 Association with Adjacent Kaawaloa and Captain Cook

Portions of the Keopuka south boundary fall within the Kealakekua Bay Historical District (National Register No. 10-47-7000), established in 1973. This designation also encompasses the State DLNR's Kealakekua Bay State Historical Park. Figure 14 depicts the limits of the National Register of Historic Places boundary which includes the State Park.

5.2.4 Cultural Assessment

The State's Procedures for Ethographic Surveys (Draft) defines a traditional cultural property as:

"Any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in a community's history and contribute to maintaining the community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those

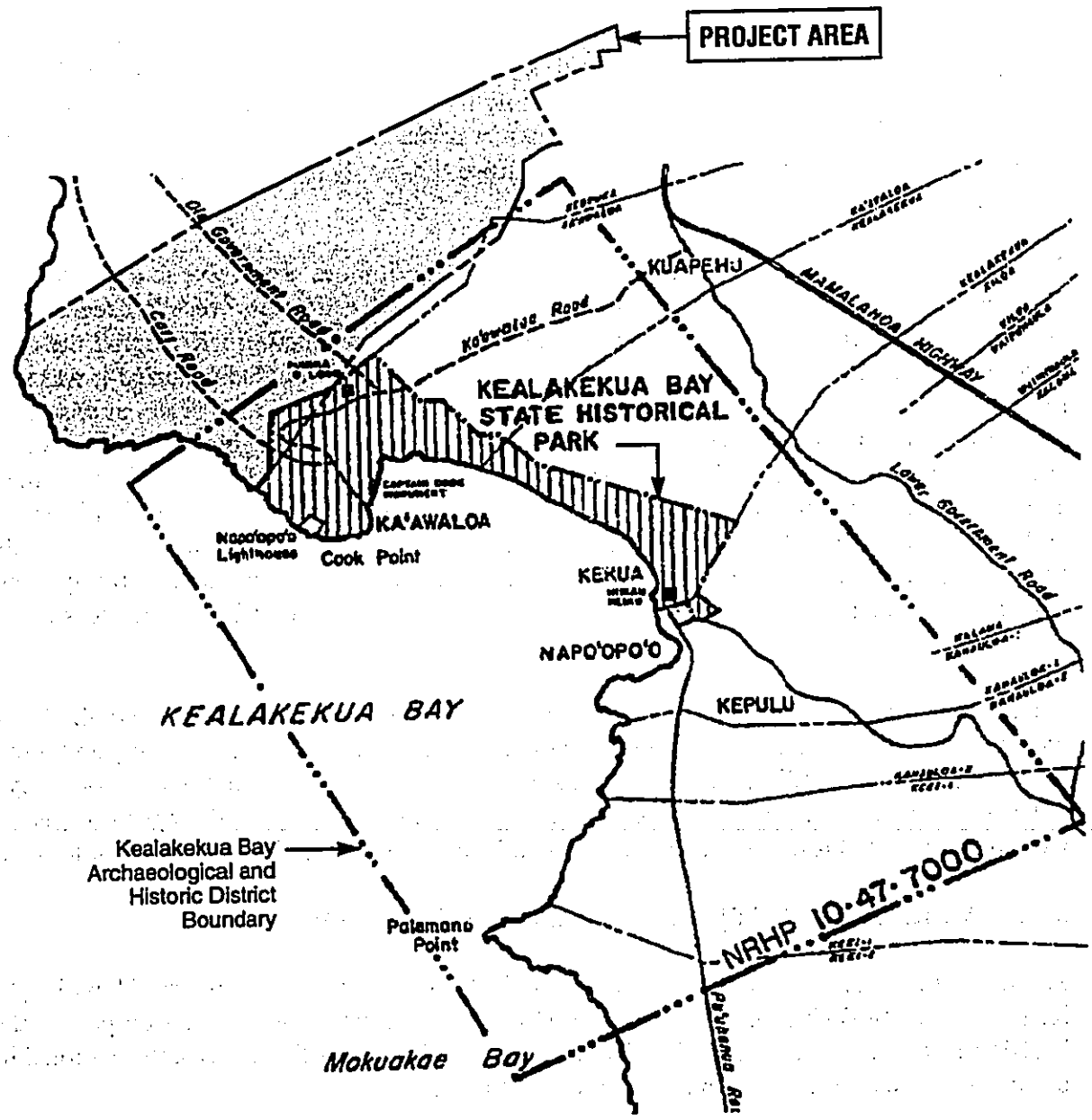

FIGURE 14

Kealakekua Bay
Historic District (No. 10-47-100) /
Kealakekua Bay State Historical Park

KEOPUKA LANDS

LEGEND

Project Area

Source: State of Hawaii DLNR, Division of State Parks

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documented in historical source materials, or both. These properties include but are not limited to, some types of archaeological sites."

Based on the background, archival and archaeological research, and on the ethnographic interviews of individuals recognized as knowledgeable, long-time residents of the Kona area, the Cultural Impact Assessment did not identify any specific traditional cultural properties as defined in the Criteria for evaluation. Presently, the only known culturally significant sites are the archaeological features that have been identified throughout the project area. Mitigation of these resources are discussed within the various archaeological site reports (Appendices I-1 and I-2) and the preceding section on archaeological and cultural resources..

5.3 ROADWAYS AND TRAFFIC

A traffic impact assessment was prepared for Keopuka Lands by M&E Pacific, Inc. The study includes a description of the existing roadways and traffic conditions at the project site and its surrounding area. The potential impact of the project on future traffic conditions is assessed in this section, as well as any recommended mitigative measures to minimize effects on traffic and transportation. The Traffic Impact Analysis Report (TIAR) is included in Appendix J.

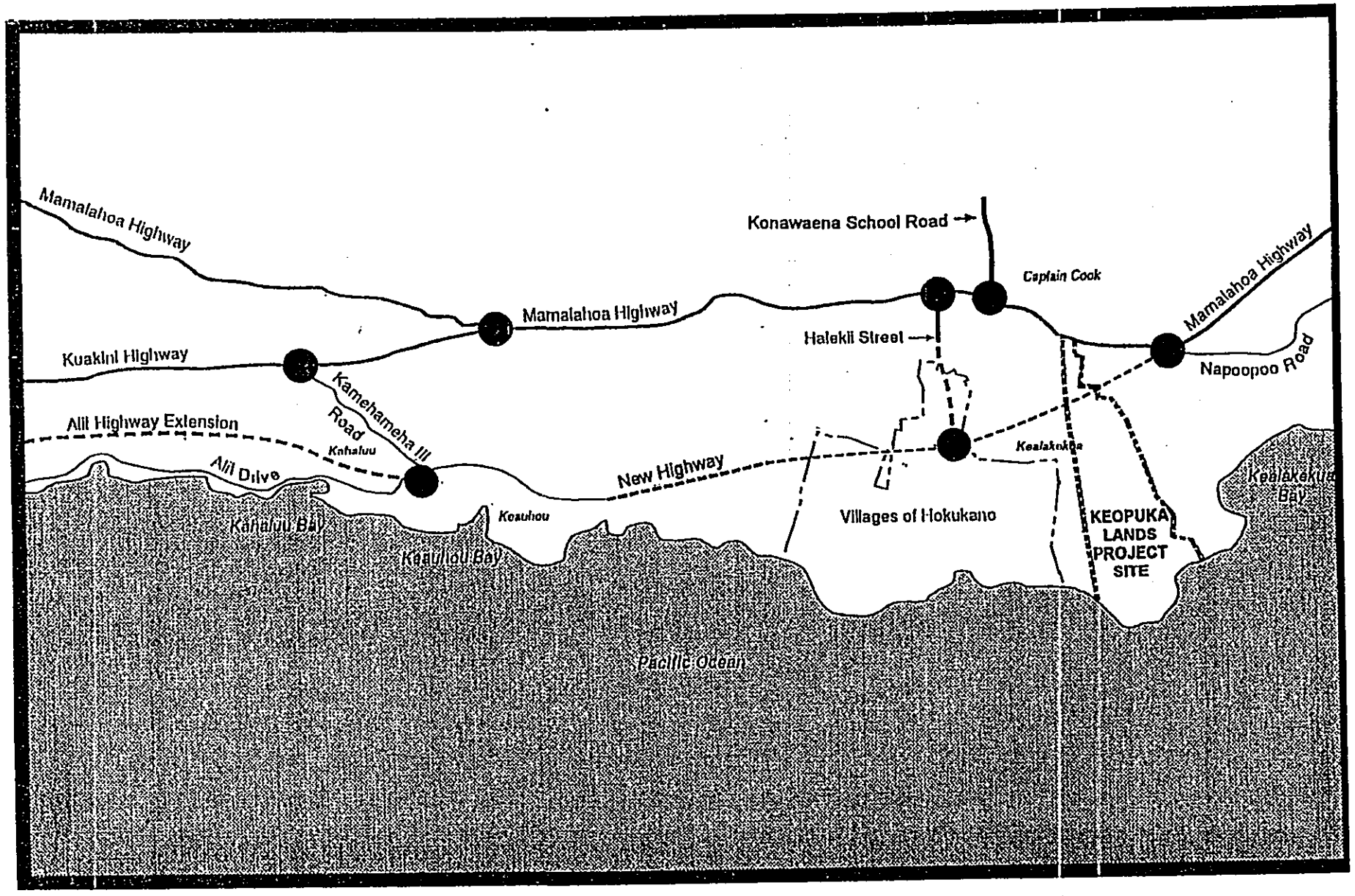
Existing Conditions

The proposed project is surrounded by a largely rural community consisting of dwelling homes, and recreational and agricultural uses. Vehicular access is presently through an unimproved roadway connecting to Mamahaloa Highway. Exclusive access to the site would be from the proposed Mamalahoa Highway Bypass roadway, which would bisect the project into a large makai parcel and a smaller mauka parcel. Access onto Mamalahoa Highway would be reserved for emergency purposes or as an alternate service entrance.

Roadway Conditions. The TIAR study area generally was bordered by Kamehameha III Road to the north, Kuakini Highway/Mamalahoa Highway to the east, Napoopoo Road to the south, and the Mamalahoa Highway Bypass roadway to the west. Figure 15A shows the project site in relation to these roadways and key intersections.

Kuakini Highway and Mamalahoa Highway are the main north-south roadways on the Kona coast. Kuakini Highway extends from Kailua-Kona to its terminus Honalo where it intersects with Mamalahoa Highway. Mamalahoa Highway then provides the only north-south connector road in this region. This corridor is primarily a two-lane arterial with left turn lanes at sected intersections. South of Kuakini Highway, Mamalahoa Highway is a narrow, winding two-lane road. The Kuakini Highway-Mamalahoa Highway intersection is not signalized and the right and left turn approaches of Old Mamalahoa Highway are separated by an island median.

The Alii Highway currently begins as a continuation of Alii Drive north of the Keauhou Shopping Center. It continues south past the Kamehameha III Road intersection and terminates by the



LEGEND

● Study Intersections

Source: M&E Pacific, Inc.

FIGURE 15A

Roadways in the Project Area

KEOPUKA LANDS

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Keauhou-Kona Golf Course. It is a two lane undivided highway with traffic signals and lane channelization at the Kamehameha III Road intersection. Alii Drive and Alii Highway currently provide a makai travel route between Kailua and Keauhou.

Kamehameha III Road is a two-lane undivided roadway that provides a connection between the mauka Kuakini Highway and the makai Alii Highway. The Kuakini Highway intersection is signalized and channelized. Walua Road, which serves a residential area, is the mauka approach to the intersection.

Halekii Street is a two-lane mauka-makai connector roadway between Mamalahoa Highway and the Kona Scenic subdivision. Its intersection with Mamalahoa Highway is channelized with traffic signals installed subsequent to the completion of the previously cited highway study. The roadway also serves a post office and commercial center on the southwest corner of the intersection. This roadway is proposed to be extended makai to connect with the proposed Mamalahoa Highway Bypass roadway. .

The Mamalahoa Highway at Konawaena School Access Road intersection is signalized, and has separate turning lanes.

Napoopoo Road is a substandard roadway that provides access to the makai communities. Its intersection with Mamalahoa Highway is at an up grade, stop sign controlled, at a nonright angle, and has space for separate left and right turn lanes. At this point Mamalahoa Highway is at about a 4 percent up grade to the south and there are no turning lanes in either direction.

Observed Traffic Conditions. The State Department of Transportation takes metered traffic counts every two years at selected roadway sections on Hawaii. Traffic counts were taken at four of the six existing study intersections:

Kuakini Highway at Kamehameha III Road
Kuakini Highway at Mamalahoa Highway
Mamalahoa Highway at Napoopoo Road
Kamehameha III Road at Alii Highway

The daily traffic volumes for the latest available counts taken in 1998 as shown on Figure 15B rounded to the nearest hundred. These daily traffic volumes showed different trends when compared to their respective 1996 traffic volumes. Volumes on Kuakini Highway decreased 15% north of but increased 10% south of Kamehameha III Road. Volumes increased by 5% at the Kuakini/Mamalahoa Highway intersection. Volumes on Mamalahoa Highway did not change north of Napoopoo Road but decreased 6% south of the intersection. Traffic volumes on Alii Drive/Highway increased by 30% while those on Kamehameha III Road decreased by 12%.

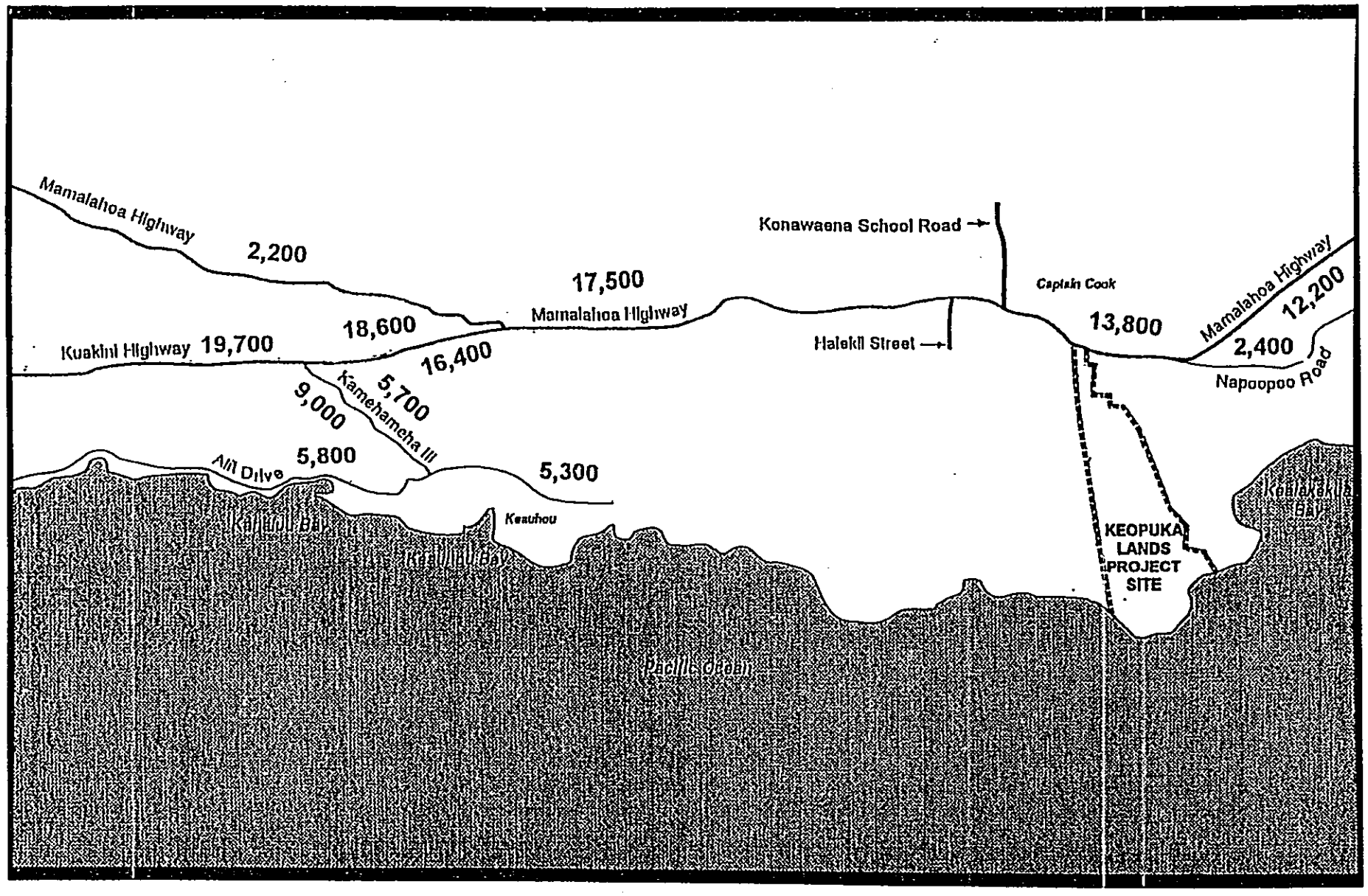


FIGURE 15B

Existing Two-Way Daily Traffic Volumes

KEOPUKA LANDS

Source: State of Hawaii Department of Transportation
Traffic Counts Taken September & October 1998

June 2000

The State DOT traffic counts were supplemented by actual counts of traffic movements at the six intersections during morning and afternoon peak hour traffic. In addtion, traffic counts from an earlier study, "Traffic Impact Study Villages of Hokukano, North and South Kona, Hawaii"

(November 1995) by Parsons Brinckerhoff Quade and Douglas, Inc (PBQD) were also used. The Existing Traffic Volumes are presented in Figure 15C.

Potential Impacts

Development of the agricultural lots is expected to begin in 2005 with five dwellings, and continue at about ten dwellings per year until completion. The golf course is expected to be in play by about 2007. Construction of the first phase of the members' hale is expected to begin in 2006 with 50 rooms. The second increment of 50 rooms is expected to be added after 2010.

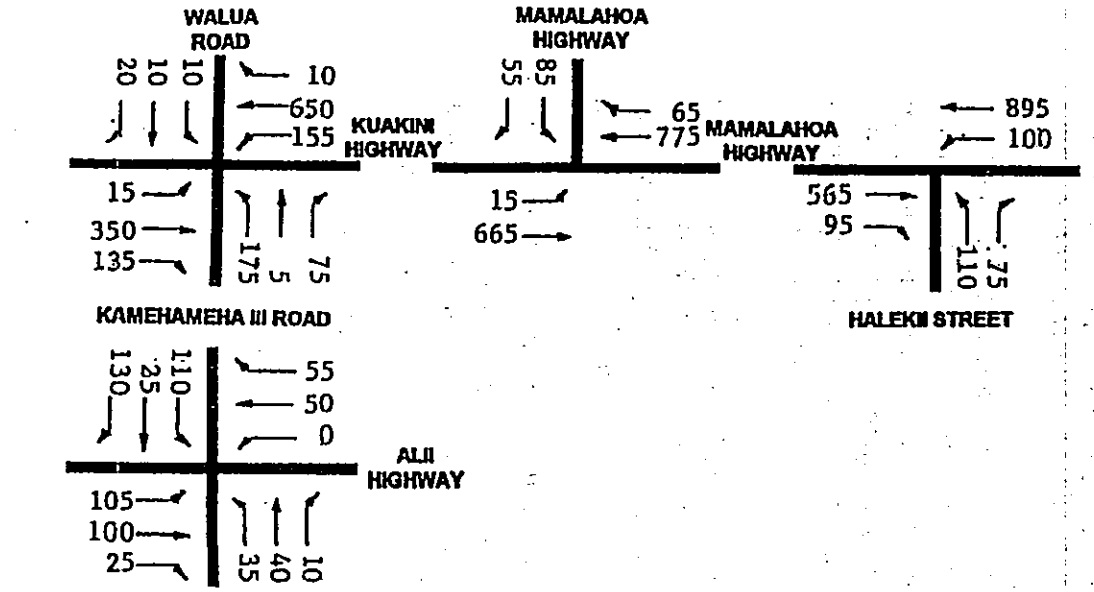
Based on the proposed development schedule, two study years were assumed: 2010 and 2015; representing the first and second phases of the project. The land uses for the first phase included: 65 occupied agricultural lots, the golf course, and 50-unit members' hale. The second phase would represent build-out with 125 agricultural lots, the golf course, and a 100-unit members' hale.

Analysis Methodology. Access to the proposed project would be exclusively from the proposed Mamalahoa Highway Bypass roadway. The traffic forecasts for the highway project from the previously cited M&E Pacific study could be used as the basis for this study. Specifically, the total traffic forecasts for the years 2010 and 2015, respectively, were used as the ambient traffic forecasts for this study. The traffic which would be generated by the Keopuka Lands project were then added to these ambient traffic forecasts to calculate total traffic forecasts.

Future Ambient Traffic. Comparison of the 1997 and 2000 existing traffic volumes indicated that the previously calculated traffic forecasts for the years 2010 and 2015 were reasonable. Although the volume of north-south corridor traffic is expected to increase, traffic volumes on Kuakini and Mamalahoa Highways can be expected to decrease due to traffic diversion to the new bypass roadway. The only change that needed to be made was to increase the turn volumes at the Konawaena Road intersection during the morning peak to match the most recently counted volumes.

Trip Generation. The traditional three step procedure of trip generation, distribution and assignment was used to forecast future traffic which would be generated by proposed project. The trip generation step forecasts the number of new trips which would be produced in the two peak hours. The trip distribution step allocates these new trips by direction of travel. Finally, the trip assignment step assigns the project-generated trips to specific turning movements on the roadway system.

The traffic generation rates used by PBQD in their previously cited study were also used for this study. The Villages of Hokukano proposed the same land uses as this project: agricultural lots, golf course, and members' hale facility but with a majority of agricultural lots.



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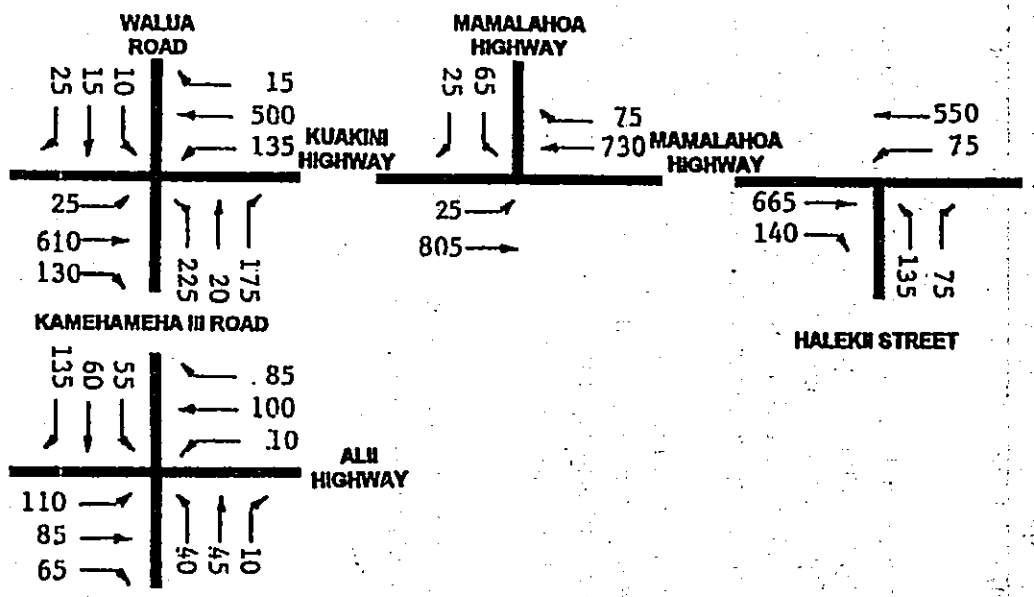
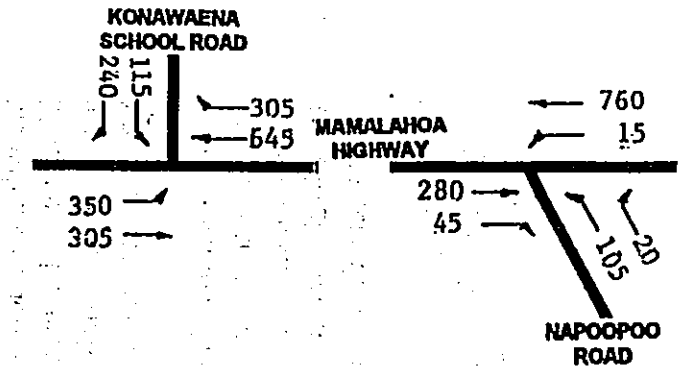


PM PEAK HOUR



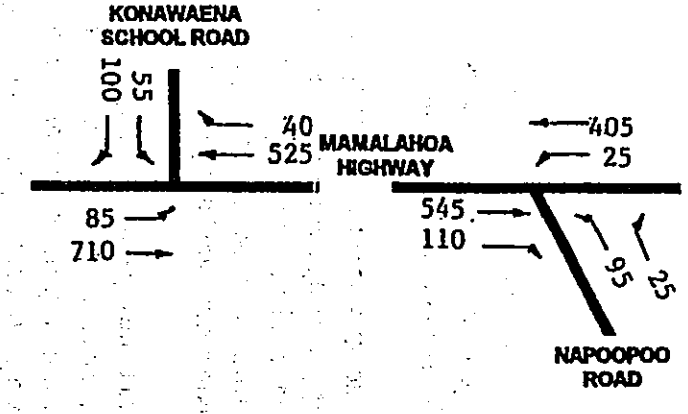


FIGURE 15C
Existing Traffic Volumes
KEOPUKA LANDS

Source: M&E Pacific, Inc.

June 2000

The proposed project is expected to generate 72 inbound and 42 outbound trips in the year 2010 morning peak hour. There would be 52 inbound and 93 outbound trips in the afternoon peak. The golf course would be the largest trip generator in the first phase of the proposed project. With full build out by 2015, there would be 91 inbound and 74 outbound trips in the morning peak and 93

inbound and 125 outbound trips in the afternoon peak. The agricultural lots are expected to generate slightly more trips than the golf course at full build out.

Construction Traffic Impacts. Short-term traffic impacts will occur as a result of construction-related traffic entering and exiting the project.

Traffic Impacts. The traffic volumes in themselves do not give an indication of the quality of traffic flow. The Transportation Research Board has addressed this matter by developing the concept of Level of Service (LOS) as shown in Table 4. LOS is determined by comparing the amount of traffic using a roadway and the amount that the road is designed to carry (its capacity). LOS have values between "A" (Free Flow, when traffic flows with little or no congestion and "F" (Forced Flow, when traffic frequently comes to a stop.) LOS "A", "B", and "C" are considered acceptable. LOS "D" is considered a "desirable minimum" operating level of service. LOS "E" is an undesirable condition and "F" is unacceptable. From an operation perspective, LOS "F" results in traffic queues backing up from downstream intersections, affecting traffic flow at the study intersection.

Table 4. Definition of Traffic Level of Service

Level of Service	Operational Description	V/C* Ratio
A	Free Flow	0.00-0.60
B	Stable Flow (slight delay)	0.61-.070
C	Stable Flow (acceptable delay)	0.71-0.80
D	Approaching Unstable Flow	0.81-0.90
E	Unstable Flow	0.01-1.00
F	Forced Flow	>1.00

V/C is the volume to capacity ration and indicated the relative traffic demand relative to the road's traffic carrying capacity.

Source: Transportation Research Board. 1985. Highway Capacity Manual, Special Report 209. Washington D.C.

The methodology for signalized intersections calculates levels of service for turning movement lane groups, approaches and intersections as the whole based on the average delay. It utilizes factors such as roadway geometry, traffic volumes, and signal timing parameters in its calculations as described in Appendix J.

The methodology for unsignalized intersections calculates levels of service for movements from the side streets and left turns from the through lanes, based on the average delay. It utilizes traffic volume and roadway geometry factors in its calculations.

The above methodologies were used on the existing year (2000) traffic volumes, and ambient and total forecast volumes for the years 2010 and 2015. Per the recommendations of the previous study, the Kuakini Highway/Mamalahoa Highway intersection was assumed to be unsignalized while the Bypass Roadway/Napoopoo Road/Mamalahoa Highway and Bypass Roadway/Halekii Street intersections were assumed to signalized for the forecast conditions. The Keopuka Lands project intersection on the Bypass Roadway was analyzed as both unsignalized and signalized.

Current roadway laneage was assumed for existing intersections. Separate lanes were assumed for each through and turning movement at the Bypass Roadway/Napoopoo Road/Mamalahoa Highway and Bypass Roadway/Halekii Street intersections. For the proposed project intersection on the Bypass Roadway, separate left and right turn lanes were assumed on the Bypass Roadway approaches primarily for safety reasons. The approach serving the makai parcel of the proposed project was assumed to be two lanes while the mauka property approach was only one lane.

The results of level of service for unsignalized and signalized intersections analyses are shown on Table 5 (following page). In general, traffic conditions on Kuakini Highway and Mamalahoa Highway are expected to improve by the year 2010 as through traffic is diverted to the bypass roadway. This analysis focuses on changes between the ambient and total forecast conditions.

There were no changes recorded at the Kuakini Highway/Kamehameha III Road intersection since the trip assignment assumed that a few Keopuka Lands trips would travel through this intersection. Levels of service at the Kuakini Highway/Mamalahoa Highway, Mamalahoa Highway/Halekii Street, Mamalahoa Highway/Konawaena School Road, and Mamalahoa Highway/Napoopoo Road/bypass roadway intersections did not change since few project-generated trips were assigned at these locations. Hence, traffic from the proposed project is not expected to have an adverse impact at these intersections.

The most heavily impacted intersection is expected to be the Alii Highway/Kamehameha III Road intersection, where almost half of the project-generated trips was assigned. This intersection is already expected to be at level of service E during both peak hours in the year 2015 under ambient conditions. The additional traffic in the afternoon peak could create a level of service F condition. To mitigate this problem, the "Traffic Impact Study Villages of Hokukano, North and South Kona, Hawaii" (November 1995) by Parsons Brinckerhoff Quade and Douglas, Inc (PBQD) recommended providing two through lanes in each direction of Alii Highway at the intersection to get the vehicles across, and then narrowing down to one lane again. These improvements were projected to be completed by 2010.

Levels of service at the Mamalahoa Bypass Highway/Halekii Street intersection are not expected to change despite the increase in traffic on the bypass roadway from the proposed project. Hence, there would not be any adverse traffic impact from the proposed project.

TABLE 5

LEVEL OF SERVICE ANALYSIS

DESCRIPTION	2000		2010				2015			
	EXISTING		AMBIENT		TOTAL		AMBIENT		TOTAL	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
UNSIGNALIZED INTERSECTIONS										
Mamalahoa Highway/Kuakini Highway										
Mamalahoa Highway Westbound Right	C	B	A	B	A	B	B	B	B	B
Mamalahoa Highway Westbound Left	F	F	F	E	F	E	F	F	F	F
Kuakini Highway Southbound Left	B	B	A	A	A	A	A	A	A	A
New Highway/Keopuka Access Road										
Keopuka Eastbound Left & Through					C	C			D	D
Keopuka Eastbound Right					A	B			A	B
Keopuka Westbound Left, Through & Right					B	B			C	B
New Highway, Northbound Left					A	A			A	A
New Highway, Southbound Left					A	A			A	A
SIGNALIZED INTERSECTIONS										
Kuakini Highway/Kamehameha III Road	C	C	B	C	B	C	B	D	B	D
Mamalahoa Highway/Halekii Street	B	B	B	B	B	B	B	B	B	B
Mamalahoa Highway/Konawaena School Road	C	B	B	B	B	B	B	B	B	B
Mamalahoa Highway/Napoopoo Road	NA	NA	B	D	B	D	C	D	C	D
Alii Highway/Kamehameha III Road	B	B	C	D	C	D	E	E	E	F
New Highway/Halekii Street	NA	NA	B	B	B	B	B	B	B	B
New Highway/Keopuka Access Road	NA	NA	NA	NA	A	A	NA	NA	A	A
NA = Not Applicable										

The levels of service at the proposed project intersection with the bypass roadway are C or higher, indicating acceptable conditions. Hence, the intersection does not have to be signalized. If this intersection were signalized, it would be operating at level of service A.

Conclusions of the Traffic Impact Analysis. The TIAR concludes that based on the phased development, the low density, and the completion and operation of the bypass road prior to commencement of construction of the Keopuka lands project, the subject project would not have any significant impacts to area wide roadways and traffic for the following reasons:

1. The proposed Mamalahoa Highway Bypass roadway is expected to divert traffic from Kuakini Highway and Mamalahoa Highway, and eliminate or delay the need for several highway improvements on the existing facilities.

2. The proposed Keopuka Lands project is not expected to have an adverse traffic impact on the adjacent roadway system and would not require additional mitigating actions. Any necessary improvements such as installing traffic signals at currently unsignalized intersections when warranted or widening Alii Highway at Kamehameha III Road would be due to increases in ambient traffic and therefore, not the responsibility of this development.

3. The intersection of the proposed project and the Bypass roadway would not have to be signalized.

Mitigative Measures

Based on the TIAR, no mitigative measures are required for the project based on the scale and phased development of the proposed improvements. However, to address potential impacts during the construction phase of the project, the following mitigative measure is proposed:

The number of worker vehicles traveling to and from the site during the heavy construction period will be minimized by the use of trucks and vans to carry workers from construction base yards. If warranted, truck and heavy equipment travel on the highway bypass road will be during non-peak traffic hours to minimize the impact on local and commuter traffic. When warranted during certain construction phases, special duty police officers would be employed to assist in directing traffic and the movement of heavy equipment and supplies at the intersection of the project access road and the Bypass Road.

5.4 NOISE

The findings of the noise quality impact study by Darby & Associates (May 2000) are summarized below; the full report is attached as Appendix K. The study utilizes guidelines of various local and federal agencies including the US Federal Highway Administration, Hawaii Department of Transportation, US Department of Housing and Urban Development, US Environmental Protection Agency, and the State Department of Health.

Existing Conditions

The project area and vicinity are currently exposed to daytime ambient noise levels of 44 to 52 dBA, with the dominant noise sources being wind, birds, and an occasional small aircraft flyover. Along the mauka most edge of the Keopuka Lands, the ambient noise levels are greater than 52 dBA due to the proximity to Mamalahoa Highway.

The measured ambient noise levels, expressed in terms of equivalent sound levels, L_{eq}, and in units of A-weighted decibels, ranged between 44 and 52 dBA which is typical for quiet suburban and rural areas. However, noise levels exceeding these ambient levels, 69 dBA, were measured along the mauka most portion of the project site. These higher levels were due to the proximity of Mamalahoa Highway, 15 feet from the right-of-way, and are not typical of the project site.

Potential Impacts

The noise levels interior to the project site in the vicinity of the proposed Mamalahoa Bypass Road will increase from existing levels due to the construction Bypass. Traffic noise levels, due to the project however, are not expected to significantly increase along the existing roadways in the vicinity of the project.

Project Construction Noise. The dominant noise sources during project construction will probably be earth moving equipment, such as bulldozers and diesel powered trucks. Noise from construction activities will occur on the subject property. The noise from construction activities could impact nearby residences to the east of the project site along Mamalahoa Highway and Kealakekua Bay State Park. Noise from construction activities should be short term and must comply with State Department of Health noise regulations.

Project Generated Traffic Noise. Traffic noise levels corresponding to the morning and afternoon peak hour travel periods were calculated with and without the project. The predicted maximum traffic noise level increase along the assessed roadways due to the project is 0.4 dB at Location 2. The minimal change in noise levels perceptible to the average listener is generally taken to be 3 dB, therefore, the increase in traffic noise due to the project will not be significant. Thus, the noise study concluded that no perceptible change will occur due to the project.

However, traffic noise levels at the proposed Keopuka housing closest to the Mamalahoa Highway Bypass is expected to be 66.2, at 100 feet from the centerline of the roadway, during the afternoon peak hour. This level is in excess of HDOT, HUD, and EPA goals and criteria.

Mitigation Measures

(1) Construction Period

Compliance with existing regulations will mitigate construction noise generated by the project to acceptable levels. State and County regulations have been established to limit construction noise generation. Prior to construction a permit will be obtained from the State DOH for operating

construction equipment, power tools and vehicles which emit noise levels in excess of the allowable limits. Required permit conditions for construction activities include:

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels . . . before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels . . . before 9:00 a.m. and after 6:00 p.m. on Saturday."
>
> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

In addition, construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds, must be equipped with mufflers, and construction vehicles using trafficways must satisfy the DOH's vehicular noise requirements.

(2) Traffic

The Noise Assessment indicates that noise levels within 100 feet of the centerline of the Mamalahoa Highway Bypass may meet or exceed Federal Noise Guidelines for dwellings. These guidelines state that if existing or projected traffic noise levels approach or exceed 67 Leq, appropriate noise mitigation measures should be considered. In order to avoid any potential impact, a minimum buffer of 150 feet from the Mamalahoa Highway Bypass right-of-way will be maintained for all residential structures. The proposed landscaping/buffer area along the Highway, as well as the generous size of the proposed lots in this area (2 to 5 acres) will likely result in an actual dwelling setbacks in excess of 300 feet from the right-of-way.

5.5 AIR QUALITY

An air quality study was prepared by B.D. Neal & Associates to examine the potential short- and long-term air quality impacts that could occur as a result of construction and use of the proposed facilities. This study also suggests mitigative measures to reduce any potential air quality impacts where possible and appropriate. The full report is included in Appendix L.

Existing Conditions

Both federal and state standards have been established to maintain ambient air quality. At the present time, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawaii air quality standards are more stringent than the comparable national standards except for those pertaining to sulfur dioxide and particulate matter.

Except for periodic impacts from volcanic emissions (vog) and possibly occasional localized impacts from traffic congestion, the present air quality of the project area is believed to be relatively good. The little air quality data that are available for the area from the Department of Health indicate that (despite

the vog) concentrations are well within state and federal air quality standards.

Potential Impacts

Development of the project would result in some short- and long-term impacts on air quality either directly or indirectly as a consequence of project construction and use.

Short-Term Air Quality Impacts. Short-term impacts from fugitive dust will likely occur during the project construction phase. To a lesser extent, exhaust emissions from stationary and mobile construction equipment, from the disruption of traffic, and from workers' vehicles may also affect air quality during the period of construction.

Long-Term Air Quality Impacts. After construction, motor vehicles coming to and from the proposed development will result in a long-term increase in air pollution emissions in the project area. To assess the impact of emissions from these vehicles, an air quality modeling study was undertaken to estimate current ambient concentrations of carbon monoxide at several intersections in the project vicinity and to predict future levels both with and without the proposed project. During worst-case conditions, model results indicated that present 1-hour and 8-hour carbon monoxide concentrations are probably well within both the state and the national ambient air quality standards. In the year 2015 without the project, carbon monoxide concentrations were predicted to increase at all the locations that were studied. Concentrations would likely remain well within the national standards but may exceed the more stringent state standards near some high-volume intersections, such as Kamehameha III Road at Alii Drive and Mamalahoa Highway at Napoopoo Road. With the project in the year 2015, carbon monoxide concentrations were estimated to increase very slightiy at some locations compared to the without-project case. Due to the very small impact the project is expected to have, implementing mitigation measures for traffic-related air quality impacts is probably unnecessary and unwarranted. It should be noted that, because the state standards for carbon monoxide are set at such stringent levels, it is likely that the standards are currently exceeded at many locations in the state that have even moderate traffic volumes.

Pesticides Applications. Pesticides will be used to maintain golf course grasses. If applied during low wind conditions using proper application techniques, contamination of nearby, downwind areas by airborne drift should not be a problem. Use of shrouded spray equipment fitted with computerized flow controllers, maintaining a buffer distance of at least 100 feet between target spray areas and populated locations, and planting vegetation screens along populated areas of the golf course perimeter would provide added measures of protection.

Electrical Demand and Solid Waste Disposal. Depending on the demand levels, long-term impacts on air quality are also possible due to indirect emissions associated with a development's electrical power and solid waste disposal requirements. Quantitative estimates of these potential impacts were not made, but based on the estimated demand levels and emission rates involved, any significant impacts are unlikely. Nevertheless, incorporating energy conservation design features and promoting conservation and recycling programs within the proposed development could serve to further reduce any associated impacts and conserve the island's resources.

Mitigative Measures

Several mitigation measures will be implemented to minimize potential air quality impacts, as listed below.

(1) Dust Control: Fugitive dust emissions can be controlled to a large extent by watering of active work areas, using wind screens, keeping adjacent paved roads clean, and by covering of open-bodied trucks. Other dust control measures could include limiting the area that can be disturbed at any given time and/or mulching or chemically stabilizing inactive areas that have been worked. Paving and landscaping of project areas early in the construction schedule will also reduce dust emissions. Monitoring dust at the project boundary during the period of construction could be considered as a means to evaluate the effectiveness of the project dust control program.

(2) Construction Equipment Transport: Exhaust emissions can be mitigated by moving construction equipment and workers to and from the project site during off-peak traffic hours.

(3) Pesticide Application Controls: Measures available to control drift from pesticide application include: 1) using coarse nozzle and low pressure spray equipment; 2) using shielded or shrouded sprayers; 3) using flow-control computers; 4) using thickener additives; 5) using non-volatile or low-volatile chemicals; 6) applying at lowest possible height and during low wind speed conditions when the wind direction will carry any drift away from populated areas; 7) applying during periods when the temperature is cooler and the humidity is higher and when ground-based temperature inversion conditions are absent; 8) maintaining an adequate buffer distance (at least 100 feet) between sprayer and populated areas; 9) planting trees and shrubs around golf course perimeters to intercept drift at golf course boundaries.

If proper safety precautions are followed, the potential for serious air quality degradation from chemical spraying for turfgrass maintenance can be virtually eliminated.

5.6 VISUAL ATTRIBUTES

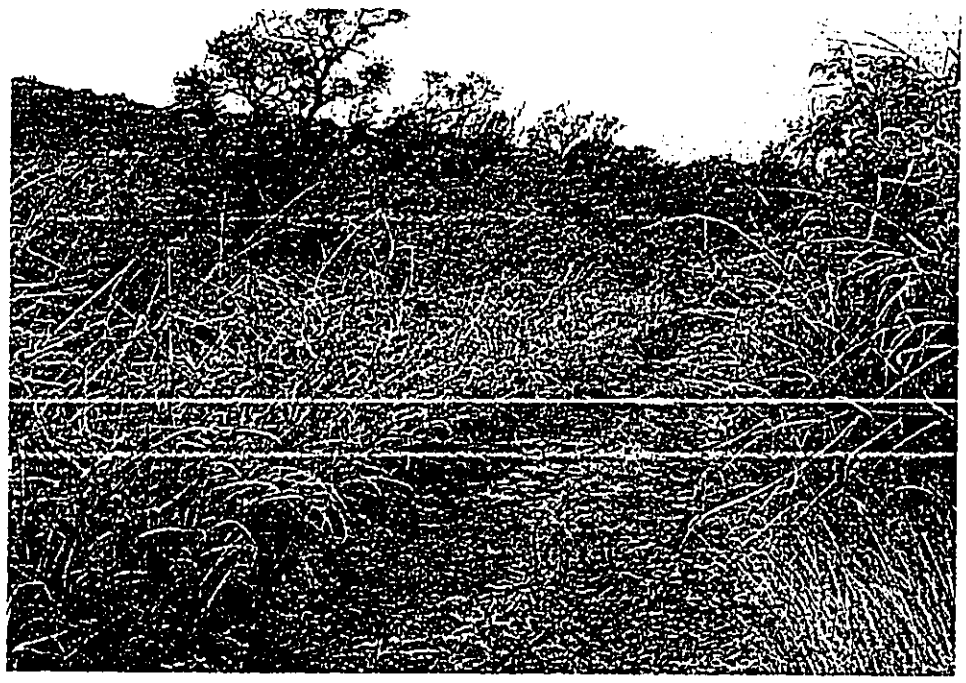
To assess the visual impacts of the project on the surrounding community, an analysis of the existing conditions and the potential visual impacts on the surrounding lands was undertaken. This analysis included a photographic study of the Keopuka Lands site and the views of the project from key locations in the surrounding area has been completed (Figure 16 A - D). The photographic study was supported by a computer generated "visibility analysis" by Ron Terry, Ph.D. (Figure 17 A-C).

Existing Conditions

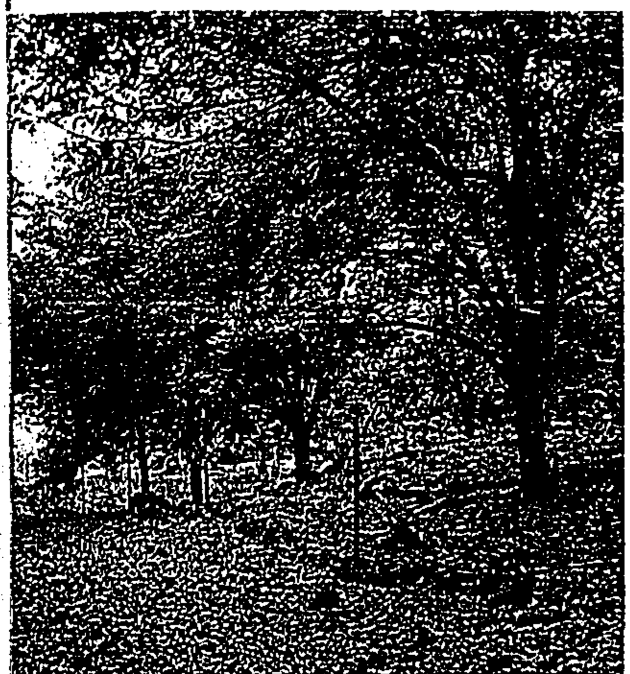
Keopuka is a narrow ahupuaa within the South Kona coastline, bordered to the north by the land of Onouli and to the south by the land of Kaawaloa. The Keopuka Lands 660-acre project site is located makai of Mamahaloa Highway at the 1400 foot elevation and extends to the coast. As an undeveloped parcel with limited agricultural uses in the uplands, the parcel is mainly a stark wilderness of scrub vegetation dominated by Christmas berry, opiuma, lantana, and koa haole and interspersed with small pockets of relict native forests of ohia trees. The majority of the property consists of 'a'a and pahoehoe lava land (Figure 16A).

1. *View from Mamalahoa Highway.* The view of the Keopuka Lands project site is obscured by the existing trees at the highway edge and the sloping topography. Current access to the property is from an unimproved road at Mamalahoa Highway.

2. *Upper elevation macadamia nut orchard.* A macadamia nu property in the mauka areas adjacent to Mamalahoa High acres have been used for agricultural purposes in the pas currently in active commercial cultivation.



3. *Makai view from the existing jeep road.* The existing mauka-makai access road begins at Mamalahoa Highway and extends to the Old Cart Road in the coastal area. The roadway consequently, goes through terrain which includes scrub vegetation and relict ohia forest, as well as lava land.



nut orchard. A macadamia nut orchard occurs on the
adjacent to Mamalahoa Highway. Approximately 30
gricultural purposes in the past, with only 10 acres
al cultivation.

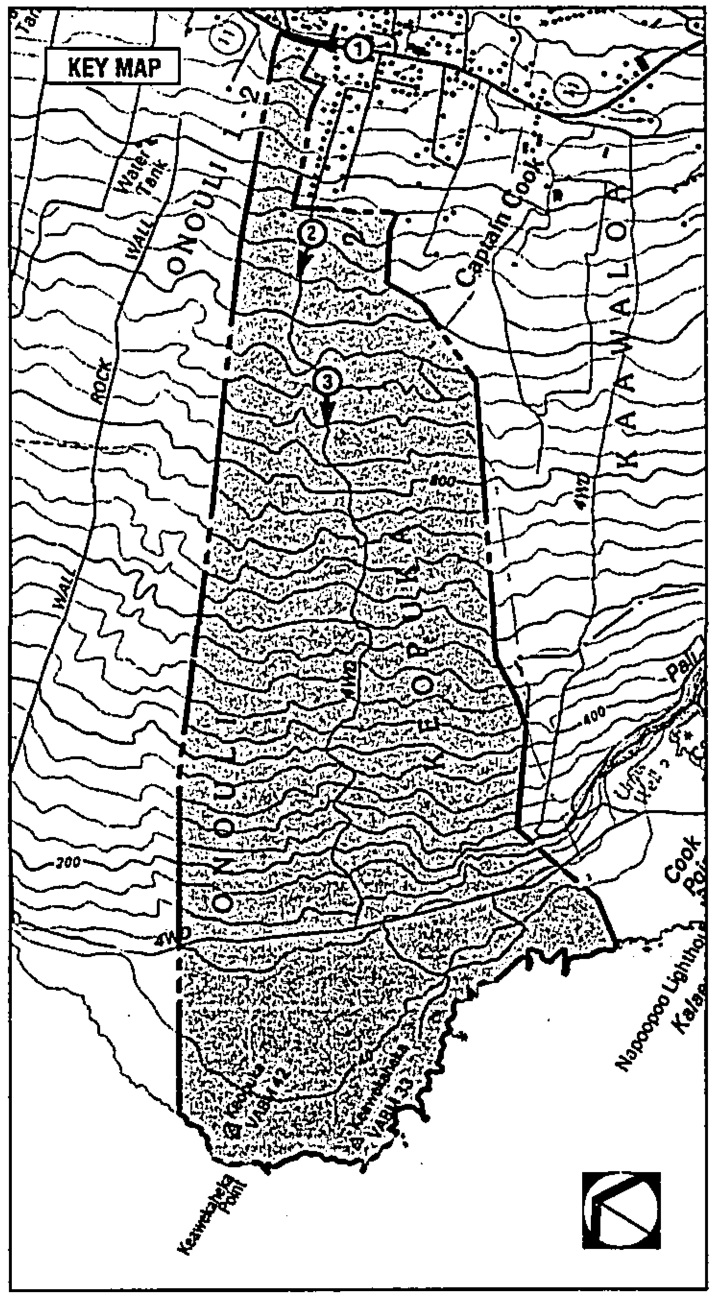


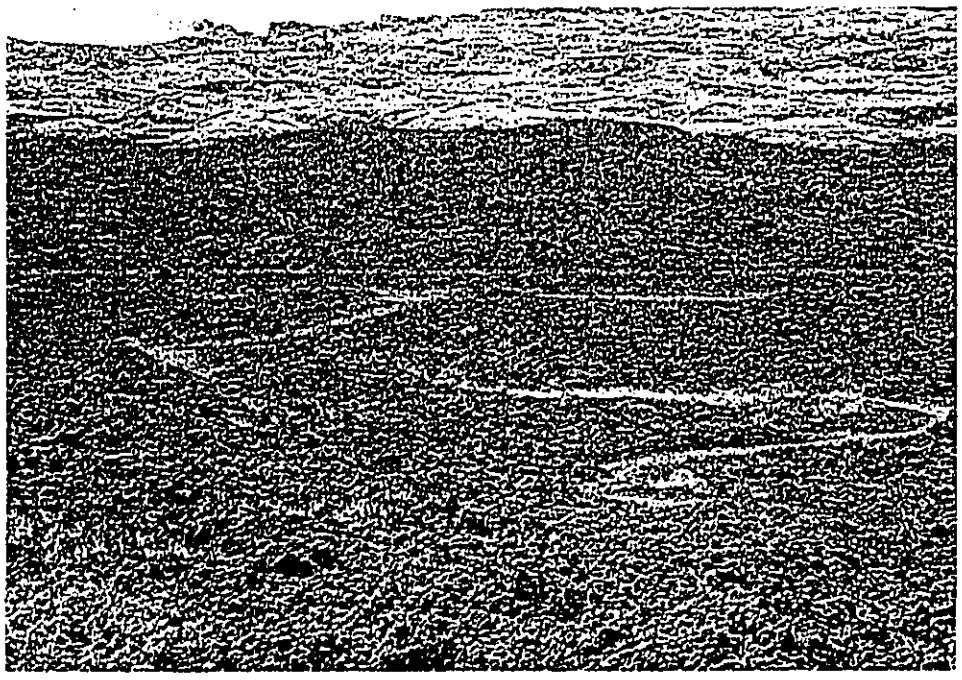
FIGURE 16A

PHOTOGRAPHIC STUDY

Views of the Project Site

KEOPUKA LANDS

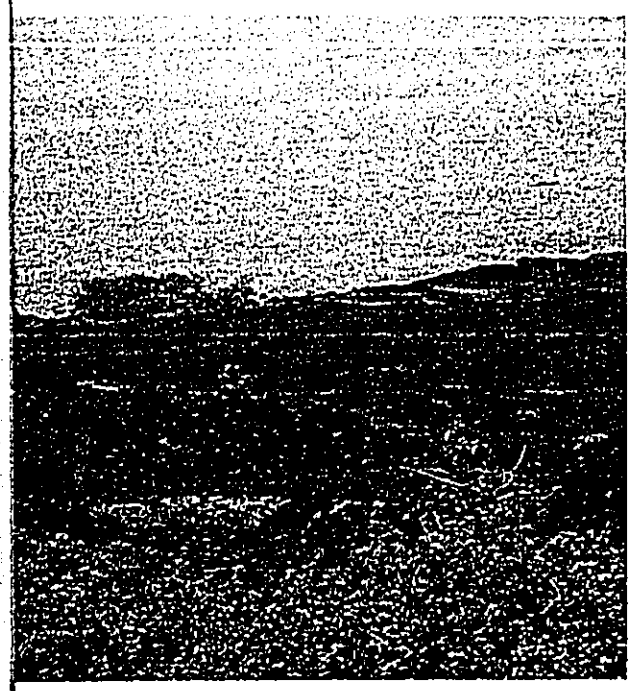
June 2000



4. *Makai view overlooking the 'a'a lava fields.* The project site and the existing access road is seen from approximately 500 ft. elevation.

5. *Makai view overlooking the bluff.* The project site includes com of the South Kona coastline. This view overlooks the bluff towa flats.

6. *Coastal view of the property towards Kealakekua Bay.* The Keopuka shoreline consists of a lava rockcliff. There are no sandy beaches and except for the kiawe trees and shrubs at the southern portion, vegetation is sparse.



bluff. The project site includes commanding vistas
. This view overlooks the bluff towards the coastal

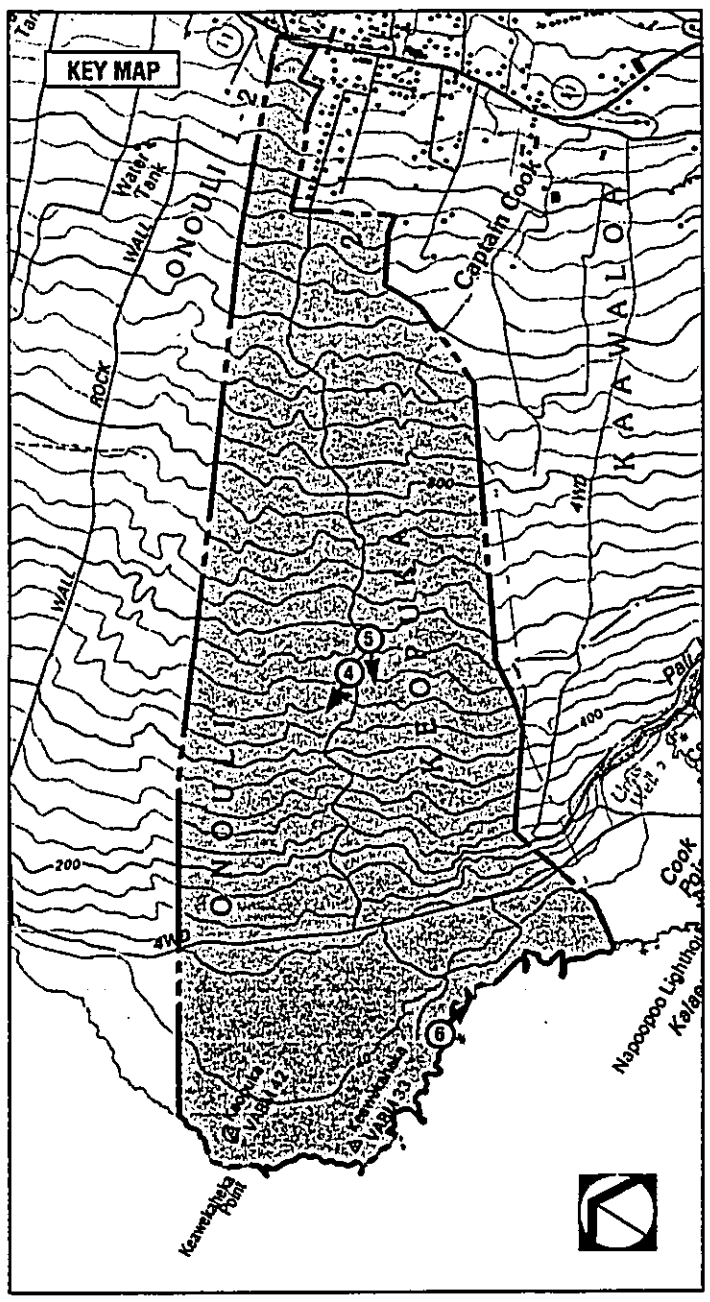


FIGURE 16A

PHOTOGRAPHIC STUDY

Views of the Project Site

KEOPUKA LANDS

June 2000

PBR HAWAII

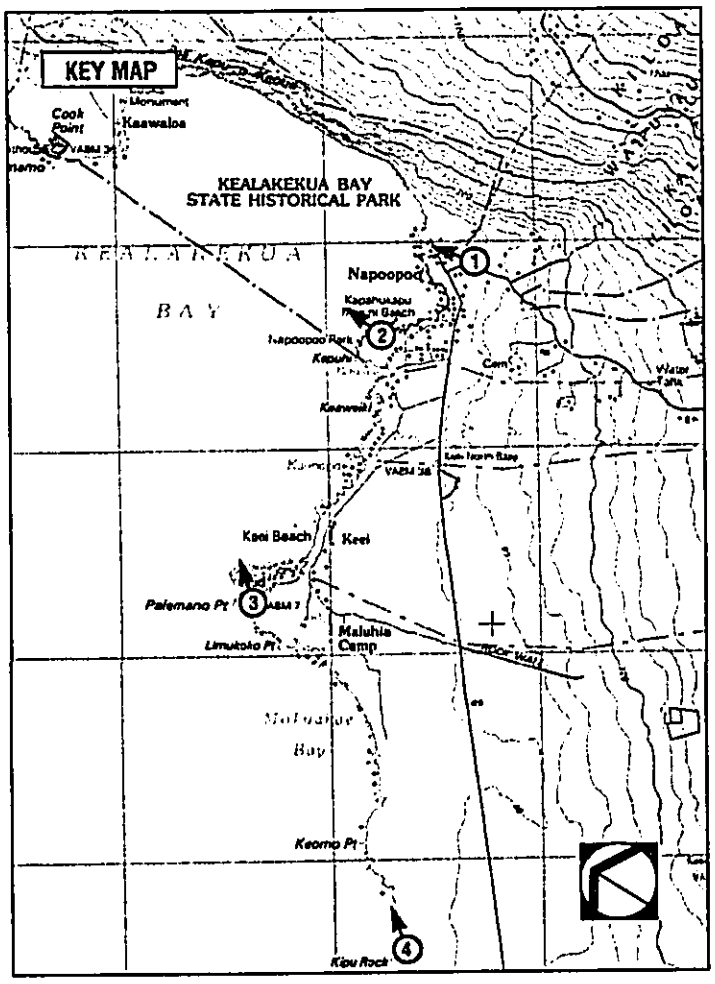
1. *View from Napoopoo Road in the residential area (@ 800 ft elevation).* Views toward the project site are minimal from Napoopoo Road and the neighborhoods along the road except through a few openings (such as this view). The steep wall of Pali Kapu o Keoua obscures Keopuka . The distance between this location at Napoopoo Road and the project site is approximately 2.5 miles, this further diminishes views of the project site.

2. *View from the Boat Launch Ramp at Kealakekua Bay.* The southern portion Kealakekua Bay includes a boat launch ramp at Kapahukapu Beach at Napoopoo. The view of Keopuka is obscured by the Pali and Cook Point at Kaawaloa. Therefore, from this low vantage point the project is not expected be visible.

3. *View from Palemano Point at Keei Beach* further south of Kealakekua Bay, from Palemano Point at Keei, portions of the Keopuka coastal land would be within the line of sight; however, the distance of 1.7 miles separating the two areas would diminish the views. Furthermore, the improvements along the coastal Conservation District area (coast to 300 ft inland) will not include structural improvements.

4. *View from Puuhonua o Honaunau.* From the Puuhonua Honaunau National 4.5 miles to the south, various coastal points within Honaunau block any dist

ekua Bay. The southern portion of
o at Kapahukapu Beach at
l by the Pali and Cook Point at
point the project is not expected to



Puuhonua Honaunau National Park located approximately within Honaunau block any distant views of Keopuka.

FIGURE 16B

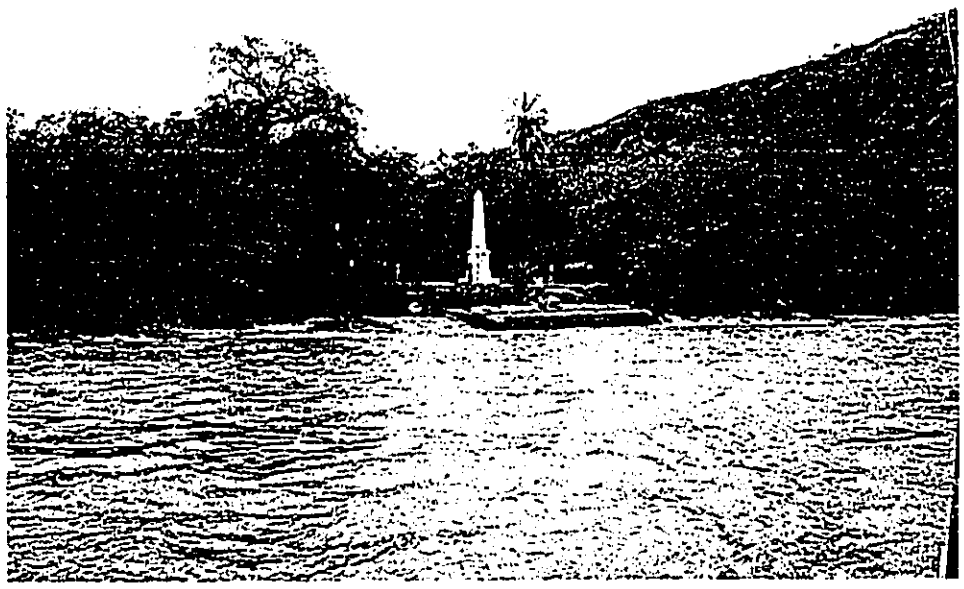
PHOTOGRAPHIC STUDY

Views From Surrounding Community

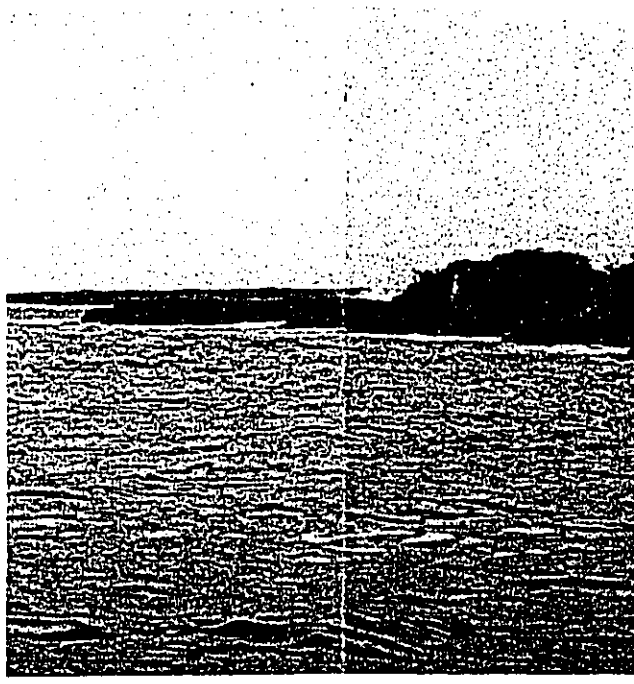
KEOPUKA LANDS

June 2000

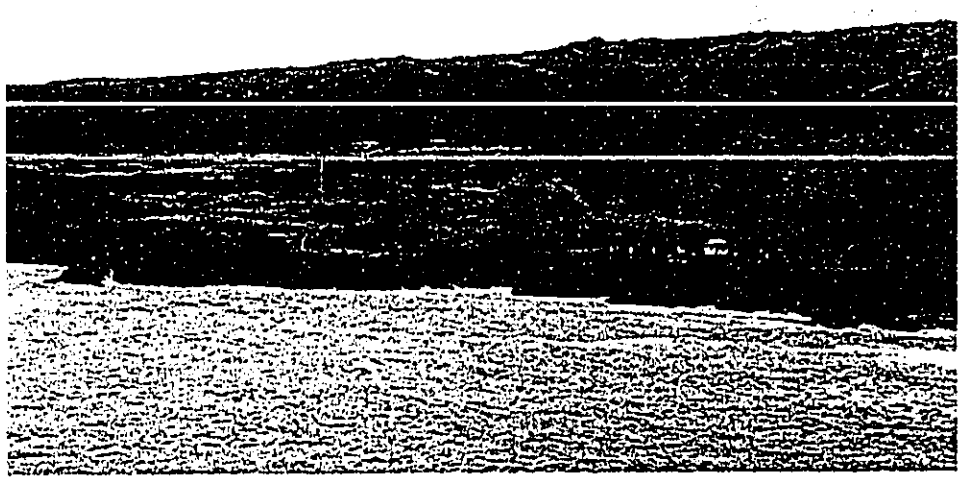
PBR HAWAII



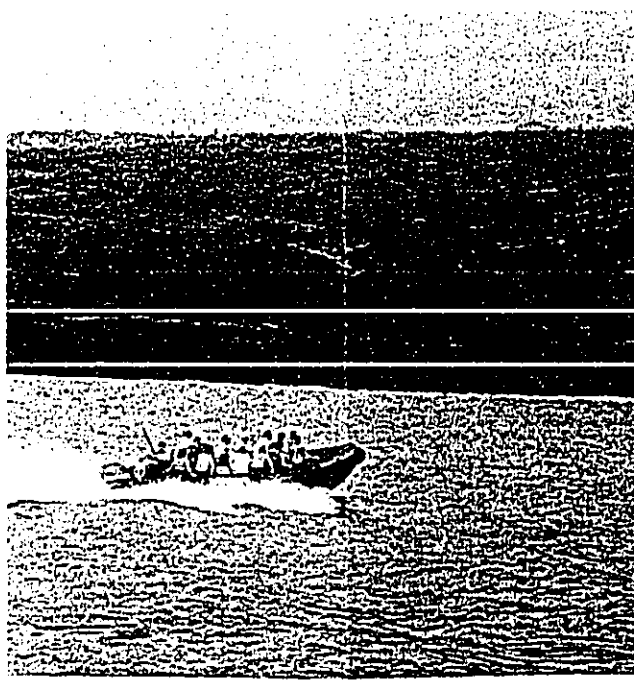
1. *View from within Kealakekua Bay towards the Captain Cook Monument.* Kealakekua Bay is designated as a State Marine Life Conservation District. This location of the bay is used for ocean recreation including snorkeling and kayaking. The Keopuka Lands property is obscured by the dominant Pali Kapu o Keoua, therefore the project will not be visible from any location within the bay.



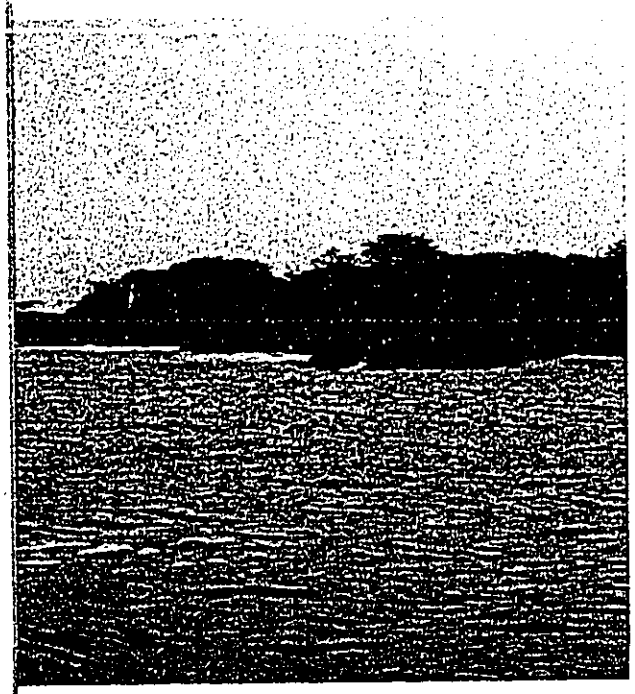
2. *View rounding Cook Point past the Napoopoo Lighthous* Bay, the Napoopoo Lighthouse on Cook Point becomes coastal land of Keopuka. The visible portion of Keopuka Conservation District land that goes inland for a distanc shoreline improvements in the Conservation district will trail and landscape improvements.



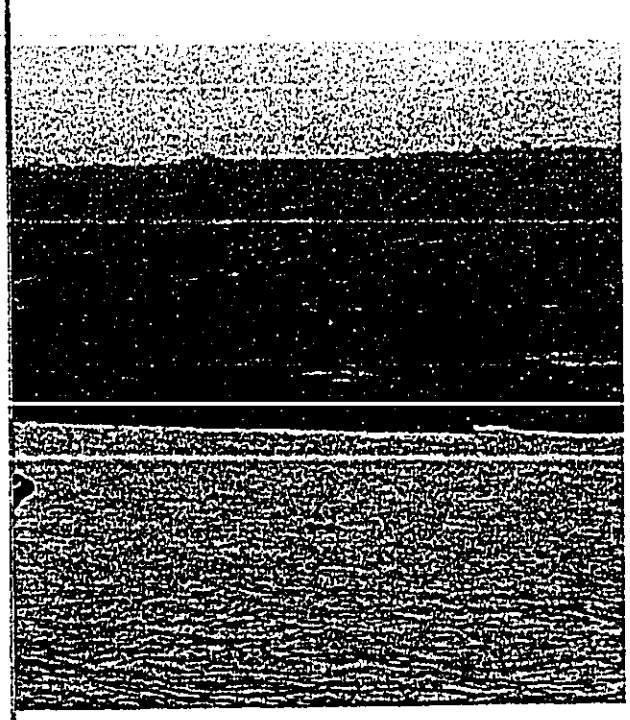
3. *Nearshore view of Keopuka Lands.* The waters fronting Keopuka will provide a clear view of much of the project site.



4. *Typical view of the project site from the boater's vantag* front of the project site include recreational boaters hea Bay and fishing boats. The project will be visible from th property.



ast the Napoopoo Lighthouse. Departing Kealakekua
se on Cook Point becomes visible and the distant
e visible portion of Keopuka coastline consists of
at goes inland for a distance of 300 feet. Minimal
he Conservation district will include a pedestrian
ments.



te from the boater's vantage point. Boat traffic in
de recreational boaters heading towards Kealakekua
roject will be visible from the shoreline fronting the

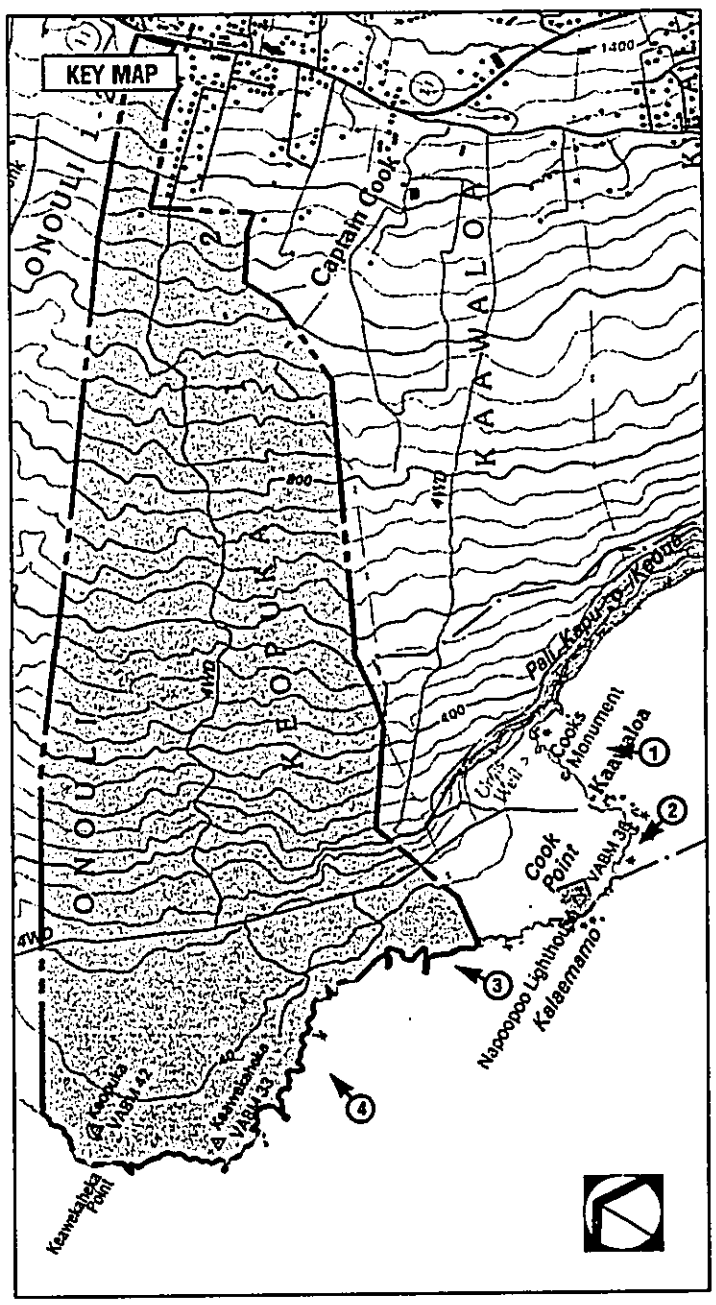


FIGURE 16C

PHOTOGRAPHIC STUDY

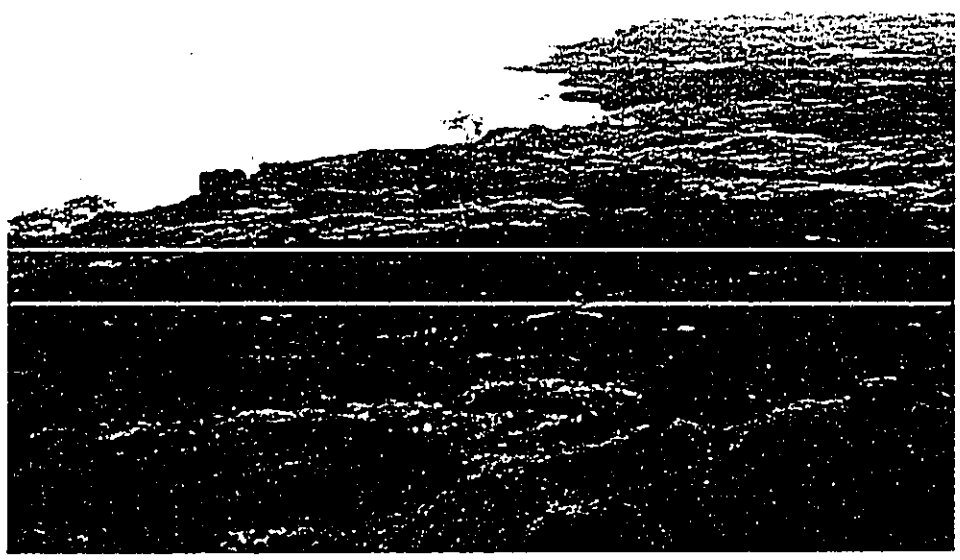
Views From Kealakekua Bay and Nearshore Fronting Keopuka

KEOPUKA LANDS

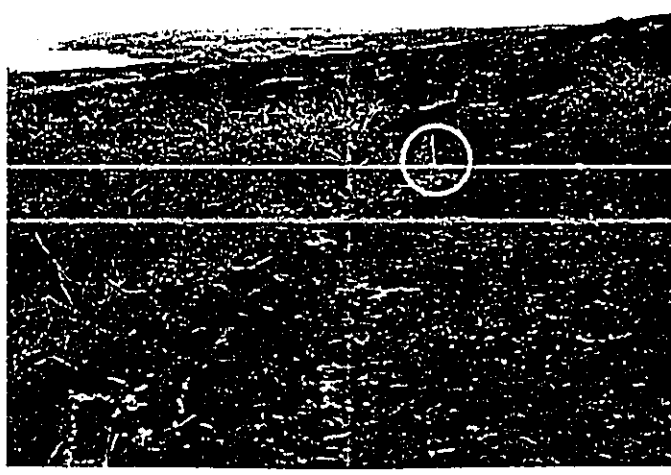
June 2000

1. *Makai view from Kaawaloa Road near the Old Government Road junction.* Kaawaloa Road, a popular hiking trail, is located on the adjacent Kaawaloa ahupua'a. The trailhead originates at Napoopoo Road near Mamalahoa Highway and provides land access to the Captain Cook Monument at Kealakekua Bay. Along the Kaawaloa Road, the proposed project structures would become visible at the approximately 450 ft. elevation MSL near the crest of Pali Kapu o Keoua. A pole is shown on the photograph (in the yellow circle) at the approximate location of the members' hale and golf clubhouse complex.

2. *View from the Kaawaloa Road switchback curve looking w Kaawaloa/Keopuka boundary.* The State Park parcel at Ka of the photograph and the Keopuka lands parcel is on the r park is referred to as Cook Point. The Old Cart Road trave parcels. The boundary is marked by a post on the old Cart yellow circle). The predominant coastal vegetation consists herbaceous grasses.

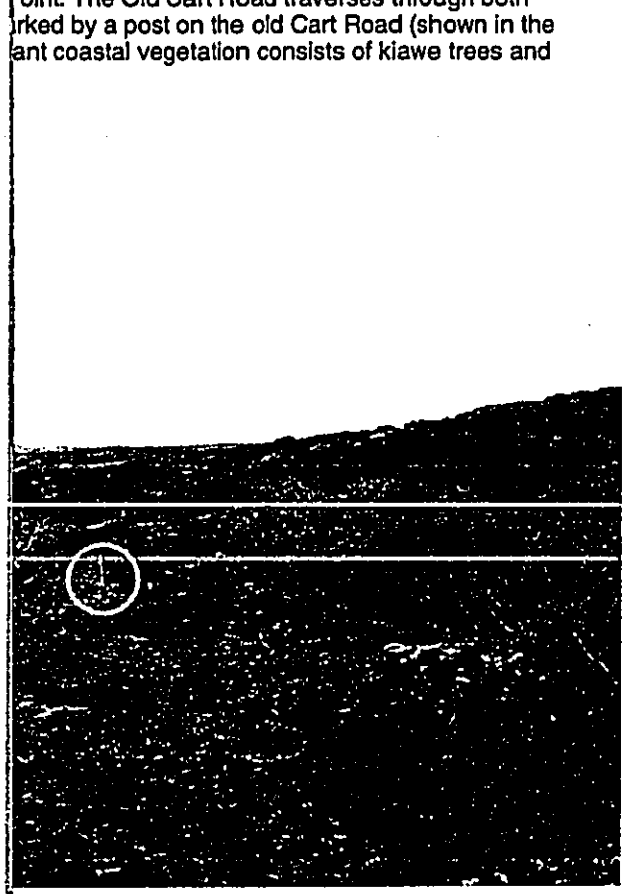


3. *View of the Keopuka Lands coastline from the switchback curve.* The Keopuka Lands coastline is approximately 4,750 ft. (0.8 mile) long. The slope of Pali Kapu o Keoua is shown on the right foreground and the Old Cart Road can be seen traversing the property.



4. *View from the Old Cart Road at Kaawaloa looking toward K* boundary between the two properties is shown by the oran Cart Road (Shown in the yellow circle). The Old Cart Road restored to its original dimensions and preserved as an arc

ad switchback curve looking west toward the y. The State Park parcel at Kaawaloa is to the left eopuka lands parcel is on the right. This area of the Point. The Old Cart Road traverses through both rked by a post on the old Cart Road (shown in the ant coastal vegetation consists of kiawe trees and



l at Kaawaloa looking toward Keopuka. The roperties is shown by the orange flag at the Old low circle). The Old Cart Road is planned to be sions and preserved as an archaeological feature.

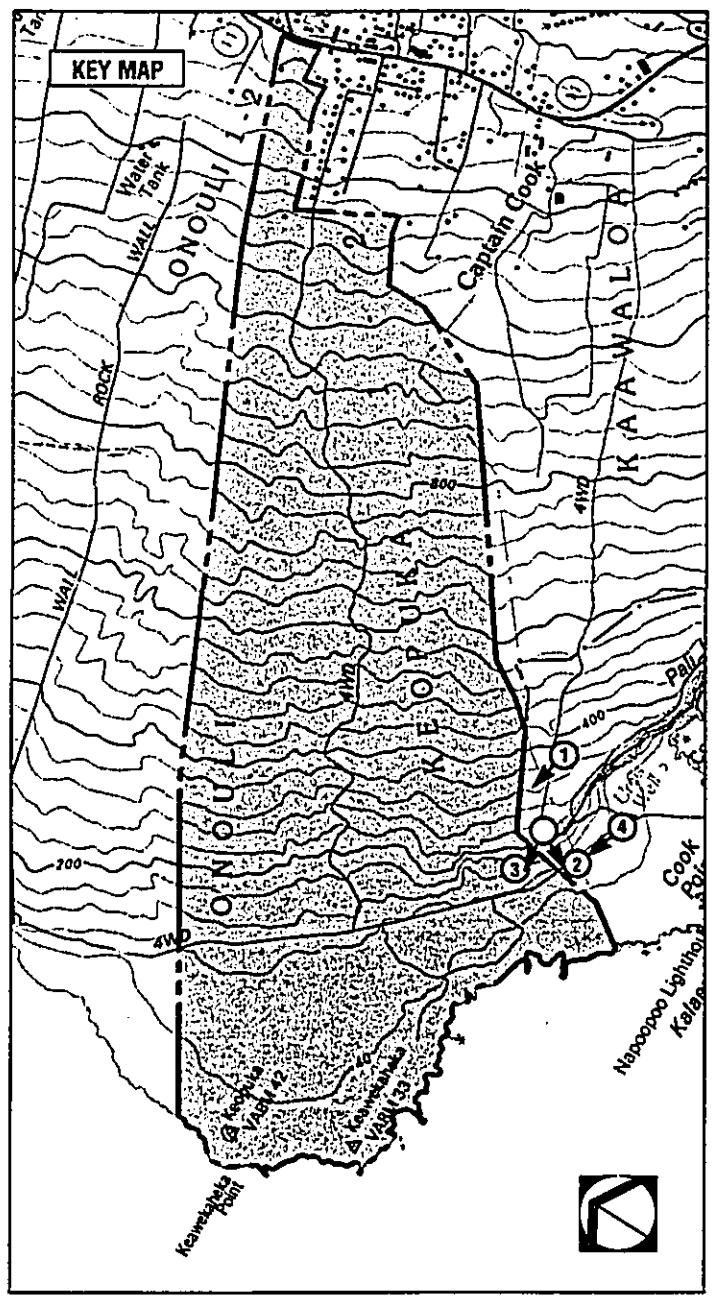


FIGURE 16D

PHOTOGRAPHIC STUDY

Views From Ka'awaloa Road

KEOPUKA LANDS

June 2000

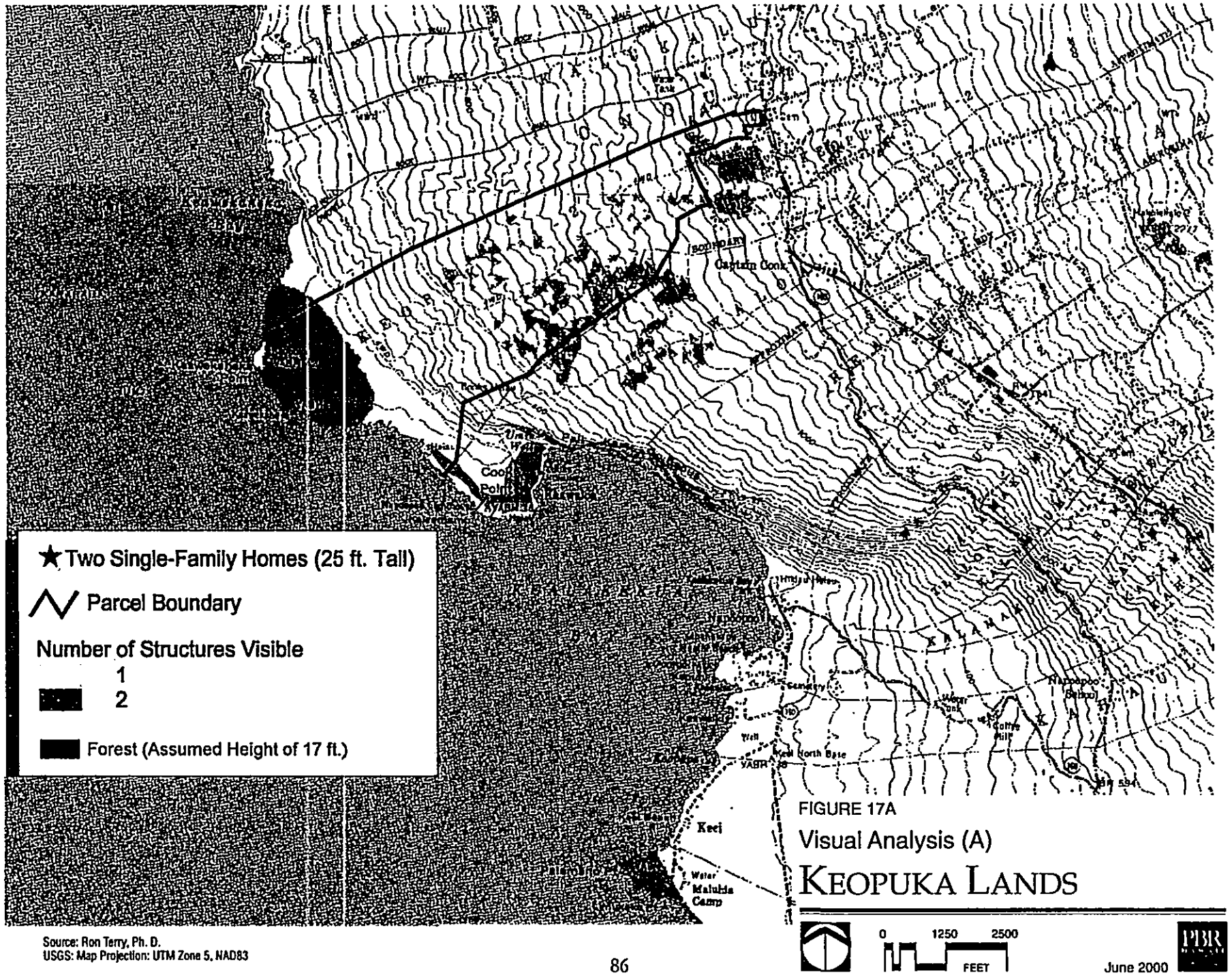


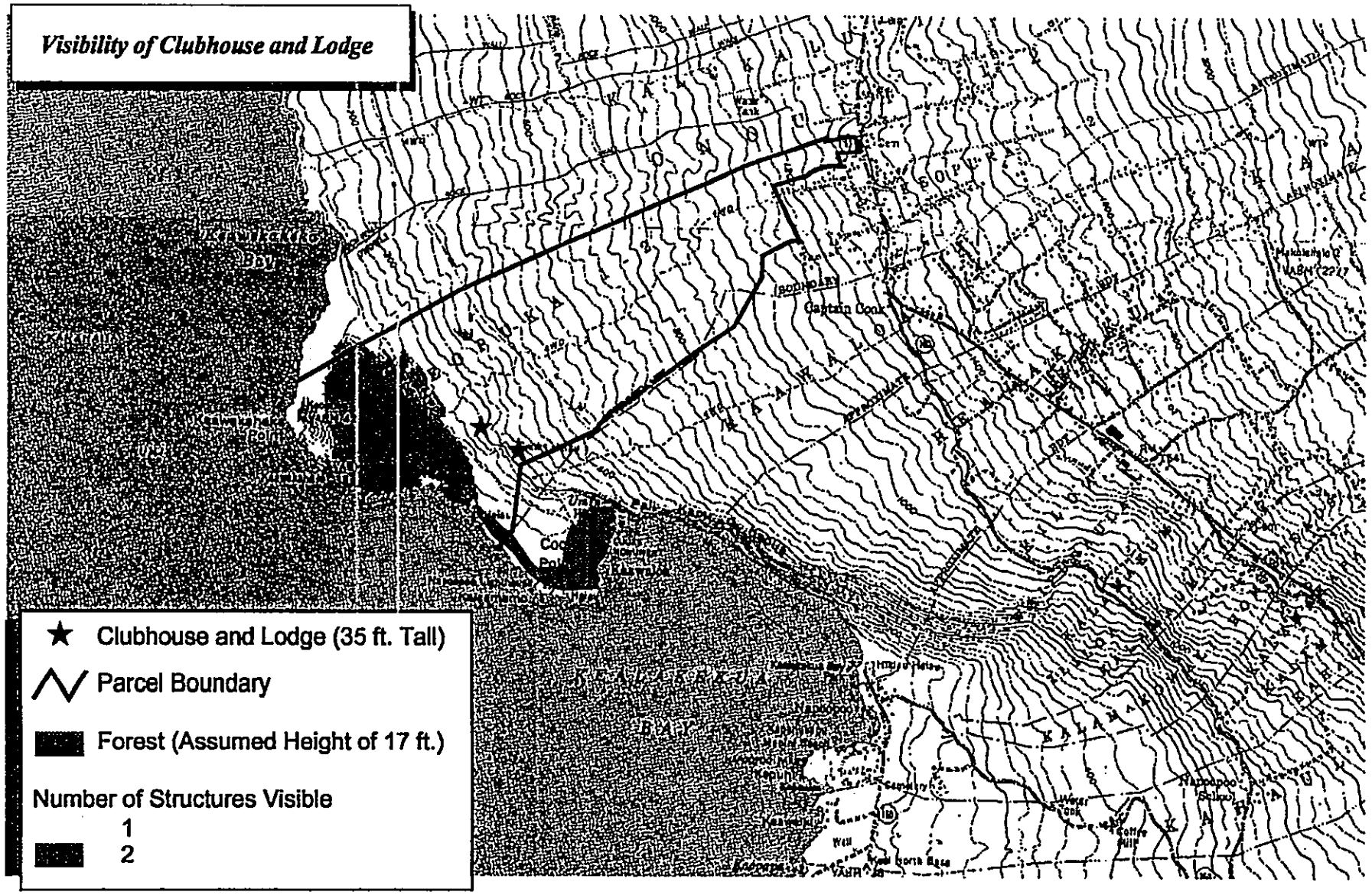
FIGURE 17A

Visual Analysis (A)

KEOPUKA LANDS

June 2000

Source: Ron Terry, Ph. D.
USGS: Map Projection: UTM Zone 5, NAD83



Source: Ron Terry, Ph. D.

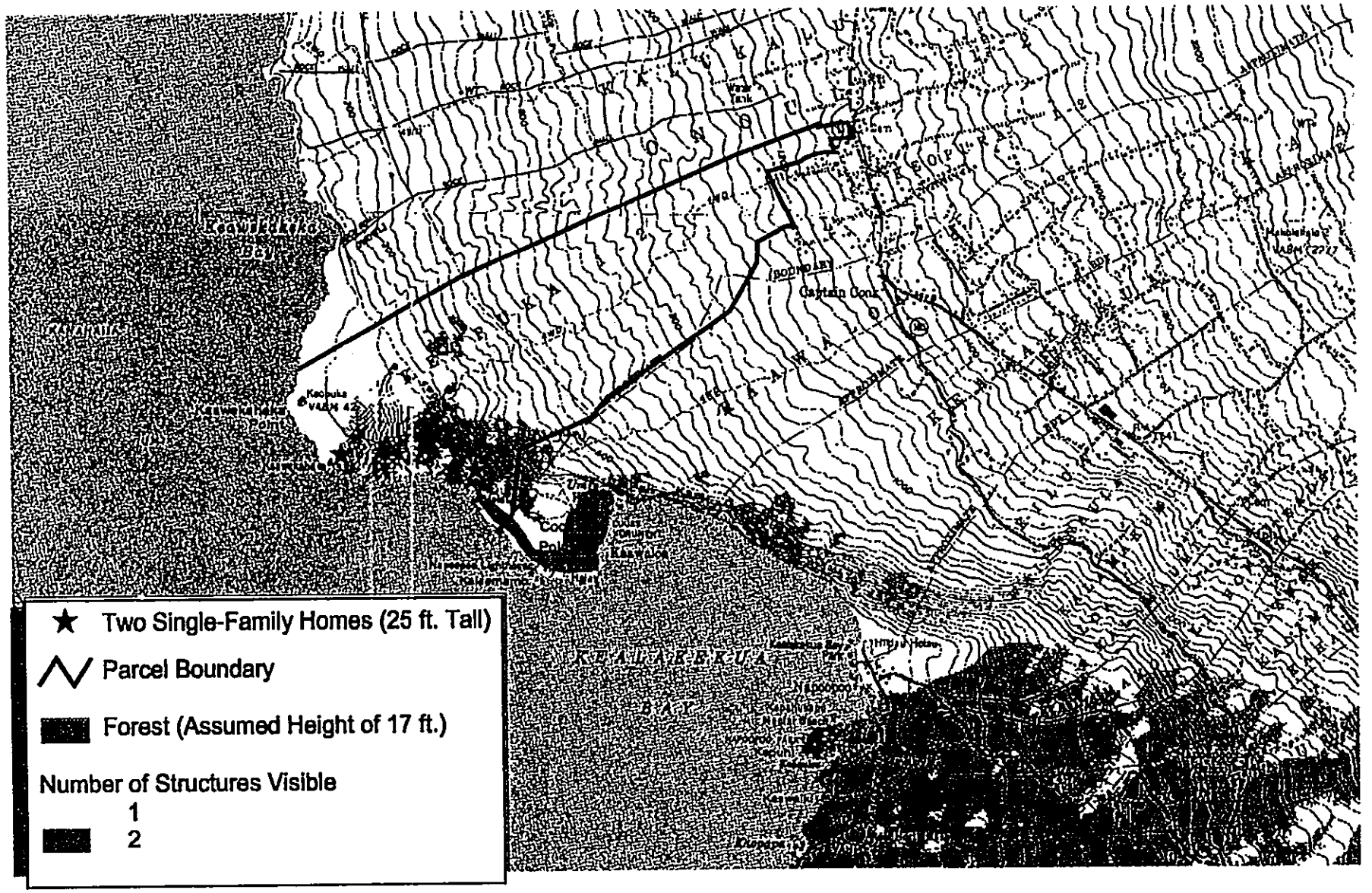
FIGURE 17B

Visual Analysis (B)

KEOPUKA LANDS

0 1250 2500 FEET

June 2000



Source: Ron Terry, Ph. D.

FIGURE 17C

Visual Analysis (C)

KEOPUKA LANDS

June 2000

PBR HAWAII

The topography of the site allows commanding makai views from most locations within the Project area. However, views to the south of the property towards Kealakekua Bay are generally blocked by the Pali Kapu o Keoua ridgeline until the 100 ft contour where the coastal flats begin.

An analysis of the Keopuka Lands site as seen from the surrounding community is shown on Figure 16B. The property is connected to Mamahaloa Highway through a narrow frontage which quickly slopes downward at a grade of approximately 15 to 20 percent. Moreover, thick vegetation along the highway and a few existing residential homes block the view of the project site from the highway. Along Napoopoo Road, the Pali Kapu o Keoua ridgeline and existing vegetation within Kaawaloa prevents any views of the upper and lower areas of the project. From the Puuhonua of Honaunau National Park located approximately 4.5 miles to the south, various coastal points within Honaunau block any distant views of Keopuka.

A portion of the Keopuka Lands property is adjacent to the Kealakekua Bay State Historical Park. This common boundary extends from approximately 500 feet above MSL (slightly mauka of the Old Government Road to the coastline) (see Figure 14).

Kaawaloa Road, which is currently used as a pedestrian and equestrian access to the Kaawaloa portion of the Kealakekua Bay State Historical Park, extends from Napoopoo Road near is junction with Mamalahoa Highway to Kaawaloa. This trail extends through residential and agricultural lands in the mauka portions, before entering the State Park near the Old Government Road intersection. The project site is visible from portions of the Road which are parallel to Keopuka as shown in Figure 16B.

Looking north and northwest from the State Park along the Kaawaloa coastal flat and from the Old Cart Road, the Project site is visible, as shown in Figure 16D, photograph 4.

From within the nearby Kealakekua Bay - a designated 360-acre Marine Life Conservation District - again, the views of the project, including views from the boat launch and within the bay, are obscured by the Pali and existing kiawe trees. The area fronting the Captain Cook Monument which is tucked along the northwestern area of the bay below the 400 ft Pali scarp is a popular dive and snorkel area and many residents and commercial ocean recreation tour outfitters in zodiacs and kayaks use the bay on a regular basis. From the shoreline area at and near the Captain Cook Monument, views to the project site are obscured by the Pali and existing kiawe trees.

From the ocean, the Keopuka Lands site becomes visible well past Cook Point and the Napoopoo Lighthouse. It is fully visible from the waters fronting Keopuka.

Potential Impacts

The Keopuka Lands project will transform the landscape from a natural undeveloped landscape to a low density master planned agricultural and recreational community. New buildings (including dwellings, bungalow guest accommodations, golf clubhouse, and associated structures), a golf course, landscape plantings, and roads will be designed to seamlessly integrate into the lava landscape. However, the development of the agricultural lots, the members' hale and golf course, its related facilities and ultimate construction will alter the visual character of the undeveloped lands.

In order to better understand the potential visual impacts of the proposed development on the surrounding areas, the views of the project site were further identified through a computerized visibility analysis conducted by Ron Terry, Ph.D. and shown graphically in Figures 17A- C. The objective of the visibility analysis is to determine the visual impact of the project on a broad scale within the region as defined in the boundaries of Figures 17A -C.

The visibility analysis is intended to provide a representation of points that are within the line of sight of the project area based on available topographic data for the region. The analysis does not account for the distance between the points or any intervening obstructions such as structures or vegetation. For instance, though the analysis would indicate that structures in the lower portions of the project site are within the line of sight of the area of lower Napoopoo Road, the photographic study (Figures 16 A-D) shows the site to be nearly completely obscured from view by the vegetation and structures in the area. The visual analysis is therefore, intended to show a "worst case" condition assuming no intervening obstructions. The primary purpose of the analysis is to show where portions of the project site are clearly not visible given the existing topographic conditions.

Six points on the project site were selected with corresponding heights representing the planned structures on the conceptual master plan:

(A) Two points representing roof heights of homes located in the higher elevation (700 feet and 900 feet elevation) agricultural lots along the southern boundary (25 feet building height)

(B) Two points representing the approximate height and location of the proposed clubhouse and members' hale (200 feet and 250 feet elevation) (35 feet building height)

(C) Two points representing the roof height of homes along the coastal agricultural lots (40 feet elevation) (25 feet building height)

For each pair of points, the visibility analysis indicates where portions of either one structure or two structures would be visible (indicated by the lighter and darker shades, respectively).

As shown in Figure 17A, the two points in the mauka area (with building heights of 25 feet at the 700 feet and 900 feet elevations) may be visible from the adjacent properties directly to the south and from points south of Kealakekua Bay, a distance of over two miles from the project site. At these distances, structures would likely be of a scale as to be hardly distinguishable from the surrounding landscape. The structures will not be visible from any portion of the Kaawaloa Flats nor from Kealakekua Bay, between Napoopoo and the Cook's Monument area.

The two points at the approximately 200 feet and 250 feet elevations and a 35 feet height are at the proposed location of the main pavilion of the members' hale and the golf clubhouse. These points represent the upper roof line of the hale and golf clubhouse structures. As depicted in Figure 17B, portions of only one structure nearest to the southern property boundary would be visible directly off site at a lower section of the Kaawaloa Road and from points south of Kealakekua Bay. Again, neither structure will be visible from the coastal portions of Kaawaloa nor from Napoopoo Village. However, the structures will be visible from the Kaawaloa Road nears its switchback at the Keopuka/Kaawaloa boundary as well as from portions of the Park area mauka of the strand of kiawe trees along the shoreline.

The lower coastal flat portion of the property as depicted in Figure 17C would be the most visible area of the project. Portions of homes , especially near the southern boundary would potentially be visible from the adjoining properties directly to the south, the lower portions along Napoopoo Road and from points south of Kealakekua Bay. However, the existing vegetation as well as the makai portions of the Pali Kapu o Keoua ridgeline will screen these structures such that they will not be visible from the coastal portions of the Kaawaloa Flats between the Napoopoo Lighthouse and the Cook's Monument area. While the structures will be theoretically visible from portions of the Napoopoo Village area to Palemano Point, which is between 1.5 to 2 miles away. At these distances, structures would likely be of a scale as to be hardly distinguishable from the surrounding landscape.

Again, the visibility analysis is intended to provide a representation of points that are within the line of sight of the project area based on available topographic data for the region. The analysis does not account for the distance between the points or any intervening obstructions such as structures or vegetation. For instance, though the analysis would indicate that structures in the lower portions of the project site are within the line of sight of the area of lower Napoopoo Road, the photographic study shows the site to be nearly completely obscured from view by the vegetation and structures in the area. The visual analysis is therefore, intended to show a "worst case" condition assuming no intervening obstructions. The primary purpose of the analysis is to show where portions of the project site are clearly not visible given the existing topographic conditions.

In this respect, the visibility analysis, as well as the photographic study, would indicate that structures on the site are generally not visible from the areas within and around Kealakekua Bay, including the Cook Monument area, and the boat launch site at Kapahukapu Manini Beach. The sheer height and mass of the Pali provides a visual barrier to much of the Keopuka Lands property as viewed from points within and around Kealakekua Bay.

Mitigation Measures

At Keopuka Lands emphasis will be directed towards developing in harmony with the land with sensitivity for the preservation of significant terrain features and the protection of historic sites. The design of structures will be tailored to the unique features of each parcel in an effort to achieve a synthesis of nature and building. To preserve the natural features of each lot, buildings will be sited to reasonably minimize disruption of the existing environment.

Roadways will, to a large degree, be winding and will follow the natural terrain. Natural drainage swales will, to the extent practicable, be left unimpeded. Surface runoff will be held in lakes to serve a dual drainage and irrigation function. Natural terrain features such as slopes, ridges, knolls and significant lava rock formations will be carefully considered and if practical, will be integrated into the overall form of the Project. Landscaping will be controlled, utilizing a combination of existing native tree clusters (ohia and kukui) and introduced landscape plants. Development will be carefully controlled to help preserve substantial open space and view corridors. Project development will alter the landscape, however, the goal is for the appearance and character of the improvements to harmonize with and enhance their natural settings and seamlessly blend the built and natural environments.

The Project proposes to maintain, as well as emphasize, the rural character of the area through the construction of a low profile clubhouse and members' hale that is compatible with the natural features

of the property and low density agricultural homesites. The 125 lots will range from one to five acres. The Conservation District, which extends along the shoreline across the width of the property is a band approximately 300 feet wide and will provide an open space transition from the shoreline area to the agricultural lots and golf course. Thus, the agricultural lots and dwellings would be located no closer to the shoreline than the Conservation District boundary.

The project design will retain natural areas with resource values (e.g., native tree clusters including kukui, ohia, and wiwliwili) and follow the existing topography of the land. Design Guidelines will be implemented which are intended to achieve a blending of the built and natural environments to achieve a visual cohesion throughout the project.

In addition, a Landscape Master Plan for the project area will be prepared in accordance with the requirements of the Planning Department's Rule 17 related to Landscape improvements. The plan will include placement of landscaping elements in strategic locations to minimize the project's impacts on key visual corridors. Building design guidelines and CC&R's will also be developed to ensure use of natural building materials as appropriate, and color schemes to blend in with the natural environment.

The implementation of recommendations related to botany will result in preservation of significant areas of native vegetation in their natural state, as practicable. In addition, the Master Plan concept will result in significant areas of open space areas, including coastal open space area, golf course, agricultural and buffer areas.

5.7 SOCIO-ECONOMIC IMPACTS

A social impact assessment for the Keopuka Lands project was undertaken by Earthplan. In addition, an economic impact assessment for the project was prepared by The Hallstrom Group. This section summarizes their studies and the full reports are attached as Appendix L and M, respectively.

5.7.1 Social Impacts

5.7.1.1 Population

Existing Conditions

The County of Hawaii population has steadily increased between 1970 and 1990. The island's population grew from approximately 63,000 in 1970 to 92,000 in 1980 to 120,000 in 1990. On the average, these population counts represent an annual 3.8 percent increase between 1970 and 1980, and a 2.7 percent increase between 1980 and 1990.

The population growth in North Kona was much more pronounced than that of the overall County. Its population almost tripled from 1970 to 1980, from approximately 4,800 to 13,748 persons, which implies an average annual growth rate of eleven percent during the decade. Growth slowed between 1980 and 1990 in North Kona, during which time the population increased to 22,300 persons. This represents an aaverage annual growth rate of five percent.

The population of South Kona experienced steady, and relatively slow growth between 1970 and 1980. The increase from 4,000 to 5,900 persons between 1970 and 1980 implies an average annual growth rate of four percent. Between 1980 and 1990, the rate of growth decreased to 2.6 percent when the population increased to 7,700 persons.

Potential Impacts and Mitigative Measures

The Keopuka Lands project conceptual master plan includes approximately 125 agricultural lots which range in size from one to five+ acres. The lots are expected to appeal to second home buyers. The 100-unit members' hale will be a membership facility. Therefore, at build-out the average daily de facto population (resident and guests) of Keopuka will be about 211 persons, comprised of some 133 hale guests and 78 home-users. Of the 78 home-users about 26 will be permanent residents and a maximum of about five resident school age children.

5.7.1.2 Housing Units

Existing Conditions

Housing information based on the 1990 census was compiled for the EIS by Earthplan for the Social Impact Assessment (Appendix M). In 1990, there were 48,253 housing units in Hawaii County, of which 14 percent were reported vacant. Of the 4,878 units in the area of the overall area of the Project (from Kahaluu - Keauhou to Kealakekua Bay - Milolii and including the Captain Cook and Napoopoo areas), 23 percent were vacant in 1990. Kahaluu - Keauhou had a significantly high housing unit vacancy rate at 40 percent. Much of this is due to the presence of second homes that are not occupied throughout the year. A significantly low vacancy rate was found in the Kealakekua - Captain Cook region, where only seven percent of the units were vacant at the time of the 1990 census taking.

The islandwide housing stock was dominated by single-family homes, which accounted for 79 percent of the total units. Proportionally, slightly less (73 percent) were single-family units in the area of the Project.

The largest proportion of single-family units was in the rural area of Kealakekua Bay - Milolii, where 91 percent were in this category. Single family units also dominated the housing stock in Kealakekua - Captain Cook (84 percent).

Kahaluu - Keauhou had proportionately more multi-family units, which made up half the total units. Single family units accounted for 49 percent, and non-conventional units made up one percent.

The area of the Project tended to have more renters than the islandwide community. In 1990, 39 percent of Hawaii County's units were renter-occupied, as compared to 44 percent in the area of the Project. Within the area of the Project, the highest proportion of renters was in Kainaliu (48 percent), and the lowest was in Kealakekua - Captain Cook region (42 percent)

The owner occupied units tended to have higher values than the islandwide housing stock, of which the median value of owner-occupied units was $113,000 in 1990. The area of the Project owner-occupied

units had median values ranging from $167,000 in Kealakekua Bay - Milolii to a high of $267,000 in Kahaluu - Keauhou.

Potential Impacts and Mitigative Measures

An additional 125 dwellings would result from the development of Keopuka Lands ranging on properties from one to five acres. As second homes, the general vacancy rate would likely be higher than the immediately surrounding community. Moreover, as a golf - membership community Keopuka Lands agricultural lots would have values higher than the surrounding community.

5.7.1.3 Character of the Community

Existing Conditions

State and County public policies advocate maintaining the rural and agricultural character of the South Kona District. While robust growth is anticipated for Hawaii County, and further urban and resort development is anticipated for the South and North Kona regions, South Kona continues to be viewed as rural. Its present character of small towns and villages, single family homes, mauka and makai agricultural lands and expanses of undeveloped shoreline is to be retained.

Potential Impacts and Mitigative Measures

The Keopuka Lands project is consistent with this direction with its low density with ample open space and agricultural potential. The predominant landscape will be open space related to the proposed golf course and the undeveloped and agricultural portions of lots, as applicable. Further, the entire length of the 0.8 mile shoreline will remain in open space.

The Keopuka Lands project will differ from the character of most of South Kona in that the project may introduce more out-of-state newcomers to the region, and the project will be an "upscale" community featuring a golf course.

From a social perspective, these factors may contribute to the potential for social conflicts due to economic disparities between the existing and future communities. Social conflicts may be avoided, however, if there is successful social integration on a regional level. While the newcomers need to be able to adjust to the values and mores of the host community. This scenario of mutual adjustment and acceptance is very likely, in that it is already occurring.

5.7.2 Economic Impacts

5.7.2.1 Employment, Personal Income, and Consumer Expenditures

Existing Conditions

The suitability of the 660-acre project site for agricultural uses have been limited to approximately 30-acres in recent times with 10 acres of macadamia nut orchards currently being harvested commercially

by four farmers. In its existing conditions, employment, income and expenditures is therefore, limited.

Potential Impacts and Mitigative Measures

Employment. The project will be a significant source of employment for the region, which currently lacks many such opportunities, during both construction and on-going operation. We have projected it will require approximately 15 years from ground-breaking to total community build-out. During this time, there will be an estimated 2,352 full-time equivalent worker years of employment created on-site, with an additional 1,176 worker years in off-site positions. After completion, there will be some 147 permanent on-site jobs in the members hale, at the golf course and in home maintenance, and an additional 74 off-site support positions.

Personal Income. Total wages paid into the region as a result of the subject development during the construction period will be in excess of $105.4 million in constant year 2000 dollars, including the on-going hale and course operations, with a stabilized operating payroll (on and off-site positions) of about $5.5 million. The total direct costs capital investment required for the community will be about $156.9 million, or the equivalent of a large resort hotel. Area contractors and suppliers should reap profits approaching $22 million from the project.

Consumer Expenditures. Discretionary expenditures by project residents/guests into the West Hawaii region on a stabilized basis are forecast to be $12.83 million per year, and total more than $95 million during the 15 year construction period. Full-time resident income is forecast at $2.58 million annually.

5.7.2.2 Fiscal Impacts / Government Revenues

Existing Conditions

The property taxes for the project site is currently assessed for vacant and unimproved agricultural land by the County of Hawaii. There are currently no public expenditures being made for direct services to the site due to its inaccessibility and undeveloped nature.

Potential Impacts and Mitigative Measures

Development of Keopuka Lands would bring additional tax revenues to the County and State governments. County government revenues would be principally in the fore of real property taxes on the new assessments on subdivided properties and facilities. Revenues to the State government would be comprised principally of General Excise Tax on construction expenditures and specific excise taxes and personal income taxes paid by additional employees and new State residents.

At build-out the assessed value of the project will be an estimated $181.2 million, generating some $2.72 million annually in property taxes for Hawaii County.

During the 15 year construction period, total personal state income taxes paid by the workers and residents is estimated to total $24.1 million, with an additional $750,000 paid annually on a stabilized basis. Corporate/business taxes during the build-out will total nearly $1 million exclusive of those paid by the developer.

The State will reap an estimated $8.1 million in gross excise taxes during the construction time-frame, and some $1.16 million annually after build-out.

The costs of the community to the public purse will be approximately nine million dollars during the construction period, split between the State ($7.1 million) and the County ($1.9 million). On a stabilized basis the annual cost total will be some $951,000 for the State and $253,000 for the County.

Overall, the State will see a net benefit of $25.8 million in benefits versus costs during the construction period, and more than $3 million annually thereafter. The County will have an aggregate benefit of more than $23 million during build-out and $2.4 million yearly thereafter. In no year will either the State or County pay out more in costs as a result of the project than received in primary taxes.

5.8 PUBLIC INFRASTRUCTURE

The preliminary civil engineering assessment for the project has been prepared by Belt Collins & Associates and includes traffic circulation, potable water and irrigation systems, wastewater facilities, on site drainage, solid waste collection and disposal, and electrical and communications systems.

5.8.1 Traffic Circulation

Regional traffic conditions and the proposed project's impact on area roadways has been described in Section 5.2. An internal roadway and circulation system will serve the Keopuka Lands project.

Internal Roadways

The site is unimproved (with the exception of 30+ acres in orchard cultivation) with only a mauka-makai jeep road through the middle of the property. This road is connected to Mamalahoa Highway.

The proposed Project roadways pavement sections will be designed to County of Hawaii subdivision standards. The roadway alignments will facilitate grading, utility, and lot design. Particular care will be exercised in the roadway layout in order to preserve any significant archaeological preservation features and to minimize potential impacts to natural topographic conditions.

The main collector roads will be constructed within minimum 60-foot rights-of-way. The developer will explore with the County roadway design features to maintain the rural character of the area and aesthetic theme of the development. The minor streets will also be designed using County of Hawaii paving design criteria and will be constructed in accordance with the requirements of the County.

Potential Impacts and Mitigation Measures

All roadway improvements will be funded by the applicant and satisfy the requirements of the County of Hawaii. The internal roadway system will consist of collector roads, minor roads, and cul-de-sacs, which satisfy the requirements of the County of Hawaii. The roads will provide access to the proposed development as well provide access for emergency vehicles.

5.8.2 Potable Water System

Existing Conditions

The Project Area is located within the area serviced by the South Kona Water System operated by the Hawaii County Department of Water Supply (DWS). Figure 18 displays the existing water system in the vicinity of the Project. Water would be supplied from the existing Halekii Tank, which is approximately one mile North of the Project Area. The Halekii Tank has a volume of 250,000 gallons and has a bottom elevation of 1747.2 feet above mean sea level. Water would be conveyed from the Halekii Tank to the Project Area via an existing 8-inch diameter pipe located along Mamalahoa Highway.

Potential Impacts

According to the County DWS a connection to the existing 8-inch diameter line in Mamalahoa Highway could be made. A construction of a well and adequate storage to address the maximum day use and fire flow will probably be required.

The total average daily demand for potable water is projected to be 117,000 as shown in Table 6 based on the requirements of the DWS. Adequate water commitments shall be secured from the DWS and/or developed both on and off site to satisfy the water requirements for the proposed project.

Table 6. Estimated Average Daily Potable Water Demand

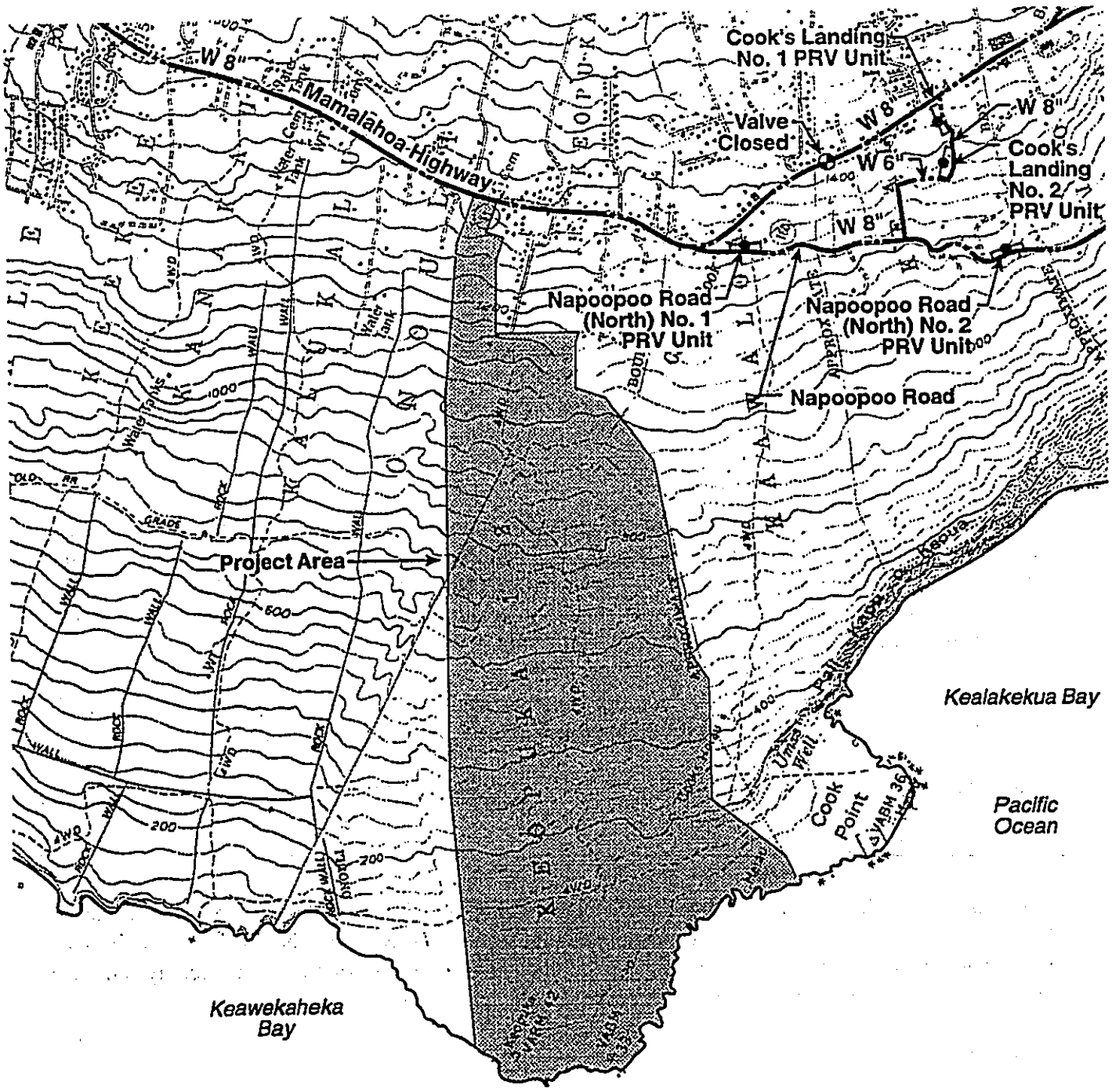
Proposed Use	No. of Units	Average Daily Demand (gallons/unit)	Estimated Demand (gallons per day)
Dwelling Units	125	400	50,000
Member's Hale	100	400	40,000
Golf Clubhouse	1	20,000	20,000
Golf Maintenance Facility	1	2,000	2,000
Sewage Treatment Facility	1	5,000	5,000
TOTAL			117,000

Source: Waimea Water Services (April 2000)

Mitigation Measures

All potable water system improvements will be developed and funded by the applicant. According to the evaluation of water resources for the Lands of Keopuka Report (see Appendix B), there are adequate water resources in the region to meet the requirements for the proposed project. The installation of a new well and pump should not have an impact on the basal lens.

Water conservation measures such as low flow water fixtures could be used to reduce water usage. In addition, the areas irrigated with potable water can be controlled or limited to reduce the amount of water used for irrigation purposes. The selection of plants that do not require much water and the use of underground irrigation systems can also help to reduce water use.



LEGEND

Project Area

W 8" Existing Water Line

Source: Belt Collins Hawaii

FIGURE 18

Existing Water System

KEOPUKA LANDS

0 1000 2000 FEET

98

June 2000

5.8.3 Irrigation System

Existing Condition

There are no existing non-potable water systems in this area.

Potential Impacts

A brackish water system is planned to meet the major irrigation water demands for the golf course, landscaped areas, and possibly agricultural uses. The system would consist of wells and distribution system. The estimated average demand for irrigation water is approximately 1.15 million gallons per day. The irrigation well(s) are proposed to be developed on site in the area of the Mamalahoa Bypass Road (see Appendix B). The brackish water is planned to be stored in irrigation lakes within the project area and distributed via a piping network to golf course fairways, open space buffer and agricultural areas.

Mitigation Measures

Use of the brackish water system to satisfy the requirements of the golf course, landscaped areas, and agricultural and open space areas will significantly reduce the demand for potable water. Water conservation measures such as drip irrigation systems should be utilized where practical. In addition, the size of the landscaped areas can be controlled and other areas can be maintained in a natural condition to reduce the demand for water.

Use of natural plants that have low water requirements is an excellent way of reducing the irrigation needs. Landscape designs could also include the use of attractive dry land plants.

5.8.4 Wastewater Facilities

Existing Conditions

The project area has a 30-acre macadamia nut orchard and the remainder of the site is vacant. Consequently, there are no existing wastewater facilities on the project site. The wastewater in this area is generally treated by cesspools. There are no municipal wastewater systems in the vicinity and there are no known plans to install a municipal wastewater system in this area.

Potential Impacts

A wastewater collection system is required for the proposed project. A system of gravity sewer lines, wastewater pump stations and force mains will convey the wastewater to a central location. Since there is no existing wastewater collection and treatment facility nearby, a private on-site wastewater treatment facility is proposed for this project. A potential site for the wastewater treatment facility is in a central location of the property in the vicinity of the golf maintenance yard. A detailed alternatives study will be completed during the design phase of the project to specifically locate the facility.

The wastewater treatment plant would have the capacity to treat all the wastewater generated from the proposed development, which is estimated to be 100,000 gallons per day. The level of treatment will vary

depending on the method of effluent disposal selected to satisfy the requirements of the Hawaii State Department of Health (DOH). Three options for the disposal of the effluent are considered viable for this project. These options are described below.

Option 1 – This option consists of mixing the wastewater effluent with brackish water utilized for golf course irrigation. R1 level of treatment would be required for this option. R1 treatment is the highest level of treatment required by the DOH.

Option 2 – This option consists of utilizing a separate irrigation system for the disposal of wastewater effluent only. This irrigation system could utilize an underground irrigation system, such a drip irrigation system, or limit the spray irrigation system to an area which has a minimum separation of 500 feet from residential areas. R2 level of treatment would be permitted for this disposal option.

Option 3 – This option utilizes injection wells. Injection wells are generally not utilized as the primary effluent disposal method, but rather as a back up to Option 1 or 2. Any injection wells would have to be installed below the Underground Injection Control line.

During the design phase, these options can be evaluated in detail to determine the best solution. Construction of an engineered wastewater treatment and disposal facility meeting DOH requirements is not anticipated to result in adverse impacts on the environment, provided that the facility is properly operated.

Mitigation Measures

A new wastewater collection system and wastewater treatment facility is planned to be provided which satisfies the requirements of DOH. R1 or R2 level of treatment is planned for the wastewater facility. This level of treatment will reduce the biochemical oxygen demand of the wastewater by a minimum of 90 percent and reduce the total suspended solids by a minimum of 85 percent. The treated effluent is planned to be utilized for irrigation to reduce the requirement for irrigation water. The facility will be funded, constructed and operated by the applicant.

5.8.5 Storm Drainage

Existing Conditions

Flood Insurance Rate Maps for this area do not indicate any flood zones associated with runoff generated from rainfall. This is consistent with the lack of any streams or major drainage ways within the Project site. The majority of the project site consists of ‘a‘a lava which reduces the potential for runoff to be generated from the site.

Potential Impacts

The storm drainage system is planned to consist of existing drainage ways, roadway swales, culverts, sumps, drywells, permeable ‘a‘a lava areas, and man made irrigation ponds. The ‘a‘a lava provides a

highly permeable material which can be used for the disposal of runoff. The ponds within the site can also collect and store runoff for use in project irrigation.

The storm drainage system is planned to maintain the existing drainage way wherever possible. The golf course and 'a'a lava areas could be used to collect and dispose of runoff. The runoff from the lots and roads is planned to be directed to the golf course and natural lava areas. This concept provides the opportunity to reduce construction cost and increase the potential for the runoff to percolate into the ground. Drywells and sumps are also planned to assist with disposal of the runoff where necessary.

The runoff generated from the site is estimated to increase by 200 cubic feet per second due to the installation of roads, buildings and the golf course. Normally, a golf course would not generate more runoff, however since the golf course is being constructed on an 'a'a lava area, the runoff will increase above the existing condition. The increase in runoff is planned to be stored in the ponds or disposed in 'a'a areas, drywells or sumps. No increase in runoff from the project area is anticipated.

Mitigation Measures

As much as possible, the surface runoff will be allowed to flow along natural existing drainage ways to maintain the percolation capacity currently experienced. The drainage system for the entire development would be integrated to include the golf course and other open areas to minimize the potential for runoff. Areas of natural 'a'a lava retained within the golf course, Member's Hale, and dwelling areas would help to maximize the potential for water to percolate into the ground. Sumps and drywells can also be utilized to reduce the potential for runoff from the site. With the implementation of the mitigation measures, the runoff from the site is not expected to increase.

5.8. 6 Solid Waste Collection and Disposal

Existing Conditions

The solid waste generated from the surrounding area is deposited at the Ke'ei waste transfer station. The County of Hawaii transports this waste to the West Hawaii Landfill located approximately 28 miles to the north.

Potential Impacts

Solid wastes would be generated during the construction phase and from normal operation of the proposed development. During the 10 to 15 year construction phase, a total of 2,300 tons of solid waste may be generated from construction related activities. Table 7 displays the estimated amount of solid waste generated during construction activities.

Table 7. Estimated Waste Generation During Construction Phase

Source	No. of Units	Tons per Unit	Estimated Waste Generation (tons)
Agricultural Dwelling Units	125	12	1,500
Member's Hale	100	7.5	750
Golf Clubhouse	1	20	20
TOTAL			2,300

Source: Belt Collins & Associates

Following the project construction, the amount of solid waste generated at build out is estimated to be 140 tons per year. Table 8 displays the estimated solid wastes generated by the proposed project. The solid waste from golf course activities and from the member's hale would be collected by a commercial hauler and disposed at West Hawaii Landfill. The agricultural lots may utilize the County's transfer station or a commercial hauler.

Table 8. Estimated Waste Generation During Operational Phase

Source	No. of Units	Tons per Unit per Year	Estimated Waste Generation (tons/Year)
Agricultural Dwelling Units	125	0.6	75
Member's Hale	100	0.5	50
Golf Clubhouse	1	10	10
Golf Maintenance Facility	1	5	5
TOTAL			140

Source: Belt Collins & Associates

Mitigation Measures

During the construction phase, whenever practical, solid wastes will be minimized and/or recycled. Green waste can be recycled and utilized on-site. Wood wastes may also be processed on-site, if practical, depending on the type of wood and the ability to chip the wood and used on-site. Cardboard and metal may be recycled off-site if practical. The remaining categories of wastes such as drywall may be recycled if a local recycling vendor is available. Otherwise, these wastes will be disposed in the landfill.

During the operational phase, the green waste can be processed on-site. Waste that cannot be incorporated into green waste processing on-site can be minimized and/or recycled when practical, and the remainder will be disposed in the landfill. Agricultural lots may have recycling collection, which may include aluminum, paper, newspaper, glass, and plastic containers. The wastes associated with commercial activities such as the member's hale, golf clubhouse, and golf course should also be recycled when practical.

5.8.7 Electrical and Communication Systems

Existing Conditions

The Hawaii Electric Light Company (HELCo) Captain Cook electrical substation provides the electrical power for the project area. A 69 KV transmission line is located along Mamalahoa Highway and links the Captain Cook substation to the electrical generating facility near Keahole Airport.

The current generating capacity of the HELCo system is approximately 200 megawatts. HELCo is in the process of adding capacity to its generation system including the Agreement to purchase power from the Hamakua Cogeneration Facility in Honokaa. Through this facility and other improvements, HELCo plans to address the Island's long-range demands for power and the development of generating capacity near the principal areas of demand.

Telephone service to the project area is provided by Hawaiian Telephone Company (HTCo) via their Kailua-Kona facilities.

Cable television service (CATV) is provided to the project area via a private cable company's system serving the Kona area

Potential Impacts

The electrical demand from the proposed development is estimated to be approximately 2.3 megawatts. Based on information provided by HELCo (Letter dated April 24, 2000 in Section 12 Comments and Responses), adequate generating capacity is anticipated. However, a new substation located close to Mamalahoa Highway is required. The new substation would interconnect with the existing 69 KV transmission line and convert the voltage to 12,470 volts to serve the existing development.

The electrical and communication lines on site are planned to be installed in underground ducts systems and conform with the requirements of the various utility companies.

Mitigation Measures

Energy efficient and conservation measures to reduce the maximum electrical demand should be considered for implementation into the project where feasible. These measures would include power factor corrections, the use of energy efficient pumps and scheduling certain types of loads to run during off-peak hours whenever practical. Further efforts to minimize energy consumption may include inclusion of select items from the "Hawaiian Design Strategies for Energy Efficient Architecture" (Energy Division of the State Department of Business, Economic Development and Tourism) into the Project's design guidelines.

Residents of the project can also reduce their home energy consumption through the use of the energy conservation measures listed below.

- Locating buildings to minimize the head loads and to effectively utilize trade winds for indoor and outdoor living and recreational spaces.

- Use of high-efficiency light sources and ballasts for indoor and outdoor lighting purposes.
- Use of high-efficiency refrigerators; washers and dryers, and ranges.
- Use of high-efficiency air conditioners.
- Use of heat pump and solar water heating systems.
- Facilitating energy saving opportunities through innovative architectural design of the buildings.

5.9 PUBLIC SERVICES

5.9.1 Schools

Existing Conditions

The project is served by the Konawaena School complex, located in Kealakekua. The complex serves the area from Keauhou Road south to Milolii.

Konawaena High School's present enrollment is 1,187 students. The school has a capacity of 1,533 students. The enrollment projection for next school year is 940 students, and the five-year projection for School Year 2005-2006 is 965 students. The drop in enrollment is due to the completion of the Kealakehe High School that will serve students residing north of Keauhou. The new school will accommodate grades nine through eleven, and grade twelve will be accommodated the following year.

Konawaena Middle School is fed by Honaunau Elementary, Hookena Elementary, and Konawaena Elementary Schools. The Department of Education plans to expand the middle school by adding sixth grade to the seventh and eighth grades it now serves. The school's current enrollment is 231 students, and the school has a capacity for 189 students. The projection for next year is 238, and the five-year projection is 638 students.

Konawaena Elementary School's enrollment is currently 765 students, and the school has the capacity for 625 students. Projections are 765 next year, and 625 in 2005-2006.

A new Konawaena Elementary School campus is under construction and is expected to be in service next year. This will allow the middle school, now housed in a group of plantation houses and portable buildings, to move to the elementary school campus.

Potential Impacts and Mitigative Measures

The potential impact of the project on public schools ranges from five to 57 students. The lower estimate is due to the second home market which is expected to have a permanent population of 26 persons with approximately 5 being children between the ages of five and 17.

The higher estimate is based on the Department of Education's standard formula for projecting school enrollments. The DOE calculates that the Keopuka Lands projected enrollment includes 31 students for Konawaena Elementary School, 13 for Konawaena Middle School, and 13 at Konawaena High School.

While this range of student population increase will impact the area's schools, two of which are operating over capacity, the planned improvements and new facilities will help to accommodate future population growth, including that attributable to this project.

5.9.2 Police

Existing Conditions

The Kona Police Station, which serves both North and South Kona Districts, is located north of Keopuka on Queen Kaahumanu Highway in Kealakehe. There are 42 patrol officers working three shifts,with 13 officers assigned to each shift Seven officers are on patrol at any one time. The Kona Police Station is a 24-hour station.

The area of the project comprises two police beats,and one officer assigned to each beat. One beat is geographically located between Keauhou mauka and Kealakekua, and the other beat extends from Kealakekua to Manuka State Park south of Milolii. These beat officers use the facilities at the Captain Cook substation.

Potential Impacts and Mitigative Measures

The Keopuka Lands project will impact police services because it will increase the resident and de facto population on the property. Relative to the total population of the region, however, the level of project-related population increase is not considered to be significant and no mitigation is necessary. Further, the need for onsite police protection may be mitigated by the presence of onsite private security personnel.

5.9.3 Fire Protection

Existing Conditions

The Captain Cook Fire Station, located less than a mile from the project site, covers the area from the Hokukano Ranch cut-off road in Kainaliu to the Manuka State Park south of Milolii. The Captain Cook Station has three shifts per day, with each shift staffed by five or six firefighters. Equipment includes a triple combination pumper with a capacity of 1,000 gallons, a mini pumper with a capacity of 250 gallons, and an ambulance.

Keauhou Fire Station serves as a back-up station. Equipment includes a triple combination pumper and an ambulance.

Potential Impacts and Mitigative Measures

The project will increase the residential population and number of structures in the service area, and therefore increase the need for fire protection services. Relative to the total number of people and

structures in the fire station area, current facilities can adequately serve the project without significant impact. Hence, no mitigation is needed.

The Project area police and fire services are provided by facilities located in Captain Cook, less than a mile from the Project area. At present, these facilities are adequate to serve existing area requirements. The police station is a substation of the main facility located just north of Kailua-Kona at Kealakehe. The fire station is staffed by 18 men divided into three shifts providing 24 hour coverage. Equipment consists of a 1,500 gallons per minute (gpm) pumper carrying 1,000 gallons of water, a mini-pumper 4X4 carrying 300 gallons of water, and an ambulance.

The Project buildout will generate additional fire and police protection needs as well as health care related services. The level of impact and adequacy of existing service levels to serve the Project will be fully evaluated in the Draft EIS.

5.9.4 Health Care

Existing Conditions

The project site is within the service area of the Kona Community Hospital located approximately 3.5 miles north of Kealakekua. The hospital is administered by the Hawaii Health Services Corporation and is staffed by 60 doctors and 400 employees. An additional 40 consultant doctors are also available.

The facility's 75 hospital beds include 53 acute care beds and 22 long-term care beds. Nine of the acute care beds are in an Intensive Care Unit. An additional 12 psychiatric beds will be available by the end of summer 2000, and a Magnetic Resonance Imaging (MRI) unit will be operating by December.

Most surgery needs can be met at the hospital. The Kona Community Hospital occupancy is approximately 80 percent. During the high season, February through April, it is often at 100 percent. Due to the present maximization of occupancy and need for expansion, the Hospital is already exploring options for expansion in the Kailua area.

The other health maintenance facility in the area is the Keauhou Rehabilitation and Health Center, a nursing home in Keauhou with 94 beds. Occupancy averages 90 percent.

Potential Impacts and Mitigative Measures

The proposed project will impact the hospital system by increasing the residential population in the hospital's service area. Given the proportion of increase relative to the total population, however, project-related population increases are not significant. Further, any impact would be mitigated when the hospital implements its plans for expansion.

5.9.5 Recreation Facilities

Existing Conditions

The vicinity of the project site is served by the following County parks and facilities:

- Greenwell Park and a community center (2.7 acres) in Captain Cook
- Kona Scenic Subdivision Park (5 acres dedicated to the County) in Kealakekua
- Higashihara Park (5 acres) north of Kainaliu
- Honaunau Boat Ramp
- Honaunau Rodeo Arena
- Hookena Beach Park

The first three parks feature a baseball field. The County also owns and maintains the swimming pool at Konawaena High School in Kealakekua.

In addition to the County parks, the State Department of Land and Natural Resources manages two parks in the region. These are the Kealakekua Bay State Historical Park and Kealakekua Bay Underwater Park.

The 181.7 acre Kealakekua Bay State Historical Park includes portions of Napoopoo, Kaawaloa and Pali Kapu o Keoua, overlooking Kealakekua Bay. The Park area includes Hikiau Heiau, which is the site where the resident population received Captain James Cook in January 1779. Less than a month later, Cook was killed at Kaawaloa. At Kaawaloa a white obelisk is erected near the spot where Cook was slain.

With respect to Kaawaloa, the Kealakekua Bay State Historical Park Conceptual Plan states:

> *Because of its recent isolation Kaawaloa is perhaps the best preserved archaeological complex within Kealakekua Bay State Historical Park. The conceptual plan seeks to retain and enhance this historical setting, provide interpretive trails through selected historic features, and maintain controlled recreational opportunities along the shoreline. Kaawaloa will be the least developed area within the historic park.*

The 315-acre Kealakekua Bay Underwater Park was designated a Marine Life Conservation District in 1969 to preserve and protect the underwater features and life forms.

Potential Impacts

The proposed Keopuka Lands project may impact public recreation resources in the area in the following ways:

- The project will expand the region's recreational resources through the establishment of an open space buffer along the entire frontage of the project site. This coastal resource will generally be kept in its natural state for recreation and public access. While public access will be maintained at the Old Government Road and the Old Cart Trail, hiking access will be encouraged at a new proposed coastal trail which will link to the Kaawaloa portion to the south of the project and the

adjacent property to the north. The planned improvements also include a comfort facility and appropriate landscape improvements.

- The additional population may increase competition for recreational resources. Project-related increase in competition for recreational resources is not significant, however, when considered in the context of the total resident and visitor population. Therefore, no population-related mitigation was found to be warranted by the social impact assessment study.

- The proximity of the proposed development to Kealakekua Bay and its recreational resources may affect the visual experience of those who visit these resources. However, while the distance between the bay and the project is close, the photographic analysis (Figure 16C) clearly indicates that the presence of the Pali Kapu o Keoua wall and the existing vegetation would obscure the project from within the bay and around Cook Point.

- The Kaawaloa area within the Kealakekua Bay State Historical Park is presently utilized by hikers, kayakers, and horse riders. While no camping is allowed in this area, the area is heavily used during the daylight hours without any restroom or other services available. There is a community concern about the use of this area without appropriate infrastructure and management.

Mitigative Measures

The Keopuka Lands Project will provide increased recreational opportunities which include an 18-hole golf course and related amenities and improvements along the 0.8 mile length of the coastal Conservation lands.

The 40 acre Coastal Open Space portion of the project will be retained as open space. A trail is proposed to be constructed along the shoreline to provide public access across the property, to provide access for fishing and gathering, and to connect to the Kaawaloa portion of the Kealakekua Bay State Historical Park. In addition, the proposed improvements within the area include the construction of a small camping area to support the existing camping activities in the area.

In response to the community concerns about the lack of infrastructure and services relative to the current use of the Kaawaloa portion of the Kealakekua Bay State Historical Park, the Keopuka Lands project is proposing to provide resources to assist the State DLNR, Division of State Parks in the management of this area. In this regard, the Keopuka Lands project is commencing discussions with the Division of State Parks to determine actions that may become appropriate improvement extensions in an "adopt-a-park" type of scenario, while maintaining distinct property boundaries at the Keopuka / Kaawaloa borders.

Possible Improvements and/or activities, which would be accomplished under the supervision and direction of the Division of State Parks, may include the following:

- Construction of a restroom facility at the "Boat Land" (Cook's Landing) area

- Maintenance of historical and archaeological sites within the area

- Rubbish pick up and other services
- Landscaping and vegetation control as appropriate
- Other service or improvements as agreed to by Division of State Parks and Keopuka Lands

6.0

Relationship of the Proposed Action to Land Use Plans, Policies, and Controls for the Affected Area

6.0 RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

The processing of various permits and approvals are prerequisites to implementation of the Keopuka Lands project. Relevant State of Hawaii and County of Hawaii laws, ordinances, land use plans, and policies as primarily described in Section 3.0 are described in this section.

6.1 STATE OF HAWAII

Several chapters of the Hawaii Revised Statutes (HRS) apply directly to the implementation of the Keopuka Lands project. These include:

4) Chapter 205 (Land Use) which establishes the State Land Use Commission and the four land use districts in which all land in the State is designated;
5) Chapter 205A (Coastal Zone Management) which establishes the Coastal Zone Management Program;
6) Chapter 226 (Hawaii State Planning Act) which sets forth the Hawaii State Plan and requires state agencies to draft implementing functional plans; and
7) Chapter 343 (Environmental Impact Statements), which establishes a system of environmental review to ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.

The following sections discuss these laws in relation to the Keopuka Lands project.

6.1.1 State Land Use, Chapter 205, Hawaii Revised Statutes

Chapter 205, HRS, establishes the State Land Use Commission and gives this body the authority to designate all land in the state within one of four districts: Urban, Rural, Agricultural, or Conservation. The Keopuka Lands are within the Agricultural and Conservation districts (as shown Figure 4).

Subject to the obtaining of all relevant permits (as primarily describe in Section 3), the proposed land uses of the Keopuka Lands project will be in conformance with all provisions of Chapter 205, HRS. Specifically, within the Agricultural district golf courses are a permitted use, provided that they are not located within Agricultural district lands with soils classified by the Land Study Bureau's detailed land classification as overall (master) productivity rating class A or B. The Keopuka lands are rated E, and are unsuited for soil-based forms of agriculture. Therefore the golf course is permitted in the Agricultural District. However, under the County Zoning Code, a Use Permit is required for the construction of a golf course.

Chapter 205 also specifies that the counties may further define uses on Agricultural district lands with soils classified as C, D, E, or U, provided that the minimum lot size shall be at least one acre. No lots in the Keopuka Lands project will be less than one acre. Further, the Hawaii County Code (Section 25-5-77(b)) allows one single family dwelling on lots in the Agricultural district, provided that the dwelling

is located on or used in connection with a farm or if the agricultural activity provides income to the family occupying the dwelling. Single-family dwellings will be in compliance with this requirement.

The Hawaii County Code also permits lodges on County Agricultural lands located in the State Agricultural district provided that a Special Permit is obtained. The applicant will seek a Special Permit in accordance with Section 205-6 of Chapter 205, HRS, prior to construction of the proposed membership accommodations.

The portion of the property located within the State Conservation district, primarily along the coastline, will remain in permanent open space. This is consistent with Section 205-2(e) of Chapter 205, which states, in part, that Conservation districts shall include areas necessary for preserving scenic and historic areas; providing park lands, wilderness, and beach reserves; and for providing open space areas whose existing openness, natural condition, or present state of use, if retained, would enhance the present or potential value of abutting or surrounding communities, or would maintain or enhance the conservation of natural or scenic resources. A Conservation District Use Permit would be required for public access trails and other low-impact improvements including an improved camping area with parking and comfort facilities within the Conservation District.

6.1.2 Coastal Zone Management, Chapter 205A, Hawaii Revised Statutes

The objectives of the Hawaii Coastal Zone Management (CZM) Program, as set forth in Chapter 205A, HRS, include the protection and maintenance of valuable coastal resources. The proposed project conforms to applicable CZM program objectives and policies of Section 205A-2 as indicated below.

Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

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

i. Protecting coastal resources uniquely suited for recreation activities that cannot be provided in other areas;

iii. Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

iv. Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

Discussion: At present, access to the shoreline in the project area is limited due to the lack of convenient access, roadways, and parking. Development of the Project for the proposed uses will provide the public with improved vehicular and pedestrian access to the coastal resources. Historic trails (or portions thereof) would be preserved for pedestrian access. In addition, recreational improvements would include a parking area and comfort facilities at a camping area. Provisions in the access plan will protect the shoreline resources, as well as historically significant sites. The development of a new coastal trail will further enhance public access to the area.

Historic Resources

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

Policies:

A) Identify and analyze significant archaeological resources;

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

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

Discussion: A full archaeological inventory survey of the 660 acre property has been conducted by PHR1 and CSH. As a result of the archaeological inventory surveys, historic sites have been identified. As applicable, their documentation, protection, and restoration are incorporated as part of the plans for the proposed development. In accordance with the recommendations of the consulting archaeologists and other community resource persons, important sites will be preserved and integrated with a pedestrian trail network. The coastal complex of sites will be preserved and will blend with the adjacent Kealakekua Bay State Historical Park.

Scenic and Open Space Resources

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

Policies:

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

C) Preserve, maintain, and where desirable, improve and restore shoreline open space and scenic resources.

Discussion: The Keopuka Lands development will protect and maintain the quality of coastal, scenic, and open space resources. The golf course, infrastructure and related facilities within practical limits, will be designed to take advantage of the natural contours of the land and minimize adverse effects on the environment. The golf course, open space and landscaped areas, coupled with the low density of the project, will ensure that the area's open space and scenic resources are maintained.

With regard to maintaining scenic views, the proposed facilities would retain a low profile to maintain coastal views from mauka areas of the property. Planned facilities are located such that views along the coast would not be obstructed since development within the Conservation District will be limited to

public access and recreational improvements and the low density of the overall development will maintain the majority of the site as open space. Coastal open space and landscaping will be incorporated into the project design to ensure the smooth visual integration of the project and makai views. All building facility designs will conform to County zoning and building regulations.

Coastal Ecosystems

Objective:

Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

A) Improve the technical basis for natural resource management;

B) Preserve valuable coastal ecosystems of significant biological or economic importance.

Discussion: To assure that groundwater and nearshore marine water quality is maintained, standard engineering and design precautions and adherence to State, County and Federal standards will be followed in the design of the project. This includes meeting all State NPDES permitting requirements. Construction specifications will provide plans and describe techniques to mitigate soil erosion and control sediment in accordance with County requirements. Design techniques will minimize required grading and the potential for soil erosion by the establishment of onsite detention basins, as required. Retention basins will serve as irrigation ponds to ensure that surface water remains on the property long enough to reduce its velocity thereby controlling erosion. Surface water runoff to existing swales and drainages will be limited to pre-construction volumes where discharging onto other lands. Other mitigation measures have been incorporated as part of the golf course planning, design, and operation to mitigate—to the furthest extent practical—the potential for nutrients or chemicals associated with the golf course maintenance from impacting groundwater or coastal waters. These measures include:

- In areas below the 100-foot elevation (MSL), engineering the golf course and with a drainage system designed to collect storm water runoff or irrigation water passing through the soil layer and conducting this to the irrigation ponds for reuse on the course;

- Implementing an Integrated Golf Course Management Program (IGCMP) aimed at minimizing the use of chemicals for golf course maintenance and ensuring safe handling and storage of all chemicals;

- Adopting Hawaii proven biorational pest control methods when appropriate; and

- Implementing a water quality monitoring and mitigation program to ensure ongoing monitoring of soil and coastal waters for chemicals used in golf course maintenance and, if indicated, implementing appropriate mitigation measures.

Collectively, these measures represent the state of the art in environmentally sensitive golf course design and management and are proposed as part of the development to ensure protection of the coastal ecosystems. Additionally, as a basis for the proposed water quality monitoring and mitigation program,

a quantitative assessment of the marine communities and water quality was conducted for the coastal waters fronting the project site, thus providing a strong technical basis for the ongoing monitoring of the coastal marine environment.

Economic Uses

Objective:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

B) Insure that coastal dependent development such as harbors and ports, visitor industry facilities and energy generating facilities are located, designed and constructed to minimize adverse social, visual and environmental impacts in the coastal zone management area.

C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long term growth at such areas, and permit coastal dependent development outside presently designated areas when . . . adverse environmental effects are minimized.

Discussion: The proposed development is significantly removed so as not to impact the surrounding communities, however, it is appropriately located as to make efficient use of certain existing infrastructure and public facilities. Additionally, the project site has the desired scenic and climatic environment to support the agricultural/residential/recreational development as proposed. Careful planning and design of the proposed project will minimize any potential adverse social, visual and environmental impacts. The development of Keopuka Lands will provide direct and indirect employment to County residents and will increase property values to generate a new source of revenue to the County.

Coastal Hazards

Objective:

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

Policies:

B) Control development in areas subject to storm wave, tsunami, flood, erosion and subsidence.

C) Ensure that developments comply with the requirements of the Federal Flood Insurance Program.

Discussion: All habitable structures within the proposed development will be located 300 feet inland and outside areas of potential tsunami, high storm or wave action. Public access to the shoreline areas will be managed to control access during times of high wave action or tsunami danger. No significant development or habitable structures will be located in the Conservation District which may experience high wave inundation from time to time. There are no drainageways on the property. Additionally, the governmental agency and public review of this EIS, along with the various permits required for the

proposed project, ensure that adequate governmental controls would be applied. The proposed project will be designed and constructed in compliance with all applicable Federal, State, and County environmental protection, design, and building standards and regulations, including the Federal Flood Insurance Program.

Managing Development

Objective:
Improve the development review process, communication and public participation in the management of coastal resources and hazards.

Policies:

A) Effectively utilize and implement existing laws to the maximum extent possible in managing present and future coastal zone development.

B) Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements.

C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the general public to facilitate public participation in the planning and review process.

Discussion: This EIS has been prepared in compliance with existing State and County environmental rules (Chapter 343, HRS, and Chapter 200, Hawaii Administrative Rules (Department of Health Environmental Impact Rules)). It will be used as the environmental documentation for the required permit applications. Further, the Developer has been meeting with appropriate State and County agency personnel as well as affected and interested community groups and individuals to communicate the plans for the project and to solicit their comments for incorporation into the planning process and this EIS. Public review of the EIS also assures adequate public and governmental agency review of the project.

A series of community informational meetings are scheduled at the early stages of the project (during the EIS review period) for the surrounding community and the community at large at meeting locations nearby the Project. The objectives of the meetings include dissemination of information and public input in the planning process of the Project.

In addition, the Project will require several permits (as described in Section 3 of this report) which will include public notification and hearings.

Public participation will therefore, be accomplished through the following avenues: (1) Circulation of the EIS to all interested and affected parties, (2) applicant sponsored community informational meetings to exchange information, and (3) additional meetings and hearings during the permitting phases.

Marine Resources

Objective:
Implement the State's ocean resources management plan.

Policies:
(1) Recreational resources;
- *(A) Improve coordination and funding of coastal recreational planning and management; and*
- *(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:*
  - *(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*
  - *(iii) Providing and managing adequate public access, consistent with conservation and natural resources, to and along shorelines with recreational value;*
  - *(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for shoreline recreation;*
  - *(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;*

(10) Marine Resources
- *(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;*
- *(B) Assure that the use and development of marine resources are ecologically and environmentally sound and economically beneficial;*
- *(C) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;*
- *(E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources*

Discussion: The Keopuka coastline consists of a rocky lava cliff ranging from 10 to 20 feet high. There are no sand beaches along the 0.8 mile length. Consequently, uses are limited to fishing along the southern boundary near the Keopuka/Kaawaloa boundary. Access to the fishing ground at Keopuka is provided to the public by the landowner, Pacific Star LLC, on a "first come first served" basis. At the present time there are no existing improvements.

The Keopuka Lands conceptual master plan includes coastal area improvements which would improve access and provide parking and comfort facilities to augment the existing fishing campground which would continue to be utilized by fishermen on a first come first served basis. The planned facilities would be sized to serve the existing level of use (approximately 12 persons) to properly manage the resources. In addition, a new coastal trail is planned with appropriate landscaping along its route.

Pacific Star has also initiated discussions with the State DLNR Division of State Parks to consider ways to coordinate the transition of "park" improvements between Keopuka and Kaawaloa. The Keopuka

Lands master plan promotes stewardship the marine and the archaeological resources within the coastal area.

The Project will also implement Best Management Practices (BMPs) in the construction grading of each phase, during operation of the golf course, and in the agricultural areas to minimize erosion and sedimentation, and pollutants entering the marine environment.

Water samples along the South Kona coast has been monitored for water quality by marine researchers with the quality found to be good. A program for water quality monitoring in accordance with the requirements of the Department of Health has commenced and will be implemented on an on-going basis to monitor for specified pollutants during the construction and operational phases of the golf course. This body of work will contribute towards the overall archive of information for the marine environment at South Kona.

6.1.3 Hawaii State Plan, Chapter 226, Hawaii Revised Statutes

The Hawaii State Plan (Chapter 226, HRS), establishes a set of goals, objectives and policies that serve as long-range guidelines for the growth and development of the State. The Plan is divided into three parts: Part I (Overall Theme, Goals, Objectives and Policies); Part II (Planning, Coordination and Implementation); and Part III (Priority Guidelines). Part II elements of the State Plan pertain primarily to the administrative structure and implementation process of the Plan. As such, comments regarding the applicability of this part to the proposed project are not appropriate. The following sections of the Hawaii State Plan are directly applicable to the proposed project:

Part I: Overall Theme, Goals, Objectives and Policies

The Hawaii State Plan lists three "Overall Themes" relating to: (1) individual and family self-sufficiency; (2) social and economic mobility; and (3) community or social well-being. These themes are viewed as "basic functions of society" and goals toward which government must strive (§226-3). To guarantee the elements of choice and mobility embodied in the three themes, the Plan states three goals:

1) *A strong, viable economy, characterized by stability, diversity and growth that enables fulfillment of the needs and expectations of Hawaii's present and future* generations.

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.*

3) *Physical, social and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring and of participation in community life (§226-4).*

Discussion: The proposed project would contribute to the attainment of the three goals by 1) providing direct and indirect short and long-term employment opportunities for the present and future residents of South Kona and West Hawaii; 2) generating increased State and County tax revenues; 3) contributing to the stability, diversity and growth of local and regional economies; and 4) protecting the archaeological, historic, and natural features of the site. Key elements of the proposed Project relative to the above noted

goals are that it would provide 1) additional employment, recreational and cultural opportunities for existing and future residents of South Kona and West Hawaii; 2) a planned setting wherein design, operation and maintenance and environmental protection provisions can be effectively, efficiently and economically controlled; 3) opportunities close to existing and planned developments such that travel times are minimized and yet would be sufficiently separated from planned or existing residential developments such that the activities within the proposed project are not a nuisance to nearby residential communities or other related activities. By providing recreational, educational and cultural opportunities within a planned setting, the proposed Project would enhance the sense of community responsibility and participation.

Specific objectives, policies and priority directions of the State Plan most relevant to the proposed Project are listed and discussed below. Those objectives and policies that are not listed below are those not applicable to the proposed project.

Objectives and Policies for Population (§226-5)

Objective:

It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic and social objectives contained in this chapter.

Policies:

8) Manage population growth statewide in a manner that provides increased opportunities for Hawaii's people to pursue their physical, social and economic aspirations while recognizing the unique needs of each County.

9) Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs and desires.

10) Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the islands.

7) Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

Discussion: Increasing population levels in the West Hawaii area are a concern to both State and County planners because of the lack of affordable housing, limited public facilities and services and increased demands on those facilities and services. The proposed project will have an effect on these factors, but that effect would be less than that which would occur should the project area remain undeveloped. That is, the proposed project will provide the economic means by which other elements of the overall County General Plan can be implemented. Without an income generating product, implementation of the County General Plan elements relating to housing, infrastructure, development and other employment opportunities becomes questionable.

The Keopuka Lands project is expected to provide long term economic and employment opportunities for businesses servicing and providing equipment and supplies for the golf club, members' lodge, and residential units. The development of the Project and residential neighborhoods are also expected to

contribute to the overall growth of the South Kona area in a manner demonstrated in the goals and policies of the County General Plan. As previously indicated in this EIS, marketing studies indicate a resurging market for both the project and related facilities, including the agricultural lots, thereby indicating resultant positive primary and secondary employment and economic opportunities for socioeconomic growth and development of the area. Additionally, the planned development can be coordinated with pertinent State and County agencies such that the Project would contribute to the enhancement of existing infrastructure to meet the growing needs of the surrounding area.

Objectives and Policies for the Economy—in General (§226-6)

Objectives:

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

2) *A steadily growing and diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of on the neighbor islands.*

Policies:

3) *Promote Hawaii as an attractive market for environmentally and socially sound investment activities that benefit Hawaii's people.*

4) *Expand existing markets and penetrate new markets for Hawaii's products and services.*

6) *Strive to achieve a level of construction activity responsive to, and consistent with, State growth objectives.*

9) *Foster greater cooperation and coordination between the public and private sectors in developing Hawaii's employment and economic growth opportunities.*

10) *Stimulate the development and expansion of economic activities which will benefit areas with substantial or expected employment problems.*

11) *Maintain acceptable working conditions and standards for Hawaii's workers.*

13) *Encourage businesses that have favorable financial multiplier effects within Hawaii's economy.*

14) *Promote and protect intangible resources in Hawaii such as scenic beauty and the aloha spirit, which are vital to a healthy economy.*

16) *Foster a business climate in Hawaii—including attitudes, tax and regulatory policies and financial assistance programs—that is conducive to the expansion of existing enterprises and the creation and attraction of new business and industry.*

Discussion: As a master planned agricultural and recreational community with associated member and recreational amenities, the project would add an environmentally and socially sound investment amenity to the marketing and promotion of Hawaii. Further, the project would expand an existing market and penetrate a new market for Hawaii's products and services. The proposed project would provide continued construction activity in South Kona and West Hawaii that would closely follow construction of other West Hawaii projects, thereby ensuring local construction workers continued employment, as well as providing employment opportunities for other types of construction trades. Given the present land use designations for the project site, the proposed project is consistent with State growth objectives. The proposed project would provide increased employment, income and job opportunities for Big Island residents, thereby leading to improved living standards. The development of the proposed project would also: 1) increase opportunities to enhance working conditions of businesses that would service the project; 2) increase the opportunities for businesses having favorable financial multiplier effects; and 3) provide a climate conducive to the expansion of existing businesses and the creation of new business.

Objectives and Policies for the Economy—Agriculture (§226-7)

Objectives:

2) Growth and development of diversified agriculture throughout the state.

3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic, and social well-being.

Policies:

2) Encourage agriculture by making best use of natural resources.

11) Increase the attractiveness and opportunities for an agricultural education and livelihood

16) Facilitate the transition of agricultural lands in economically non feasible agricultural production to economically viable agricultural uses.

Discussion: The Keopuka Lands project, with small agricultural lots on agricultural zoned land, will facilitate diversified agriculture by increasing opportunities for small-scale agriculture. These small farms will contribute toward a dynamic agricultural industry by allowing a range of crops to be produced on a small-scale basis. The Keopuka Lands project will also make the best use of marginal agricultural land and will facilitate the transition of agricultural lands in economically non-feasible agricultural production to economically viable agricultural uses.

Objectives and Policies for the Economy—Potential Growth Activities (§226-10)

Objective:

Planning for the State's economy with regard to potential growth activities shall be directed towards achievement of the objectives of development and expansion of potential growth activities that serve to increase and diversify Hawaii's economic base.

Policies:

1) Facilitate investment and employment in economic activities that have the potential for growth such as diversified agriculture, aquaculture, apparel and textile manufacturing, film and television production and energy and marine-related industries.

2) Expand Hawaii's capacity to attract and service international programs and activities that generate employment for Hawaii's people.

3) Enhance and promote Hawaii's role as a center for international relations, trade, finance, services, technology, education, culture, and the arts.

5) Promote Hawaii's geographic, environmental, social, and technological advantages to attract new economic activities into the State.

6) Provide public incentives and encourage private initiative to attract new industries that best support Hawaii's social, economic, physical, and environmental objectives.

Discussion: The proposed project would assist in the achievement of the above State objective and policies by: 1) providing facilities that directly promote the growth of diversified agriculture; 2) encouraging existing business to expand and provide the impetus for the creation of new businesses related to golf and real estate activities centered around the project; 3) assisting in enhancing and promoting Hawaii's role as a center for international and domestic relations, trade, finance, services and technology; and 4) promoting the State's geographic, environmental, social and technological advantages, especially given the project's location relative to the internationally known recreational facilities and sport fishing grounds off West Hawaii. Granting of the requested permits would represent the extent of public incentives required to encourage the private interests to construct homes and utilize planned facilities, thereby supporting the State's social, economic, physical and environmental objectives.

Objectives and Policies for the Physical Environment—Land Based, Shoreline and Marine Resources (§226-11)

Objectives:

1) Prudent use of Hawaii's land-based, shoreline, and marine resources.

2) Effective protection of Hawaii's unique and fragile environmental resources.

Policies:

1) Exercise an overall conservation ethic in the use of Hawaii's resources.

2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.

3) Take into account the physical attributes of areas when planning and designing activities and facilities.

4) *Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.*

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

7) *Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.*

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

9) *Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational and scientific purposes.*

Discussion: The demonstrated policy of the developers of the proposed Keopuka Lands project is to exercise a strong overall conservation ethic in the planning of all its projects. This has been demonstrated in the care and planning that has occurred with regard to the natural and historical/cultural resources found within the project boundaries and with on-going projects such as Hokulia which is located to the north of Keopuka. This same ethic would be continued with the development of Keopuka Lands to ensure compatibility between the project-associated activities, and the natural resources and ecological systems affected by the proposed project.

The planning and design of the project has taken into account the physical attributes of the property and the adjacent state lands at Kaawaloa and Kealakekua Bay. Further, it is the intention of the developer to manage the natural resources and environs of the project area so that beneficial and multiple uses are encouraged and the resources are not damaged. Granting of the requested permits and land use actions provides an additional public incentive for encouraging private actions to protect significant natural resources from degradation or unnecessary depletion. This, together with a desire to provide a desirable and marketable product, will encourage the developer to pursue compatible relationships among the activities, facilities and natural resources of the area.

The proposed project would also promote increased accessibility and prudent use of shoreline areas for public recreational purposes. Plans for the proposed Keopuka Lands project have been developed and prepared in conjunction with extensive environmental studies of the site. This EIS documents the process by which these environmental considerations have been integrated into the planning process. Although no rare, threatened or endangered species of plants, animals were encountered through these studies, native species will be respected through appropriate site planning considerations. Similarly, significant archaeological/historical features within the project boundaries will be preserved and protected in compliance with applicable DLNR SHPD rules and regulations and implementation of an approved mitigation plan.

Objectives and Policies for the Physical Environment—Scenic, Natural Beauty and Historic Resources (§226-12)

Objective:

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.

Policies:

1) Promote the preservation and restoration of significant natural and historic resources.

2) Provide incentives to maintain and enhance historic, cultural and scenic amenities.

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

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

5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Discussion: The proposed Keopuka Lands project master plan is based on the unique attributes of the land and has thus been planned and designed to maintain and/or enhance the site's natural features. Significant historical, cultural, and archaeological sites will be protected. Additionally, building lots have been planned and sited to maintain the primary vistas to the mountains and ocean as well as to avoid significant archaeological sites. The low density, golf course and landscaped character, as well as the integration of significant open space elements, will provide a means for the development to accommodate and be complemented by the surrounding land and ocean environment.

Objectives and Policies for the Physical Environment—Land, Air and Water Quality (§226-13)

Objectives:

1) Maintenance and pursuit of improved quality in Hawaii's land, air and water resources.

2) Greater awareness and appreciation of Hawaii's environmental resources.

Policies:

1) Foster educational activities that promote a better understanding of Hawaii's environmental resources.

2) Promote the proper management of Hawaii's land and water resources.

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

8) *Foster recognition of the importance and value of land, air and water resources to Hawaii's people, their cultures and visitors.*

Discussion: The proposed project has been designed and would be constructed so that the land and water resources of the area can be managed in an environmentally compatible and beneficial manner that will foster the recognition of the importance and value of the area's land, air, and water resources to Hawaii's people, their cultures, and visitors.

Objectives and Policies for Socio-Cultural Advancement—Housing (§226-19)

Objective:

2) *The orderly development of residential areas sensitive to community needs and other land uses.*

Policies:

1) *Effectively accommodate the housing needs of Hawaii's people.*

5) *Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services and other concerns of existing communities and surrounding areas.*

7) *Foster a variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods that reflect the cultures and values of the community.*

Discussion: The proposed development has been planned and designed to foster a sense of community and cohesiveness. It is the intent of the proposed development to create a character that reflects the values that are traditional to Hawaii in general and specifically to the region through an appreciation and respect for the beauty of the land. The proposed Planned Unit Development will allow for a more comprehensive site planning of the various uses and adaptation of the design of development to the land.

Part II. Planning, Coordinating and Implementation

Part II of the Hawaii State Plan pertains to the administrative structure and implementation process of the Plan. As such, comments are not deemed appropriate.

Part III. Priority Guidelines

The purpose of this part of the Plan is to establish overall priority guidelines to address areas of Statewide concern. The Plan notes that the State shall strive to improve the quality of life for Hawaii's present and future population through the pursuit of desirable courses of action in five major areas of Statewide concern which merit priority attention: 1) economic development, 2) population growth and land resource management, 3) affordable housing, 4) crime and criminal justice; and 5) quality education (§ 226-102). The priority guidelines applicable to the proposed project are discussed below:

Economic Priority Guidelines (§ 226-103)

a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaii's people and achieve a stable and diversified economy:

1) Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.

8) Provide public incentives and encourage private initiative to develop and attract industries which promise long term growth potentials and which have the following characteristics:

D) An industry that can take advantage of Hawaii's unique location and available physical and human resources.
E) A clean industry that would have minimal adverse impacts on Hawaii's environment
D) An industry that would provide reasonable income and steady employment.

b) Priority guidelines to promote the economic health and quality of the visitor industry:

1) Promote visitor satisfaction by fostering an environment which enhances the Aloha Spirit and minimizes inconveniences to Hawaii's residents and visitors.

2) Encourage the development and maintenance of well-designed, adequately serviced hotels and resort destination areas which are sensitive to neighboring communities and activities and which provide for adequate shoreline setbacks and beach access.

3) Support appropriate capital improvements to enhance the quality of existing resort destination areas and provide incentives to encourage investment in upgrading, repair and maintenance of visitor facilities.

4) Encourage visitor industry practices and activities which respect, preserve and enhance Hawaii's significant natural, scenic, historic and cultural resources.

7) Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.

f) Priority guidelines for energy use and development:

3) Provide incentives to encourage the use of energy conserving technology in residential, industrial and other buildings.

Discussion: Although not a hotel or resort, the proposed Keopuka Lands project would assist in meeting the above stated guidelines by allowing private investment in a facility that would assist in expanding existing businesses and provide the impetus for new businesses to: 1) serve an expanded real estate market; 2) assist in the development of an industry that can take advantage of Hawaii's location and available physical and human resources; 3) encourage expansion of a clean industry that would have minimal adverse impacts on Hawaii's environment; and 4) assist an industry that provides reasonable income and steady employment.

With regard to promoting economic health, the proposed project would: 1) provide an ideal rural living area while allowing the development of businesses that would serve the project and residents of the project; and 2) allow the expenditure of private capital to upgrade and improve the quality of facilities in an area where they are now lacking. The proposed project would also aid in the attainment of energy related guidelines through energy conservation measures that would be taken during the design, construction and operation of the lodge and golf club facilities and encouraged in the design and construction of individual homes.

Population Growth and Land Resources Priority Guidelines (§226-104)

a) Priority guidelines to effect desired Statewide growth and distribution:

1) Encourage planning and resource management to insure population growth rates throughout the State that are consistent with available and planned resource capacities and reflect the needs and desires of Hawaii's people.

2) Manage a growth rate for Hawaii's economy that will parallel future employment needs for Hawaii's people.

4) Encourage major State and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.

b) Priority guidelines for regional growth distribution and land resource utilization:

6) Seek participation from the private sector for the cost of building infrastructure and utilities and maintaining open spaces.

12) Utilize Hawaii's limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs while ensuring the protection of the environment and the availability of the shoreline, conservation lands and other limited resources for future generations.

13) Protect and enhance Hawaii's shoreline, open spaces and scenic resources.

Discussion: The project would comply with and assist in the achievement of the above stated population growth and land resources priority guidelines and objectives. The proposed project would provide the means by which the developer would make available investment capital for the members' hale, golf course, clubhouse, and agricultural lots. Further, the project would 1) maintain the open space character of the area; 3) be designed to protect and enhance the shoreline and coastal resources of the area; and 3) provide additional recreational opportunities in West Hawaii. The proposed development would provide employment opportunities paralleling future employment needs; and encourage private investment on a neighbor island. Infrastructure components including roadways, wastewater collection, treatment and disposal water development and transmission and utility distribution which are required by and for the project would be provided by the developer.

6.1.3.1 *State Functional Plans*

The Hawaii State Plan directs State agencies to prepare functional plans for their respective program areas. There are 13 state functional plans that serve as the primary implementing vehicle for the goals, objectives, and policies of the Hawaii State Plan. The Functional Plans applicable to the Keopuka Lands project, along with each plan's applicable objectives, policies, and actions are discussed below.

6.1.3.2 *Agriculture*

The Agriculture functional plan seeks to increase the overall level of agricultural development in Hawaii, in accordance with the two fundamental Hawaii State Plan objectives for agriculture: continued viability in Hawaii's sugar and pineapple industries, and continued growth and development of diversified agriculture throughout the State. The objectives, policies, and actions of the Agriculture functional plan applicable to the Keopuka Lands project are as follows:

Objective A: *Achievement of increased agricultural production and growth through cultural and management practices.*

Objective H: *Achievement of productive agricultural use of lands most suitable and needed for agriculture.*

Policy H (2): *Conserve and protect important agricultural lands in accordance with the Hawaii State Constitution.*

Objective J: *Achievement of maximum degree of public understanding and support of agriculture in Hawaii.*

Policy J(4): *Foster increased public awareness and understanding of the contributions and benefits of agriculture as a major sector of Hawaii's economy.*

Discussion: The Keopuka Lands site is typical of West Hawaii coastal land and has relatively little soil cover, although pockets of soil are found throughout the site. The lands of the site are classified as "E" by the Land Study Bureau system of agricultural land classification. The "E" classification signifies land that is very poorly suited for agriculture and is the lowest productivity rating used by the Land Study Bureau system. Under the Agricultural Lands of Importance to the State of Hawaii (ALISH) system no portion of the Keopuka Lands has been identified as "prime" or "unique," however, approximately one third of the site is identified as "other important land." The site is designated "Extensive Agriculture" and "Orchards" under the County General Plan Land Use Pattern Allocation Guide Map.

The Keopuka Lands project, with its proposed 5+ acre agricultural lots, will allow increased agricultural uses on land that is currently of marginal agricultural quality. These lots are identified as "other important land." An agricultural program will allow for the best agricultural use of this land. In general, the agricultural zoning of property, the project has the potential to increase diversified agriculture. In addition, the project will be compatible with the surrounding rural uses in the area. This rural lifestyle may in turn foster an increased public awareness and understanding of the contribution and benefits of agriculture.

6.1.3.3 Conservation Lands

The Conservation Lands Functional Plan addresses the impacts of population growth and economic development on the natural environment and provides a framework of the protection and preservation of Hawaii's pristine lands and shorelines. Within the overall theme of balanced growth, the plan also provides for enhancement and increased access to Hawaii's scenic natural resources and the effective management of already developed lands. Objectives, policies, and implementing actions of the Conservation Lands Functional Plan applicable to the Keopuka Lands project include the following:

Objective: IIC: Enhancement of natural resources.

Policy IIC(1): *Expand marine and fresh water fishing areas and promote fishing opportunities.*

Policy IIC(2): *Expand and enhance outdoor recreation opportunities and other resource uses. Implementing action IIC(2)b: Expand nature trail system. Implementing action IIC(2)b: Provide and improve public access to the shoreline and to mauka areas as condition on leases, executive orders, easements, and other encumbrances on lands with recreational and/or educational potential.*

Objective IID: Appropriate development of natural resources.

Policy IID(3): *Develop recreational and archaeological resources on the shoreline and mauka areas.*
Implementing action IID(3)b: Establish a statewide trails and access system.

Objective IIF: Increase enforcement of land and natural resource use laws and regulations.

Policy IIF(2): *Strengthen monitoring and enforcement of use laws and regulations.*

Discussion: The Keopuka Lands project will enhance the area's natural resources in the Conservation district by preserving all Conservation land as permanent open space. The rocky cliff coastline has been used for fishing on a permit basis but because of the undeveloped nature of the mauka lands, currently much of this shoreline area is difficult to access. The Project proposes to improve access for fishing by providing a new coastal trail and improved camping facilities including parking and comfort facilities for public use on a permit basis.

In addition, appropriate measures to preserve archaeological and historic resources and existing trails will further enhance public access. While the Old Government Road and Old Cart Road traverse Keopuka at elevations setback from the coastline, the Project proposes pedestrian access within the undeveloped conservation coastal land. As such, a trail system within the Conservation District will be provided and public access to the shoreline will be improved, archaeological resources will be preserved, and shoreline fishing opportunities will be expanded.

All improvements within the Conservation District/shoreline area will be in compliance with all natural resource use laws and regulations. This includes requesting a Special Management Area permit from the County Planning Department in compliance with the Coastal Zone Management program regulations and requesting a Conservation District Use permit from the Board of Land and Natural Resources. The process of obtaining these permits, along with information in this EIS, will allow extensive review by government agencies and the general public of the potential impacts and proposed mitigating measures of any proposed actions in the Conservation district/shoreline area.

6.1.3.4 *Employment*

The Employment Functional Plan focuses on the preparation of Hawaii's workforce for the global, information-based twenty-first century economy. It takes a multi-agency approach in providing job training and education services, implementing job placement services, improving the quality of the work environment, and coordinating employment information, analysis, and planning. The four main issue areas and related objectives of the Employment Functional Plan are as follows:

Issue 1: Education and Preparation Services for Employment

Objective A: *Improve the Qualifications of Entry Level Workers and their Transition to Employment*

Objective B: *Develop and Deliver Education, Training and Related Services to Ensure and Maintain a Quality and Competitive Workforce*

Issue 2: Job Placement

Objective C: *Improve Labor Exchange*

Issue 3: Quality of Worklife

Objective D: *Improve the Quality of Life for Workers and Families*

Issue 4: Employment Planning Information and Employment Coordination

Objective E: *Improve Planning of Economic Development*

Discussion: The proposed project is generally in concert with the objectives of the State Employment Functional Plan in that new jobs will be created and/or others, such as in construction, will be continued for a period of time. By providing additional employment opportunities in several areas the proposed project would be one more element along the South Kona coast assisting in the improvement of the quality of life for workers and families. As noted in the Economic and Fiscal Impact Analysis for the project, proposed project at completion of build-out is expected to generate new direct onsite and indirect offsite employment.

6.1.3.5 *Energy*

The Energy Advisory Committee highlights three major concerns for Hawaii in its Functional Plan: (1) the state's over dependency on oil and fossil fuels, (2) the need for an integrated approach to energy development and management, and (3) energy emergency preparedness. The issues, objectives, policies, and actions that are most relevant to the proposed Keopuka Lands project are listed below.

Issue Area: Overdependence Upon Oil and Other Fossil Fuels for Energy Needs.

Objective A: *Moderate the growth in energy demand through conservation and energy efficiency.*

Policy A(1): *Promote and stimulate greater energy efficiency and conservation in non-transportation sectors.*

Objective B: *Displace oil and fossil fuels through alternate and renewable energy resources.*

Policy B(1): *Displace oil and fossil fuels consumption through the application of appropriate alternate and renewable energy resources and technologies.*

Discussion: Although the architectural design of the structures for the Keopuka Lands project has not been completed, energy efficient design and energy conservation measures will be implemented whenever practical. These could include such measures as energy efficient light fixtures and/or daylighting design. Passive cooling/natural ventilation and reduction of heating loads through appropriate landscape design.

6.1.3.6 Health

The State Health Functional Plan identifies four major priority issues. These are: (1) preventive health care, (2) access to health care, (3) environmental protection, and (4) public administration issues. Of these four, environmental protection is the most relevant issue for the proposed Keopuka Lands project.

Policy 5A. Air, Land and Water Quality Programs: The DOH will develop and implement new programs to prevent degradation and enhance the quality of Hawaii's air, land and water.

Implementing Action 5A1: Develop and implement comprehensive air toxic control programs.

Implementing Action 5A2: Develop and implement a comprehensive Solid and Hazardous Waste Management Program.

Implementing Action 5A3: Develop and implement a comprehensive Recreational Water Quality Monitoring Strategy.

Implementing Action 5A4: Develop and implement a Non-Point Source Pollution Program to protect recreational and other surface waters.

Implementing Action 5A5: Develop and implement an Indoor Air Pollution Control Program.

Implementing Action 5A6: Develop and implement a Groundwater Protection Program including groundwater monitoring, safe drinking water and underground injection control.

Discussion: The Keopuka Lands project seeks conformance with these areas of concern by complying with all relevant DOH and Hawaii County rules, regulations, and health standards and by applying for all required health permits. The proposed project is not expected to produce any toxic air emissions. During construction, temporary emissions of dust and carbon monoxide from diesel construction machinery may occur. However, best management practices will be employed by the contractor to keep these emissions within State standards. All solid and hazardous wastes will be disposed of with appropriate County facilities and stormwater and irrigation runoff will be disposed of in properly permitted underground injection systems. Furthermore, baseline surveys of marine and shoreline environments as well as groundwater supplies have been performed and potential impacts and proposed mitigation measures have been described.

6.1.3.7. Historic Preservation

The long-term philosophy of the Historic Preservation Functional Plan highlights the importance of maintaining a record of Hawaii's unique history. History enriches our social, intellectual, aesthetic and economic lives with insights from the past. With the rapid change and development of our island state, our historical resources are at risk. The Historic Preservation Functional Plan attempts to preserve these resources by focusing on three main issue areas. They are: (1) preservation of historic properties, (2) collection and preservation of historic records, artifacts and oral histories, and (3) provision of public information and education on the ethnic and cultural heritages and history of Hawaii. Of the three issue areas, the first two hold the most relevance to the proposed project. Although most of the objectives, policies, and related implementation actions are directed at government agencies, the applicable items are listed below:

Issue Area I: Preservation of Historic Sites

Objective B: *Protection of Historic Properties*

Policy B.2.: *Establish and make available a variety of mechanisms to better protect historic properties.*
Implementing Action B.2.c.: Respond to the discovery of prehistoric/historic burials in a timely and sensitive manner, which takes into consideration cultural concerns.

Objective C: *Management and Treatment of Historic Properties*

Policy C.2.: *Encourage the preservation and maintenance of historic properties through economic incentives and support.*
Implementing Action C.2.a.: Increase support for and streamline the awarding of moneys from the historic preservation special fund which provides moneys for Stat historic preservation grants-in-aid.
Implementing Action C.2.b.: Develop State economic incentives for property owners who rehabilitate and/or actively preserve their historic properties.

Policy C.3.: *Explore innovative means to better manage historic properties.*
Implementing Action C.3.a.: Increase efforts to organize and train community and private organizations as curators of sites to assist in enforcement of the laws, and maintenance and management of the sites.
Implementing Action C.3.c.: Explore ways of easing private property owners' liability concerns relating to the opening of historic sites for public use.
Implementing Action C.3.d.: Encourage greater support for historic property management by the private sector, especially the visitor industry.

Policy C.4.: *Encourage proper preservation techniques.*
Implementing Action C.4.a.: Provide technical information and assistance to people involved in preservation projects, and hold workshops to further disseminate such information.

Issue Area II: Collection and Preservation of Historic Records, Artifacts and Oral Histories and Perpetuation of Traditional Skills

Objective E: *The Establishment of Programs to Collect and Conserve Historic Records, Artifacts, and Oral Histories and to Document and Perpetuate Traditional Arts, Skills, and Culture.*

Implementing Action E.1.a.: Expand financial support to both private organizations and public agencies for oral history projects, increase the coordination of oral history efforts, provide training opportunities in the field and include oral histories as a mitigation measure for projects impacting ways of life.

Implementing Action E.1.d.: Increase the documentation of Hawaii's history, heritage and traditional arts and skills.

Discussion: Archaeological surveys for the Keopuka Lands project have been conducted by archaeological and cultural experts in 1990 and 1995 and updated for the subject EIS. The archaeologists have identified a total of 127 archaeological sites and have proposed preservation for 32 of the sites as well as various data recovery measures for 81 sites. The remaining 14 sites have been classified as non-significant and no further work has been recommended for those sites. The developers have agreed to follow these recommendations as approved by the State Historic Preservation Division in the effort to preserve, protect, and collect historically significant artifacts and to maintain and provide access to key sites. To the extent practical, all improvements including buildings, roads, infrastructure, and the proposed golf course will be designed to avoid the sites slated for preservation. Details concerning these actions are described in Section 5.1 of this report.

6.1.3.8 Housing

The State Housing Functional Plan, prepared by the State Housing Finance and Development Corporation (now Housing and Community Development Corporations of Hawaii), addresses six major areas of concern: (1) increasing home ownership, (2) expanding rental housing opportunities, (3) expanding rental housing opportunities for the elderly and other special need groups, (4) preserving housing stock, (5) designating and acquiring land that is suitable for residential development, and (6) establishing and maintaining a housing information system. The majority of the objectives, policies, and implementing actions of the State Housing Functional Plan apply to the government sector.

Discussion: Keopuka Lands is being developed as an agricultural lot and recreational project located on land within the Agricultural Zoning District. While agriculture is the primary function of the proposed 125 agricultural lots (where suitable natural soils are present), one farm residence will be allowed on every lot, potentially increasing the housing supply of Hawaii Island by up to 125 homes.

6.1.3.9 Human Services

Elderly care, Children and Family Support, Self-Sufficiency, and Service Delivery Improvements are the priority issues of the Human Services Functional Plan. Similar to many of the other Functional Plans,

the objectives, policies, and actions described in the plan are directed toward various government agencies.

Discussion: In general, the proposed project is in concert with the basic philosophy of the Human Services Functional Plan in that it will assist (through the provision of employment opportunities,) families in achieving economic self-sufficiency. In addition to the multiple effect the project will have on the local economy, the Keopuka Lands project will create an additional 100 construction jobs and 147 permanent jobs (primarily servicing the golf course and members' hale).

6.1.3.10 Recreation

The Recreation Functional Plan outlines the public and private sectors' roles in serving the recreation and open space needs of the public. It organizes the objectives, policies, and actions into six major issue areas: (1) Ocean and shoreline recreation, (2) Mauka, urban, and other recreational opportunities, (3) Public access to shoreline and upland recreation areas, (4) Resource conservation and management, (5) Management of recreation programs, facilities, and areas, and (6) Wetlands protection and management. The items most relevant to the proposed project are listed below.

Issue Area II. Mauka, Urban, and Other Recreation Opportunities

Objective II-A: *Plan, develop, and promote recreational activities and facilities in mauka and other areas to provide a wide range of alternatives.*

Policy II-A(1): *Plan and develop facilities and areas that feature the natural and historic/cultural resources of Hawaii. Develop interpretive programs for these areas.*

Policy II-A(3): *Proceed with planning, acquisition, and development of trails.*

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.*

Issue Area III. Public Access to the Shoreline and Upland Recreation Areas

Objective III-A: *Prevent the loss of access to shoreline and upland recreation areas due to new development.*

Policy III-A(1): *Require land use permit applicants to fully address the impact of their projects on trails and public access.*

Issue Area IV. Resource Conservation and Management

Objective IV-A: *Promote a conservation ethic in the use of Hawaii's recreational resources.*

Objective IV-B: *Prevent degradation of the marine environment.*

Policy IV-B(1): *Enhance water quality to provide high-quality ocean recreation opportunities.*

Policy IV-B(2): *Protect, preserve, restore, and enhance recreational fishery resources.*

Policy IV-B(3): *Protect surfing sites.*

Discussion: The Keopuka Lands project complies with the goals and objectives of the Recreational Functional Plan by providing new mauka/makai golf course opportunities and coastal makai shoreline improvements. In addition, the golf course and other common areas will provide ample open space in comparison to the area planned for buildings.

The shoreline areas of the property are located in the Conservation District and will be preserved as open space with minimal improvements. This, in addition to appropriate engineering measures to control surface runoff and other non-point sources of pollution, will be implemented to maintain the marine and shoreline environment. Public access to the shoreline will be maintained and improved for fishing, conservation, and aesthetic purposes as supported by the Recreational Functional Plan.

Finally, the proposed project will restore and preserve representative portions of the historic Old Government Road and Old Cart Road. Other archaeological features will be placed, into the overall design and layout of the proposed project in a culturally-sensitive manner. The Cart Road that exists in the flats portion of the property is proposed to be reconstructed as the original steppingstone trail and established as a preservation site and functionally replaced with a new trail near the shoreline, within the Conservation District.

6.1.3.11 Tourism

The Tourism Functional Plan recognizes the delicate balance required between economic growth and strength and the need to preserve and enhance the social and natural environment for Hawaii's tourism industry to succeed. It discusses six issue areas of particular concern which include: (1) Growth, (2), Physical Development, (3) Environmental Resources and Cultural Heritage, (4) Community, Visitor and Industry Relations, (5) Employment and Career Development, and (6) Marketing. Many of the objectives, policies, and actions of Issue Area 3 have relevance to the proposed project. These items are listed below.

Issue Area III: Environmental Resources and Cultural Heritage

Objective III.A.: *Enhancement of respect and regard for the fragile resources which comprise Hawaii's natural and cultural environment. Increased preservation and maintenance efforts.*

Policy III.A.1.: *Assist in preserving and maintaining recreational resources.*

Policy III.A.2.: *Assist in preserving, perpetuating, and interpreting cultural, historic and archaeological resources. Preserve cultural authenticity as much as possible in commercialized and tourist-oriented presentations.*

Policy III.A.3.: *Assist in keeping Hawaii clean, beautiful, and safe.*

Discussion: The proposed project seeks conformance with the Tourism Functional Plan by maintaining a low density development and providing setbacks from the shoreline through a buffer, roughly 300-feet wide along the coastline. This area is located within the Conservation District. Furthermore, as noted earlier in the discussion on the Historic Preservation Functional Plan, significant archaeological and cultural resources will be preserved and/or recovered as recommended. Fishing and arranged access, as practiced historically will continue. Where a trail and landscape improvements are proposed to be added to enhance the nearshore hiking experience.

6.1.3.12 Transportation

The Transportation Functional Plan is implemented as a short- to mid-term action agenda by the State Department of Transportation (DOT). It identifies four key issue areas as the most critical concerns relating to transportation in Hawaii. They are: (1) Congestion, (2) Economic Development, (3) Funding,

and (4) Education. The following objectives, policies, and actions have the most relevance to the proposed project:

Issue I. Congestion

Objective I.A.: *Expansion of the transportation system*

Policy I.A.2.: *Improve regional mobility in areas of the State experiencing rapid urban growth and road congestion.*

Implementing Action I.A.2.a. Plan, design, and construct the road infrastructure for West Hawaii including improving Queen Kaahumanu Highway and developing a supporting local road network.

Objective I.E.: *Planning and designing State highways to enhance inter-regional mobility.*

Policy I.E.1.: *Design highways with controlled accesses, grade-separated crossings, and minimum four-lane divided highway standards where applicable. Encourage counties to develop local road networks for local travel and access.*

Discussion: The overall objective of the Transportation Functional Plan is to provide for the efficient, safe, and convenient movement of people and goods. The project will be accessed by the proposed Mamalahoa Highway Bypass Road which is to be built through the Keopuka Lands site. While the subject Keopuka project is separate from the approved Hokuli'a (formally Villages at Hokukano) project it is through the funding by Hokuli'a that the bypass road will be constructed to divert a portion of the through traffic from Mamalahoa Highway to relieve current congestion at peak travel periods. This bypass would increase capacity and relieve congestion along Mamalahoa Highway in and around Captain Cook.

6.1.4 Environmental Impact Statements, Chapter 343, Hawaii Revised Statutes

The State Environmental Impact Statement Law (Chapter 343, HRS) specifies actions applicable to new development that trigger the environmental review process. These triggers include any use in the Conservation District, use of State lands, and any use within the shoreline area. While for the most part, these areas of the Keopuka Lands project will be kept in their natural state, the Administrative Rules pertaining to Environmental Impact Statements (Chapter 11-200, HAR) require that cumulative impacts of related actions must be considered. As a result, this environmental impact statement has been prepared to address the proposed master plan and to address its potential impacts. Therefore, with the acceptance of this environmental impact statement the Keopuka Lands project will be in conformance with the Environmental Impact Statement Law (Chapter 343, HRS).

6.2 COUNTY OF HAWAII

6.2.1 The General Plan Hawaii County

The Hawaii County General Plan is the policy document for the long-range comprehensive development of the Island of Hawaii. It provides direction for balanced growth of the County and contains goals, policies and standards concerning thirteen functional areas as well as a series of land use maps referred to as General Plan Land Use Pattern Allocation Guide (LUPAG).

Land Use Pattern Allocation Guide (LUPAG) Map
The LUPAG Map designations for the property are Extensive Agriculture (EA) and Orchard (OR), while the area along the coastline is designated Open Area (O) (Figure 5). In that the proposed uses are in compliance with the existing zoning and General Plan LUPAG Map designation for the area no changes to the designations are being sought for the project, and hence the project will be in conformance with the LUPAG Map.

Relevant Goals, Policies and Standards

Economic

Goals

- *Provide residents with opportunities to improve their quality of life.*
- *Economic development and improvement shall be in balance with the physical and social environments of the Island of Hawaii.*
- *The County of Hawaii shall strive for diversity and stability in its economic system.*
- *The County shall provide an economic environment which allows new, expanded, or improved economic opportunities that are compatible with the County's natural and social environment.*

Policies

- *The County of Hawaii shall assist in the expansion of the agricultural industry, especially diversified agriculture, through the protection of important agricultural lands, capital improvements, and other programs, and continued cooperation with appropriate State and Federal agencies.*
- *The County of Hawaii shall strive for an economic climate which provides its residents an opportunity for choice of occupation.*
- *The County of Hawaii shall encourage the development of a visitor industry which is consistent with the social, physical and economic goals of the residents of the County.*
- *The County shall require a study of the significant social and physical impact of large developments prior to approval.*
- *The County of Hawaii shall strive for diversification of its economy by strengthening existing industries and attracting new endeavors.*
- *The County shall encourage the expansion of the fishing industry, various forms of aquaculture, and other fresh and ocean water based activities.*

Standards

- *The Island of Hawaii should be developed into a unique scientific and cultural model. The island should become a model of living where economic gains are in balance with social and physical*

amenities. Development should be reviewed on the basis of total impact on the residents of the County, not only in terms of immediate short run economic benefits.

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

Discussion: The proposed project will increase the availability and variety of job opportunities for local residents, resulting in higher employment and improvement of the quality of life for local residents. By using sensible planning principles and developing needed support facilities and infrastructure in an orderly fashion, the proposed project will minimize any potential adverse effects on the physical and social environment of the area and help expand the variety and quality of services available to the community. The proposed development will provide continued employment for those in the construction and real estate industry and other jobs needed for the operation and maintenance of the related facilities such as the golf course and clubhouse, restaurants, members' hale and infrastructure.

Consistent with the economic policy of encouraging ocean-based activities, ocean recreational activities such as ocean fishing will be provided to project residents and to the public. The economic and fiscal studies conducted for the preparation of this EIS indicate that the proposed project will have a positive effect on the local economy by providing direct and indirect employment opportunities and bringing increased State and County tax revenues. Additionally, because the proposed project is agriculturally-based residential, rather than tied to the visitor industry, it will be less susceptible to the cyclical trends of the economy and thus will provide for greater economic stability to the region and Island's economy.

Energy

Goals:

- *Strive towards energy self-sufficiency for Hawaii County.*

- *Establish the Big Island as a demonstration community for the development and use of natural energy resources.*

Policies:

- *The County shall strive to educate the public on new energy technologies and foster attitudes and activities conducive to energy conservation.*

- *The County shall strive to assure a sufficient supply of energy to support present and future demands.*

- *The County shall provide incentives which will encourage the use of new energy sources and promote energy conservation.*

Standard:

- *New power plants shall incorporate devices which minimize pollution.*

Discussion: To the extent practical, the engineering design of the members' hale and associated facilities will use appropriate technologies to ensure efficient use of energy. Opportunities to conserve energy in the areas of water heating, lighting, air conditioning, refrigeration, and other areas as appropriate, will be encouraged in all residential development, including passive design techniques aimed at reducing mechanical air conditioning and lighting requirements.

Environmental Quality

Goal:

- *Maintain and, if feasible, improve the existing environmental quality of the island.*

Policies:

- *The County of Hawaii shall take positive action to further maintain the quality of the environment for residents both in the present and in the future.*
- *Encourage the concept of recycling agricultural and municipal waste material.*

Standards:

- *Pollution shall be prevented, abated, and controlled at levels which will protect and preserve the public health and well-being, through the enforcement of appropriate Federal, State and County standards.*
- *Environmental quality controls are to be incorporated either as standards in appropriate ordinances or as conditions of approval.*
- *Federal and State environmental regulations shall be adhered to.*

Discussion: The applicant will endeavor to maintain or improve environmental quality, will comply with all Federal, State, and County environmental rules and regulations, and will mitigate potential adverse impacts to the greatest extent practical. Applicable pollution control measures will be employed. Additionally, in concurrence with a Marine Water Quality Monitoring Plan prepared for the project, coastal marine waters will be monitored to detect any significant impacts to water quality. In the area of recycling, treatment plant effluents are being considered to irrigate the golf course rather than being discharged to groundwaters or coastal marine waters. It is also planned that landscape and golf course cuttings will be composted onsite, thus reducing the stream of solid waste.

Flood Control and Drainage

Goals:

- *Protect human life.*
- *Prevent damage to man-made improvements.*
- *Control pollution.*
- *Prevent damage from inundation.*

- *Reduce surface water and sediment runoff.*

Policies:

- *The County shall promote participation in the Soil and Water Conservation Districts' conservation programs for developments on agricultural and conservation lands.*

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

- *It is the responsibility of both the government and the private sector to maintain and improve existing drainage systems and to construct new drainage facilities.*

Standards:

- *"Storm Drainage Standards," County of Hawaii, October, 1970, and as revised.*

- *Applicable standards and regulations of Chapter 27, "Flood Control," of the Hawaii County Code.*

- *Applicable standards and regulations of the Federal Emergency Management Agency (FEMA).*

- *Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawaii County Code.*

Discussion: The majority of the proposed development areas described within this document occur significantly inland (300 feet) to reduce the potential threat from strong wave action or tsunami. The development plan will insure that habitable structures are placed outside flood zones or that necessary improvements are made to accommodate development. Standard engineering and design precautions and adherence to State and County design standards will be followed in the design of the drainage system. Additionally, construction specifications, in accordance with County requirements, will provide plans and describe techniques to mitigate the potential for erosion and to control sedimentation. To further ensure that erosion control is maintained, a marine water quality monitoring program has been implemented along the shoreline area to identify impacts, should they occur.

Historic Sites

Goals:

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

- *Access to significant historic sites, buildings and objects of public interest should be made available.*

Policies:

- *Agencies and organizations, either public or private, pursuing knowledge about historic sites should keep the public appraised of projects.*

- *The County of Hawaii shall require both public and private developers of land to provide a historical survey prior to the clearing or development of land when there are indications that the land under consideration has historical significance.*
- *Public access to significant historic sites and objects shall be acquired.*
- *The County of Hawaii shall encourage the restoration of significant sites on private lands.*
- *Signs explaining historic sites, buildings and objects shall be in keeping with the character of the area or the cultural aspects of the feature.*

Standards:

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

- *Importance in the life or activities of a major historic person.*
- *Associated with a major group or organization in the history of the island or community.*
- *Associated with a major historic event (cultural, economic, military, social, or political).*
- *Associated with a major recurring event in the history of the community (such as annual celebrations).*
- *Associated with a past or continuing institution which has contributed substantially to the life of the community.*
- *Unique example of a particular style or period.*
- *One of the few of its age remaining.*
- *Original materials and/or workmanship which can be valued in themselves.*
- *Sites with a preponderance of original materials in context and complexes rather than single isolated sites unless they are of great significance.*
- *Sites of traditional and cultural significance.*

Discussion: A full archaeological survey of the property has been conducted by Paul H. Rosendahl and Cultural Surveys Hawaii (Appendix I-1 and I-2). Historic sites have been identified, and their documentation, protection, and restoration, where appropriate, are incorporated as part of the plans for the proposed development. In accordance with the recommendations of the consulting archaeologists and concurrence of the State Historic Preservation Division, important sites will be preserved and, where appropriate, restored and incorporated as part of an overall interpretive program integrated with a pedestrian trail network. Public access to important historic sites will be provided, as appropriate. The archaeological sites which are clustered adjacent to State lands at Kaawaloa will be preserved to blend with the Kealakekua Bay State Historical Park sites.

Natural Beauty

Goals:

- *Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.*
- *Protect scenic vistas and view planes from becoming obstructed.*
- *Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.*

Policies:

- *Increase public pedestrian access opportunities to scenic places and vistas.*
- *Access easement to public or private lands which have natural or scenic value shall be provided or acquired for the public.*
- *Standard criteria for natural and scenic beauty shall be developed as part of design plans.*
- *The County shall consider structural setback from major thoroughfares and highways and shall establish development and design guidelines to protect important view planes.*

Standards:

The following standards provide guidelines for designating sites and vistas of extraordinary natural beauty which shall be protected.

- *Distinctive and identifiable landforms distinguished as landmarks, e.g., Mauna Kea, Waipio Valley.*
- *Coastline areas of striking contrast, e.g., Laupahoehoe Point.*
- *Vistas of distinctive features.*
- *Natural or native vegetation which makes a particular area attractive.*
- *Areas which are harmoniously developed and enhanced by man so as to appear natural.*

Discussion: The project proposes to maintain, as well as emphasize, the rural character of the area through the integration of a low density development with generous open space elements. Throughout the project, homes will be subject to architectural landscape standards to enhance its visual integrity with the surrounding area. Public access would be provided through a public shoreline trail system and through the Old Government Road and Old Cart Road. Views to the shore from surrounding residential areas and views to the mountains from the shore will not be obstructed.

Natural Resources and Shoreline

Goals:

- *Protect and conserve the natural resources of the County of Hawaii from undue exploitation, encroachment and damage.*
- *Provide opportunities for the public to fulfill recreational, economic, and educational needs without despoiling or endangering natural resources.*
- *Protect and promote the prudent use of Hawaii's unique, fragile and significant environmental and natural resources.*
- *Protect rare or endangered species and habitats native to Hawaii.*
- *Protect and effectively manage Hawaii's open space, watersheds and natural areas.*
- *Ensure that alterations to existing land forms and vegetation, except crops, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides. erosion, siltation, or failure in the event of earthquake.*

Policies:

- *The County of Hawaii should require users of natural resources to conduct their activities in a manner that avoids or minimizes adverse effects on the environment.*
- *The shoreline of the Island of Hawaii shall be maintained for recreational, educational, and/or scientific uses in a manner that is protective of resources and is of the maximum benefit to the general public.*
- *The shoreline shall be protected from the encroachment of man-made improvements and structures.*
- *Encourage the use of native plants for screening and landscaping.*

Standards:

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

- *Areas necessary for the protection and propagation of specified endangered native wildlife, and conservation for natural ecosystems of endemic plants, fish and wildlife.*
- *Lands with a general slope of 20% or more which provide open space amenities or possess unusual scenic qualities.*
- *Lands with topographic, locational, soils, climate or other environmental factors that may not be normally adaptable or required for urban, rural, agricultural or public use.*

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

Discussion: The Conservation Land at the Keopuka Lands project will remain as coastal open space with minimal improvements to maintain coastal, scenic, and open space resources. The proposed project will not impact shoreline or conservation areas, other than providing improved pedestrian shoreline access for hiking and fishing. A botanical survey of the property identified no endangered or threatened species on site. Native plants species found on site, such as *kukui, ohia,* and coastal plants will be incorporated in the landscaping plan to the extent practicable.

Housing

Goals:

- *Attain safe, sanitary, and livable housing for the residents of the County of Hawaii.*
- *Attain a diversity of socio-economic housing mix throughout the different parts of the County.*
- *Maintain a housing supply which allows for a variety of choice.*
- *Develop better places to live in Hawaii County by creating viable communities with decent housing and suitable living environments for our people.*
- *Ensure that housing is available to all persons, regardless of age, sex, marital status, ethnic background, and income.*
- *The cornerstone of the County's housing programs and activities shall continue to be the encouragement and expansion of appropriate home ownership opportunities for our residents.*

Policies:

- *The County shall encourage a volume of construction and rehabilitation of housing sufficient to meet growth needs and correct existing deficiencies.*
- *The County shall protect residential property values from depreciating influences.*

Standards:

Housing standards shall consist of and comply with:

- *Housing Code*
- *Building Code*
- *Electrical Code*
- *Plumbing Code*

- *Zoning Code*

- *Subdivision Code Standards of the single family and multiple residential land use element.*

Discussion: The proposed project will provide as many as 125 additional dwelling units, which will add to the County's primary housing market. The project will have an overall positive impact to regional housing conditions, especially with regard to meeting the goals of the County General Plan and will be designed and constructed according to County standards.

Public Facilities

Goal:

- *Encourage the provision of public facilities that effectively service community needs and seek ways of improving public service through better and more functional facilities which are in keeping with the environmental and aesthetic concerns of the community.*

Public facilities are separated into four groups in the General Plan: education, protective services, health and sanitation, and government operations. The goals, policies and standards provided pertain to provision of facilities by government agencies and, in the area of health and sanitation, by government and private entities. The following policy and standards pertain to health and sanitation.

Policy:

- *The County should encourage the development of new or improvement of existing health care facilities to serve the needs of Hamakua, North and South Kohala, and North and South Kona.*

Standards:

- *Sanitary landfill sites for refuse disposal shall be established in accordance with the needs of communities and shall be landscaped. Appropriately designed and cost effective transfer station sites shall be located in areas of convenience and easy access to the public.*

Discussion: The proposed development will serve to increase tax revenues to the State and County and thereby support the goal of expanded protection, health services and sanitation installations servicing the community at Keopuka Lands, protection services may be supplemented with private security, thereby reducing the potential demand for these services. Water service for the development will be provided through the County water system where water resources are sufficient to satisfy the project's potable water requirements. The developer's contribution through water development assessments will help to upgrade the existing system's infrastructure to the benefit of the surrounding community.

Public Utilities

Goals:

- *Ensure that adequate, efficient and dependable public utility services will be available to users.*

- *Maximize efficiency and economy in the provision of public utility services.*
- *To have public utility facilities which are designed to fit into their surroundings or concealed from public view.*

Policies:

- *Public utility facilities shall be designed so as to complement adjacent land uses and shall be operated so as to minimize pollution or disturbance.*
- *Provide utilities and service facilities which minimize total cost to the public and effectively service the needs of the community.*
- *Utility facilities shall be designed to minimize conflict with the natural environment and natural resources.*

The Public Facilities functional group is subdivided into five subgroups: water, telephone, electricity, gas and sewer. Specific policies and standards within those areas are as follows.

Water

Policies:

- *All water systems shall be built to Department of Water Supply standards.*
- *Improve and replace inadequate systems.*
- *Water sources shall be adequately protected to prevent depletion and contamination from natural and man-made occurrences or events.*
- *The fire prevention systems shall be coordinated with water distribution systems in order to ensure water supplies for fire protection purposes.*

Standard:

- *Water systems shall meet the requirements of the Department of Water Supply and the Subdivision Control Code.*

Telephone

Policy:

- *The County shall encourage underground lines where they are economically and technically feasible.*

Standard:

- *In the development and placement of telephone facilities, such as lines, poles and substations, the design of the facilities shall consider the existing environment, and scenic view and vistas shall be considered and preserved where possible.*

Electricity

Policies:

- *Power distribution shall be placed underground when and where feasible.*
- *The County shall encourage developers of new urban areas to place utilities underground.*
- *Route selection for high voltage transmission lines should include consideration for setbacks from major thoroughfares and residential areas.*
- *Safety standards for power systems shall conform to safety standards as established by appropriate regulatory authority.*

Standards:

- *There shall be a minimization of obstruction of scenic views and vistas by electrical facilities.*
- *Facilities such as substations shall be aesthetically pleasing.*

Gas

Policy:

- *Gas storage facilities shall be located so as to minimize danger to commercial and residential areas.*

Standard:

- *The County's ordinances shall reflect appropriate safety standards for gas facilities.*

Sewer

Policies:

- *The "Sewerage Study for All Urban and Urbanizing Areas of the County of Hawaii, State of Hawaii," December 1970 and the "Water Quality Management Plan for the County of Hawaii," December 1980, shall be used as guides for the general planning of sewerage disposal systems.*
- *Private systems shall be installed by land developers for major resort and other developments along shorelines and sensitive higher inland areas, except where connection to nearby treatment facilities is feasible and compatible with the County's long-range plans, and in conformance with State and County requirements.*
- *Schemes for wastewater reclamation and reuse for irrigation shall be utilized where feasible and needed.*

Standards:

- *Incorporate sewage works standards proposed in the "Sewerage Study for All Urban and Urbanizing Areas of the County of Hawaii" and the "Water Quality Management Plan for the County of Hawaii."*

- *Sewerage systems shall be designed for the particular area, depending on topography, geology, density of population, costs, and other considerations of the specific area.*

Discussion: Infrastructure systems will be constructed to support the proposed development, including roadways, wastewater, potable water, drainage, communications and electrical systems. Use of underground utilities will enhance the physical appearance of the project while also improving the system safety and reliability. The facilities will conform to current standards as to efficiency and quality.

Recreation

Goals:

- *Provide a wide variety of recreational opportunities for the residents and visitors of the County.*

- *Maintain the natural beauty of recreation areas.*

- *Provide a diversity of environments for active and passive pursuits.*

Policies:

- *Recreational facilities in the County shall reflect the natural, historic, and cultural character of the area.*

- *The use of land adjoining recreation areas shall be compatible with community values, physical resources and recreational potential.*

- *Public access to the shoreline shall be provided in accordance with an adopted program of the County of Hawaii.*

Discussion: The proposed project will provide increased recreational opportunities, including an 18-hole private golf course and public ocean related activities. In addition, the public shall be provided improved access to the shore and to significant historical sites located within the State Conservation District lands through a pedestrian access trail system. Archaeological studies have been completed to accurately identify the existing sites on the property. Based on these studies, development plans have been prepared to protect sites which are recommended for preservation and minimize potential impacts to the site's natural resources. In addition, the botanical survey identified clusters of native trees including *ohia* and *kukui* some of which will be integrated into the overall landscape of the project.

Transportation

Goal:

- *Provide a transportation system whereby people and goods can move efficiently, safely, comfortably and economically.*

Policy:

- *The improvement of transportation service shall be encouraged.*

Standard:

- *Transportation systems shall meet the requirements of the State DOT and the County of Hawaii.*

Discussion: Traffic impacts related to the overall Keopuka Lands development have been studied and are described in the traffic analysis performed for the proposed project. The results of this analysis indicate that the future traffic conditions will be positively affected by the proposed construction of the Mamalahoa Highway bypass that would traverse the mauka portion of the Keopuka site. The proposed bypass will divert much of the through traffic from Mamalahoa Highway, thereby relieving the current congestion that occurs during the peak hours in the villages of Kealakekua, Kainaliu, and Honalo. The Keopuka Lands project will therefore not adversely affect the local and regional traffic conditions. The Bypass road will be under County of Hawaii jurisdiction, therefore the applicant will design the access intersection improvements according to County requirements.

Land Use

Goals:

- *Designate and allocate land uses in appropriate proportions and mix and in keeping with the social, cultural, and physical environments of the County.*
- *Protect and encourage the intensive utilization of the County's important agricultural lands.*
- *Protect and preserve forest, water, natural and scientific reserves and open areas.*

Policies:

- *Zone urban and rural types of uses in areas with ease of access to community services and employment centers and with adequate public utilities and facilities.*
- *Promote and encourage the rehabilitation and use of urban and rural areas which are serviced by basic community facilities and utilities.*
- *Allocate appropriate requested zoning in accordance with the existing or projected needs of neighborhood, community, region and County.*
- *The County shall encourage the development and maintenance of communities meeting the needs of its residents in balance with the physical and social environment.*

Standard:

- *The designated land uses will be delineated on the General Plan Land Use Pattern Allocation Guide Map.*

Eight types of land uses are addressed individually. Relevant goals, policies and standards are summarized and discussed below.

Agriculture

Goal:

- *Identify, protect and maintain important agricultural lands on the Island of Hawaii.*

Policies:

- *Zoning shall protect and maintain important agricultural lands from urban encroachment. New approaches to preserve important agricultural land shall be implemented by the County.*
- *Agriculture land shall be used as one form of open space or as green belt.*
- *Rural-style residential-agricultural developments, such as new small-scale rural communities or extensions of existing rural communities, shall be encouraged in appropriate locations.*

Open Space

Goal:

- *Provide and protect open space for the social, environmental, and economic well-being of the County of Hawaii and its residents.*

Policy:

- *Open space in the County of Hawaii shall reflect and be in keeping with the goals, policies, and standards set forth in the other elements of the General Plan.*

Public Lands

Goal:

- *Utilize publicly owned lands in the best public interest and to the extent possible, to the maximum benefit for the greatest number of people.*

Policy:

- *Encourage uses of public lands which will satisfy specific public needs, such as housing, recreation, open space and education.*

Discussion: The scale and design of the proposed development is in keeping with the social, cultural and physical environment. The majority of the land will be in the form of open space, either golf course, natural open space areas, landscaped areas, or small scale agriculture. The rural style residential agricultural lots will be a significant feature of the project, providing benefits in the areas of agriculture,

residences, recreational opportunities and an open space buffer. The applicant plans to provide opportunities for limited commercial agricultural activities within large-lot agriculture zoned areas by providing the access, infrastructure and site preparation necessary to support agricultural activities in an ongoing and sustainable manner. Managed public access to the shoreline and the State Conservation District will be maintained and improved.

Courses of Action

Section 5 of the General Plan provides "Courses of Action" for the districts of the Island. Their are specific courses of action of the South Kona District. Those relevant to the proposed development include the following:

Economic

- *The County shall assist the further development of agriculture by protecting important agricultural land from urbanization, by providing necessary resources, such as water, and through other assistance.*

Flood Control and Drainage

- *Drainage recommendations proposed by the South Kona Flood Hazard Analysis for the Kealakekua, Napoopoo and Honaunau areas shall be implemented. These consist of diversions and catchments to collect and transport water and reduce peak flows from upper watershed areas through the urban area. The practice of proper soil conservation measurers and the improvement, of existing drainage features complement these proposals.*

- *Establish and maintain appropriate vegetative cover in high rainfall, sediment and debris producing areas.*

Housing

- *Since the lands in this district are sloped, the County shall encourage the use of innovative types of housing developments, such as cluster and planned unit developments, which take advantage of topographic conditions.*

- *Aid and encourage the development of a wide variety of housing for this area to attain a diversity of socio-economic housing mix.*

Public Utilities

- *Pursue groundwater source investigation, exploration and development in areas that would provide for anticipated growth and that would provide for efficient and economic system operation.*

Recreation

- *Expand and/or develop recreational facilities in existing and urbanizing communities.*

- *Encourage the development of the coastal area for public recreational use.*

Transportation

- *Improve present Kona-Kau road.*

Land Use

(a) Agriculture

- *Assist in the provision of water in agricultural areas.*

(b) Single Family Residential

- *The County shall encourage the concentration of residential structures to avoid strip residential development.*

- *Due to the geologic and topographic conditions, the County shall encourage the use of more innovative types of housing developments, such as zones of mix and cluster and planned unit developments.*

Discussion: Proper soil conservation measures and improvements to existing drainage areas, where necessary, are proposed as a component of the planned development. Although the area is subject to relatively low rainfall and erosion, appropriate precautions for protecting disturbed areas, such as watering and prompt re-vegetation, are also proposed.

The use of cluster and planned unit developments that take advantage of topographic conditions will be incorporated as part of the planning and design of the planned residential areas. These provisions, in conjunction with the proposed residential developments, would add significantly to the variety of housing available for this area.

Additionally, the project has explored the water resources that are available onsite and will work with the County Department of Water Supply to coordinate the anticipated water demands for both potable and irrigation uses. In concert with recreation related goals of the County General Plan, the project will increase the recreational opportunities through provisions for public shoreline access.

6.2.2 Hawaii County Zoning

The County zoning designation of the Keopuka property is Agricultural-5a (A-5a). The "5a" specification indicates the minimum number of acres for a building site. Within the A-5a zone the minimum building site is five acres. In general, the Agricultural district provides for agricultural and very low density agriculturally-based residential use, encompassing rural areas of good to marginal agricultural and grazing land, forest, forest land, game habitats, and areas where urbanization is not found to be appropriate. One single-family dwelling or one farm dwelling is permitted on any building site in the A district. A farm dwelling is a single-family dwelling that is located on or used in connection with a farm if the agricultural activity provides income to the family occupying the dwelling.

To facilitate lot sizes smaller than five acres for some parcels, the developer will apply for a Planned Unit Development (PUD) permit as specified under Division 1, Article 6, Chapter 25, of the Hawaii County Code. The purpose of a PUD is to encourage comprehensive site planning that adapts the design of development to the land, by allowing diversification in the relationships of various uses, buildings, structures, open spaces and yards, building heights, and lot sizes in planned building groups, while still

insuring that the intent of the zoning code is observed. Under the Hawaii County General Plan (Plan) "Courses of Action" of the South Kona District, PUDs are specifically encouraged. As stated in the Plan: "Since the lands in this district are sloped, the County shall encourage the use of innovative types of housing developments, such as cluster and planned unit developments, which take advantage of topographic conditions." To implement a Planned Unit Development on the Keopuka Lands parcel, the developer will comply with all requirements under Division 1, Article 6, Chapter 25, of the Hawaii County Code.

Because development of a member's hale is part of the Keopuka Lands project, the developer will apply for a Special Permit as required by Section 25-5-72(c)(9), Chapter 25, Hawaii County Code. The developer will comply with all requirements and conditions for obtaining a Special Permit. In addition, to implement the golf course, the developer will apply for a Use Permit as required by Section 25-2-61(a), Chapter 25, Hawaii County Code. All requirements and conditions of a Use Permit will be followed.

6.2.3 Special Management Area

The Special Management Area (SMA) lands extend inland from the shoreline as delineated on maps filed with the County. Properties within the SMA are subject to special controls to avoid permanent losses and protection of valuable resources. The makai portion of the site located below the lateral Old Government Road to the shoreline is within the County Special Management Area (SMA), and is subject to the provisions of Chapter 205A, Hawaii Revised Statutes (HRS) and Rule 9 of the County of Hawaii Planning Commission Rules of Practice and Procedure. The overall Project will be generally consistent with the Objectives and Policies set forth in Chapter 205A, HRS.

The land below the Old Government Road is within the "Special Management Area" (SMA) as defined by the Hawaii County Planning Commission under the provisions of Chapter 205A, HRS, and the County's Rule 9, Special Management Area (Figure 7). As such, an SMA permit application will be filed with the Hawaii County Planning Commission for the proposed project. That permit application will be supported in part by this EIS. In essence, County objectives and policies regarding the Special Management Area mirror the State objectives and policies as discussed in Section 3. County SMA guidelines relevant to the proposed project are as follows:

Guidelines A 2,3,4, and 5

These guidelines seek to minimize alterations to any body of water; impose restrictions on public access to tidal and submerged lands and beaches; interfere with or detract from the line-of-sight toward the sea; and minimize adverse effects on water quality and wildlife habitats.

Discussion: Although the proposed project would not affect the offshore area, the project is intended to expand and enhance the recreational opportunities available to the residents of the area as well as visitors to the project. The visual character of the proposed project is expected to be positive and assist in maintaining the open space character of the site. Views inland from the shoreline and views seaward from the highway are not expected to be adversely affected.

Guidelines B 1, 2, and 3

These guidelines seek to minimize potential adverse environmental impacts; assure that projects are consistent with State objectives and policies; and assure that projects are consistent with the County General Plan.

Discussion: The proposed project is not expected to result in any adverse impacts that cannot be mitigated. The project is consistent with applicable provisions of the State's coastal zone management objectives and policies. Further, the project will be subject to additional review as part of the processing of the Conservation District Use Permit (as required), the Planned Unit Development approval, Special Permit and Use Permit.

Guidelines C 1, 2, 3, 4, 5, and 6

These guidelines seek to assure adequate public access to publicly owned beaches, recreation areas and natural reserves; reserve public recreation areas and wildlife preserves; and provide liquid and solid waste treatment, disposition and management that will minimize adverse effects on Special Management Area resources.

Discussion: The proposed project: 1) includes provisions for public access to the shoreline; 2) would provide additional recreational opportunities for the residents and visitors to the project; and 3) includes provisions to preserve the archaeological/historical resources of the project area. Liquid and solid wastes will be treated, disposed of and managed in compliance with applicable Federal, State and County roles and regulations. Liquid wastes will be treated and disposed of in the wastewater treatment and disposal system to be developed as part of the project. Solid wastes would be collected and disposed of at approved County sanitary landfill sites.

7.0

Contextual Issues

7.0 ALTERNATIVES TO THE PROPOSED ACTION

In compliance with the provisions of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 11-200-17(f), the following is a discussion of the alternatives to the proposed Conceptual Master Plan that would allow the objectives of the Conceptual Master Plan to be met, while minimizing potential adverse environmental impacts. The possible alternatives to the proposed plan, including the "no-action" alternative, have also been investigated to identify other potential land uses which might be more appropriate on the property relative to existing environmental and social/ economic conditions.

The rejected alternatives do not meet the stated objectives of the State's and County's plans and goals as effectively as the proposed Conceptual Master Plan, or would result in greater environmental impacts than the preferred alternative.

7.1 THE PREFERRED ALTERNATIVE

Under the preferred alternative, the project area would be developed as an agricultural and recreational master planned community. As a result, the natural open space character of the site would be diminished or lost, however, the low density agricultural lots of sizes from one to five acres surrounding the golf course would maintain a low density rural quality. This alternative would respond to the current market demand for second homes consisting of large lots in a recreational setting. Through its development new demands would be placed on existing resources including increased use of potable water, existing infrastructure including intensified generation of wastewater and solid wastes, and greater demand for public facilities and services. The development of the project will contribute towards the development of water resource systems in the area and help to improve the existing water infrastructure. Through master planning in response to a projected population increase, the environmental and social impacts of population growth will be mitigated as compared to scattered unplanned growth that could be expected with the no action alternative.

The Keopuka Lands conceptual master plan is considered to be the best alternative, although refinement of the plan layout during the design phase may result in a changed configuration, the concept described herein would remain consistent.

7.2 NO-ACTION ALTERNATIVE

The no-action alternative would involve no changes to the existing project site for the foreseeable future. The currently practiced small scale agricultural use of the property would continue and the majority of the property would remain vacant of any improved uses. The archaeological resources on the property including along the coastal strip would be neglected and possibly overgrown with exotic plant species. Access to the site would likely become more restricted under the no-action alternative.

The no-action alternative would not be consistent with stated governmental policies of establishing new housing and employment opportunities and would not create the overall positive economic impacts to the South Kona District. New tax revenues would not be generated and the infrastructure improvements to be provided in support of the conceptual master plan would not be constructed by the developer.

This alternative would deny the community of the potential public benefits associated with the current development proposal. Some of these benefits include:

- Efficient integration of existing infrastructure with the present system to more efficiently accommodate existing and future needs of the community.
- Provisions for improved public access to the shoreline.
- Generation of new tax revenues that would exceed the expenditures necessary to support the development, resulting in a net fiscal benefit to the State and the County.
- Opportunity to protect, preserve, or restore, as appropriate, important archaeological sites that may otherwise deteriorate or be damaged.
- Creation of new jobs for local residents in an area characterized by relatively high unemployment rates.

7.3 HIGH DENSITY NO GOLF ALTERNATIVE

The high density alternative, possibly including intensive resort use, would not allow for a sensitive design which would preserve the rural character of the site and would not be in keeping with the lower density rural character of the surrounding region. However, this alternative would not be in concert with the State and County long-range plans for the area.

Overall, the potential impacts to public services and facilities, as well as to the environment, would be amplified with a higher density development.

7.4 FIVE-ACRE AGRICULTURAL LOT DEVELOPMENT

Subdivision of the project site under the existing A-5a General Agricultural district zoning classification would involve the creation of approximately 125 five-acre minimum lots. There would be no clustering of lots and no large area open spaces such as is provided by the proposed golf course. This would result in the same residential density without the open space and buffers, especially along the Kealakekua Bay State Historic Park boundary.

The property as a whole is only marginally suited for intensive agricultural use, which would not be feasible without significant capital input and site and infrastructure improvements. Without the necessary capital and improvements that would accompany the proposed Keopuka Lands development, intensive agricultural use on the property by itself does not appear to be a viable alternative from an economic perspective.

7.5 ALTERNATIVE LOCATION FOR THE PROPOSED PROJECT

Pacific Star LLC does not own other lands in Kona nor does Pacific Star intend to purchase other lands to develop the Project as described in the Keopuka Lands Conceptual Master Plan. Therefore the alternative of an alternative location for the development of the Project was not pursued.

7.6 COMPARATIVE EVALUATION

In general, the alternatives evaluated do not provide the degree of satisfaction to meet the project objectives, they have greater adverse impacts, higher on or off site infrastructure costs, and less expansion capabilities. Moreover, these alternatives are incompatible land uses for the area, a well as being economically unfeasible, and/or would not allow the County's overall goals and objectives regarding the project area to be met. Alternative use of the property, including the no-action alternative, were rejected because they do not meet the objectives of the proposed project.

The proposed project satisfies the owner's objectives and provides the best opportunity to assist in supporting West Hawaii's forecasted residential, recreational, educational, and public facility needs over the period of development. Although each alternative evaluated may have some merit, none of the alternatives meet the proposed project's stated objectives. Table 10 evaluates the potential alternatives on the basis of meeting the project objectives and avoiding significant environmental impacts.

Table 9. Potential for Alternatives to Meet Project Objectives and Avoid Significant Environmental Impacts

Objective	No-Action	Preferred Alternative	High -Density Golf	5-Acre Agriculture Lots
Provide an economic generator	-	+	+	-
Provide agricultural lots	-	+	-	
Provide recreational opportunities	-	+	+	-
Provide member/guest facilities	-	+	-	-
Avoid significant environmental impacts	+	+	-	o

Legend: + = Alternative satisfies objective.
o = Alternative minimally satisfies the objective
- = Alternative does not satisfy the objectives

8.0

Alternatives to the Proposed Action

8.0 CONTEXTUAL ISSUES

A summary of the key issues within the context of the overall project is presented in this section.

8.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

Analyses of various onsite environmental features have found the Keopuka Lands property to possess physical attributes that are desirable as amenities in an agricultural and recreational master planned development. These attributes include a superior location with regard to views, slope, climate and achieving an ambience of privacy in a membership community. The studies performed have also indicated that the proposed project is compatible with and will enhance the existing natural environment. Specific measures will be employed to mitigate potential adverse environmental impacts (as discussed in Sections 4 and 5) in the design, construction and operations phases of the project.

The subject property is currently generally vacant with a small portion being used for agricultural purposes. No other short term uses of the property that may have potential negative long term consequences have been identified. No short-term exploitation of resources that will have negative long-term consequences has been identified.

The proposed development, as described in this document, will maintain the highest quality standards that the owner is known for in other proven projects . The principal long-term benefits of the project include the productive use of the property at a low density enhanced by substantial open space elements including the golf course and a 40-acre coastal band setback approximately 300 feet from the shoreline. Thus, the proposed action will not foreclose future options, narrow the range of beneficial uses, or pose long-term risks to health or safety.

8.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The development of the Project and construction of the agricultural lots, 18-hole golf course, and members' hale, and supporting facilities would result in the irreversible and irreversible commitment of certain natural, cultural and fiscal resources. Major resource commitments include the 660-acre property and the monetary funds, construction materials, non-renewable resources, manpower and energy required for the Project's completion. The impacts represented by the commitment of these resources, however, should be weighed against the positive socio-economic benefits that could be derived from the project versus the consequences of either taking no action or pursuing another less beneficial use of the property.

In addition, the construction of the Project could possibly result in environmental accidents; however, precautions (including monitoring and best management practices) are in place to prevent, mitigate or offset such accidents.

8.3 OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES

The proposed Keopuka Lands project largely conforms to the broad land use policies of the State and the County. There are however, various inherent conflicts in the goals and objectives of the land use plans, policies and controls, and the proposed project's relationship to various policies that must be reconciled against those plan elements which most appropriately apply. As indicated in Section 6, the proposed project would be consistent with the applicable Hawaii County General Plan goals, policies and standards. The proposed project is also consistent with the Hawaii State Plan and various Functional Plans, as well as the objectives and policies of the Hawaii Coastal Zone Management Program (Chapter 205A, HRS). Significant adverse effects are not expected to result from the proposed project and any minor impacts may be offset by the benefits which are expected to be accrued from the project. State and County plans have encouraged quality development of housing with the County of Hawaii, especially when these have been planned in concert with community goals, as expressed with the County General Plan.

The required infrastructure needed to support the project are present or planned as part of project development. Additions that may be required would largely be provided by the developer or funded through increased tax revenues that the project would generate. The project development is consistent with governmental policies calling for increased access to the shoreline and increased recreational facilities and opportunities.

Public access to the shoreline would be improved and managed in a manner that would protect the historical and archaeological sites in the area and overuse of the coastal resources. Historical and archaeological sites would be protected and incorporated into the development plan, thereby adding to the cultural resources of the County and State and needed employment, economic and housing opportunities would be provided. Generally, as discussed in Section 6, the plan is consistent with relevant government plans and policies. Keopuka Lands would fulfill the goals of the Hawaii County General Plan, which call for economic growth that maintains the desired physical environment that meets the needs of Hawaii's people.

8.4 POTENTIAL UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Land Use Character. Portions of South Kona are undergoing a gradual land use change to a more diversified rural character. Keopuka Lands, with its low-density agricultural and recreational community facility orientation, would contribute to this cumulative land transformation. The country and rural qualities of South Kona will be reflected in the low-density plan for Keopuka Lands. A key element of the rural quality is maintaining open space with landscaping and building design appropriate for the environment.

Visual Resources. The generally vacant property - with the exception of the limited agricultural use in the mauka area - would be transformed from a natural open area to a low-density built environment. The naturally sloped landscape set within the shadow of the Pali Kapu o Keoua ridge would be visible primarily from the nearshore marine waters, from the lower portions of Kaawaloa Road (a mauka-makai hiking and equestrian trail which leads to the Captain Cook Monument at Kealakekau Bay), and from the Old Cart Road and Kaawaloa flats at the State Park parcel.

Views of the built project from within the 360-acre Kealakekua Bay and from Cook Point are obscured by the steep and massive Pali, therefore, the experience from the State Park, with the exception of Kaawaloa Road, will not be negatively affected.

Ocean Water Quality. Keopuka Lands will not create adverse ocean water quality impacts because extensive measures will be implemented to control erosion, storm water and chemical use on the site. Treated wastewater (reclaimed water) will be disposed on-site which will not impact ocean water quality. All waste water generated by the project will be treated onsite in a manner meeting State Department of Health standards. Construction best management practices (BMP) and golf course integrated pest management practices (IPM) will be implemented. In addition, water quality monitoring regimen in accordance with the Department of Health's requirements will be implemented over the long-term.

Air Quality. During construction, the project will unavoidably contribute to air pollutant concentrations due to fugitive dust releases on construction areas, however, appropriate mitigative measures including frequent watering of exposed surfaces will help to establish controls. Over the long-term operation of the project, an air quality modeling analysis of future project related and ambient traffic indicated that even during worst-case conditions the predicted concentrations will remain within the national and the state standards.

Noise. The project will generate short-term noise impacts during the construction period, however, all requirements of the County and the State would be met to minimize the impacts. Added future project and ambient traffic along the proposed Mamalahoa Highway Bypass would require a setback of 150 feet for any residences on both sides of the Bypass roadway.

8.5 POTENTIAL ADVERSE EFFECTS ON PUBLIC SERVICES AND FACILITIES

Traffic. Traffic levels on the Keopuka site will increase as the project achieves buildout. Within the South Kona District, however, regional traffic levels and circulation patterns are expected to be favorably altered when the proposed Mamalahoa Highway Bypass is constructed. Access to the Keopuka Lands development is planned from the new Bypass, the completion of which is planned prior to the commencement of project construction. The traffic impact analysis for the project by M&E Pacific (Appendix J) has determined that because of the project's low density and lengthy development schedule the Keopuka Lands contribution to local and regional traffic would not be significant nor warrant any mitigative measures even as the future population of South Kona and Kona in general continues to grow.

Potable Water. Keopuka Lands will create a small additional demand for potable water within the County Department of Water Supply's South Kona system. Pacific Star, LLC will participate with the County in source development as required to meet the projected project requirement. The water resources study for the project has identified the availability of high level groundwater within the South Kona region that would be capable of providing the 117,000 gallons per day required by the project at buildout.

An irrigation water source would be developed on site to meet the project's irrigation demands.

Schools. The Keopuka Lands development is phased over a 10-year period and is expected to attract second home buyers whose children are beyond school age, therefore, the Keopuka Lands development should not have a negative impact on schools in the area.

8.6 UNRESOLVED ISSUES

Potable Water

The water resource study for the project by Waimea Water Service has indicated that a high level groundwater source is available within the project region. Water commitments to meet the potable water demand of 117,000 gallons per day will be pursued through the development by the project of additional water resources in the area in coordination with the County Department of Water Supply.

Site Preservation Measures

A complete archaeological survey has been conducted for the site by Paul H. Rosendahl, Inc. (1989) and Cultural Surveys Hawaii (1995) for the 660 acre property (Appendices I-1 and I-2, respectively). Based on the field reconnaissance, limited data recovery and subsurface testing, initial significance determinations and treatment recommendations were provided. The survey reports have been submitted to DLNR State Historic Preservation Division (SHPD) for review and approval. Although the property has been thoroughly surveyed for the presence of archaeological sites, and evaluated for their potential historic or cultural significance, the specific measures for site preservation and appropriate buffer treatment will be determined through discussions with the Historic Preservation Division, the Hawaii Island Burial Council and the County of Hawaii Planning Department. The applicant will continue to work closely with local historians and cultural specialists, as well as the Historic Preservation Division, in gaining full appreciation of the archaeological sites and preparing a comprehensive plan for site protection and preservation.

Historic Trails and Roads

Two existing historic trails which traverse the project area in a north-south direction include the Old Government Road and the Old Cart Road. A determination on the disposition is required through additional research and through discussions with the State. Similarly with other historic trails and sites that may be present on the property, the measures for protection and treatment will be determined as part of the regulatory approval process.

9.0

Parties Consulted and Those Who Participated in the Preparation of the EIS

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

In the course of planning for this Project, agencies (or agency documents) were consulted and/or provided information for the preparation of this environmental impact statement.

9.1 CONSULTED PARTIES ON THE ENVIRONMENTAL ASSESSMENT/EIS NOTICE OF PREPARATION

9.1.1 County of Hawaii Agencies

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

9.1.2 State of Hawaii Agencies

Department of Agriculture
Department of Business, Economic Development & Tourism
Department of Business, Economic Development & Tourism - Energy, Resources, & Technology Division
Department of Business, Economic Development and Tourism - Land Use Commission
Department of Business, Economic Development and Tourism - Office of Planning
Department of Education
Department of Health
Department of Land and Natural Resources
Department of Land and Natural Resources - Division of State Parks
Department of Land and Natural Resources - Land Division
Department of Land and Natural Resources - State Historic Preservation Division
Department of Transportation
Office of Environmental Quality Control
Office of Hawaiian Affairs

9.1.3 University of Hawaii

University of Hawaii at Manoa - Hawaii Institute of Marine Biology
University of Hawaii at Manoa - Water Resources Research Center

9.1.4 Federal Agencies

U.S. Army Corps of Engineers - Pacific Ocean Division
U.S. Department of Agriculture - Natural Resources Conservation Service

U.S. Department of Commerce - National Marine Fisheries Service
U.S. Department of the Interior - Fish and Wildlife Service
U.S. Department of the Interior - National Park Service

9.1.5 Utilities

Hawaii Electric Light Company

9.1.6 Community Organizations

American Lung Association
Kona Hawaiian Civic Club
Kona Kohala Chamber of Commerce
Kona Traffic Safety Committee
Moku Loa Group Sierra Club - Sierra Club Hawaii Chapter
Sierra Club

9.1.7 Media

Hawaii Tribune-Herald, Ltd.
West Hawaii Today

9.1.8 Libraries

Hilo State Library
Kailua-Kona State Library
Kealakekua State Library

9.1.9 Individuals

Howard Ackerman
Sotero Agoot
Gus Brocksen
William "Skip" Cowell
Mark Crawford
Jack Davis
Kila DeMello
Dale Fergerstrom
Jean Greenwell
Kelly Greenwell
Sherwood Greenwell
George Harai
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10.0 LIST OF PREPARERS

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Several key technical consultants were employed to provide specific assessment of environmental factors for this project. These consultants, their company affiliation, and their specialty are listed below:

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Leann McGerty	SCS	Cultural Impact Assessment
Ed Harada, P.E.	M&E Pacific	Traffic Impact Analysis
Wm. Lee Berndt, Ph.D.		Golf Course Management
Steve Bowles	Waimea Water Resources	Water Resources Assessment
Barry Neal	B.D. Neal & Associates	Air Quality Assessment
Tim Noonan	Darby & Associates	Noise Assessment
Ron Terry		Botanical Survey
		View Shadow Assessment
Philip Bruner		Wildlife Survey
Reginald David	Rana	Arthropod (Cave Entomology)
Steven L. Montgomery	In association with Rana	Arthropod (Cave Entomology)

11.0

References

11.0 REFERENCES

Baker, H.L. et al., 1965. *Detailed Land Classification, Island of Hawaii.* L.S. Land Study Bureau, University of Hawaii.

Brock, R.E. 1992. A Quantitative Assessment of the Marine Communities and Water Quality . Honolulu, Hawaii.

Bruner, P. 1992. *Survey of the Avifauna and Feral Mammals at Keopuka, North and South Kona, Hawaii.*

Funk, E. 1991. *Botanical Survey Report for the Keopuka Lands, Captain Cook, South Kona, Hawaii.* Honolulu, Hawaii.

Hammatt, H.H., P.O. Walsh, J.J. Robins, M. Strides, and T.R. Barr, 1995. *Archaeological Inventory Survey and Limited Subsurface Testing of a 500-Acre Parcel in the Ahupua'a of Keopuka, District of South Kona, Island of Hawaii (TMK: 3-8-1: 06-11, 13-19).* Honolulu, Hawaii.

Hawaii, County of. (1989) *The General Plan Hawaii County.* Hilo.

Hawaii, County of. (1995) *Hawaii County Code.* Hilo

Hawaii State Department of Agriculture, 1977. *Agricultural Lands of Importance to the State of Hawaii.* Honolulu, Hawaii.

Hawaii, State of. Department of Agriculture. (1991) *State Agriculture Functional Plan.* Honolulu.

Hawaii, State of. Department of Business, Economic Development and Tourism. (1991) *State Energy Functional Plan.* Honolulu.

Hawaii, State of. Department of Business, Economic Development and Tourism. (1991) *State Tourism Functional Plan.* Honolulu.

Hawaii, State of. Department of Education. (1989) *State Educational Functional Plan.* Honolulu.

Hawaii, State of. Department of Health. (1989) *State Health Functional Plan.* Honolulu.

Hawaii, State of. Department of Human Services. (1989) *State Human Services Functional Plan.* Honolulu.

Hawaii, State of. Department of Labor and Industrial Relations. (1990) *State Employment Functional Plan.* Honolulu.

Hawaii, State of. Department of Land and Natural Resources. (1991) *State Conservation Lands Functional Plan.* Honolulu.

Hawaii, State of. Department of Land and Natural Resources. (1991) *State Historic Preservation Functional Plan.* Honolulu.

Hawaii, State of. Department of Land and Natural Resources. (1991) *State Recreation Functional Plan.* Honolulu.

Hawaii, State of. Department of Transportation. (1991) *State Transportation Functional Plan.* Honolulu.

Hawaii, State of. (1999) *Hawaii Revised Statutes 1999 Cumulative Supplement.* Honolulu.

Hawaii, State of. (1993) *Hawaii Revised Statutes 1993 Replacement.* Honolulu.

Hawaii, State of. Housing Finance and Development Corporation. (1990) *Addendum to the State Housing Functional Plan.* Honolulu.

Hawaii, State of. Housing Finance and Development Corporation. (1989) *State Housing Functional Plan.* Honolulu.

Hawaii State of. (1989) Office of State Planning. *West Hawaii Regional Plan.* Honolulu.

Hawaii, State of. University of Hawaii. (1984) *State Higher Education Functional Plan.* Honolulu.

Heliker, C., 1991 Volcanic and Seismic Hazards on the Island of Hawaii: U.S. Geological survey general interest publication, 48 pp.

Juvik, S. & J. Juvik, eds., 1998. *Atlas of Hawaii.* 2nd edition. Honolulu: University of Hawaii Press.

United States Department of Agriculture Soil Conservation Service, 1972. *Island of Hawaii, State of Hawaii.*

Walker, A.T and P.H. Rosendahl. 1990. *Archaeological Field Inspection Survey, Keopuka Lands Parcel. Lands of Onouli 2nd and Keopuka 1st & 2nd, South Kona District, Island of Hawaii (TMK: 3-8-1-07: 1, 54, 55).* Hilo Hawaii.

12.0

Comments and Responses

12.0 COMMENTS AND RESPONSES

The following agencies and organizations were sent or reviewed available copies of the EA/EISNOP. 14 comment letters were received and are denoted with an asterisk (*).

12.1 County of Hawaii Agencies

Department of Parks and Recreation
Department of Public Works
Department of Water Supply*
Fire Department
Planning Department
Police Department*

12.2 State of Hawaii Agencies

Department of Agriculture
Department of Business, Economic Development and Tourism
Department of Business, Economic Development and Tourism - Energy, Resources, and Technology Division
Department of Business, Economic Development and Tourism - Land Use Commission*
Department of Business, Economic Development and Tourism - Office of Planning*
Department of Education*
Department of Health*
Department of Land and Natural Resources
Department of Land and Natural Resources - Division of State Parks*
Department of Land and Natural Resources - Land Division*
Department of Land and Natural Resources - State Historic Preservation Division
Department of Transportation*
Office of Environmental Quality Control
Office of Hawaiian Affairs

12.3 University of Hawaii

University of Hawaii at Manoa - Hawaii Institute of Marine Biology
University of Hawaii at Manoa - Water Resources Research Center

12.4 Federal Agencies

U.S. Army Corps of Engineers - Pacific Ocean Division
U.S. Department of Agriculture - Natural Resources Conservation Service
U.S. Department of Commerce - National Marine Fisheries Service
U.S. Department of the Interior - Fish and Wildlife Service*
U.S. Department of the Interior - National Park Service

12.5 Utilities

Hawaii Electric Light Company*

12.6 Community Organizations

American Lung Association
Kona Hawaiian Civic Club
Kona Kohala Chamber of Commerce
Kona Traffic Safety Committee
Moku Loa Group Sierra Club - Sierra Club Hawaii Chapter*
Sierra Club*

12.7 Media

Hawaii Tribune-Herald, Ltd.
West Hawaii Today

12.8 Libraries

Hilo State Library
Kailua-Kona State Library
Kealakekua State Library

12.9 Individuals

Chris Norrie*

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
25 AUPUNI STREET • HILO, HAWAII 96720
TELEPHONE (808) 961-8660 • FAX (808) 961-8657

May 5, 2000

Mr. James Leonard
PBR Hawaii
101 Aupuni Street
Hilo Lagoon Center, Suite 310
Hilo, HI 96720-4276

ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE
KEOPUKA LANDS
SOUTH KONA, ISLAND OF HAWAII
TAX MAP KEY: 8-1-007:001, 054 AND 055

We have reviewed the subject notice and our comments follow.

Water availability for the South Kona water system is such that there are 7 units of water available for each existing zoned parcel. Since the proposal is for three lots, there would be a total of 21 units of water available to the project. Each unit is equal to a daily maximum use of 600 gallons. A connection to the water system could be made to the existing 8-inch waterline in the Mamalahoa Highway that fronts the three parcels.

The project as proposed will require a minimum of 225 units of water. We will require the submission of water demand calculations by a registered engineer for our review and approval to determine the exact amount of water that the project will need. Even at the proposed minimum level, we will probably require the construction of a well and adequate storage to address both maximum day use and fire flow.

Lastly, the concentration of 100 units at the clubhouse is at a density that fire flow must be addressed. We suggest that you contact the Fire Department early on to get a determination on the fire flow needed.

If you have any questions, please contact our Water Resources and Planning Branch at 961-8665.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

BCM:gms

copy - William L. Moore Planning

... Water brings progress ...

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Milton D. Pavao, P.E., Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Pavao:

Thank you for your letter dated May 5, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments:

Water availability. We acknowledge your statement that a connection to the water system could be made to the existing 8-inch waterline within Mamalahoa Highway fronting Keopuka.

Water demand for the project. A preliminary study by Waimea Water Resources has calculated the water demand for the conceptual master plan. These calculations will be refined as site specific plans are prepared. The water study addresses the potential requirement of well and storage development to meet the projected day use and fire flow requirements. A description of the project's domestic water requirements, along with the Waimea Water Resources study will be included in the EIS.

Coordination with the Fire Department. We will consult with the Fire Department to address the spacing of the units and the fire flow requirements for the 100-unit members' hale.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

HONOLULU OFFICE
1001 BISHOP STREET, PACIFIC TOWER, SUITE 650, HONOLULU, HAWAII 96813-3429
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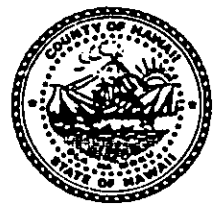
Stephen K. Yamashiro
Mayor



Wayne G. Carvalho
Police Chief

James S. Correa
Deputy Police Chief

County of Hawaii
POLICE DEPARTMENT

349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-2702

April 17, 2000

Mr. James Leonard
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, HI 96813

Dear Mr. Leonard:

SUBJECT: ENVIRONMENTAL ASSESSMENT/ENVIRONMENTAL IMPACT STATEMENT
NOTICE OF PREPARATION
KEOPUKA LANDS
SOUTH KONA, HAWAII
TAX MAP KEY: 8-1-07: 1, 54 AND 55

Staff reviewed the above-referenced documents prepared for the proposed Keopuka Lands Project.

According to the report, the Traffic Impact Assessment Study (TIAR) will be submitted at a later time when the Draft Environmental Impact Statement (EIS) is submitted. The TIAR will describe existing and future roadway conditions along the proposed "Mamalahoa Bypass Highway" which is scheduled to commence construction in 2000. The draft EIS will also address the roadways, traffic, and police services for the area.

Presently, the only access to the project site will be from a four-wheel drive roadway from Mamalahoa Highway located just south of the 111-mile marker in Keopuka, South Kona, Hawaii. The report indicates that use of this roadway will be temporary until the Mamalahoa Bypass Highway is completed.

We do not believe that there will be a negative impact to traffic or police services in the area at this time. However, we reserve further comments on the project pending review of the completed draft EIS.

Thank you for the opportunity to comment.

Sincerely,

WAYNE G. CARVALHO
POLICE CHIEF

WENDELL D. PAIVA
ASSISTANT POLICE CHIEF
INVESTIGATIVE OPERATIONS BUREAU

TH:lk

cc: Office of Environmental Quality Control
County of Hawaii, Planning Department

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Wayne G. Carvalho, Police Chief
Mr. Wendell D. Paiva, Assistant Police Chief
Investigative Operations Bureau
County of Hawaii
Police Department
349 Kapiolani Street
Hilo, Hawaii 96720-3998

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Carvalho and Mr. Paiva:

Thank you for your letter dated April 17, 2000 concerning the Keopuka Lands EA/EISNOP.

We note your comment that you do not believe there will be a negative impact to traffic or police services, however, you reserve further comments pending review of the Draft EIS.

The Draft EIS will contain the full Traffic Impact Assessment Report (TIAR) and description of public services in the area of the project.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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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

May 11, 2000

Mr. James Leonard
PBR Hawaii
Hilo Lagoon Center, Suite 310
101 Aupuni Street
Hilo, Hawaii 96720-4276

Dear Mr. Leonard:

Subject: Environmental Assessment/EIS Preparation Notice for Keopuka Lands, South Kona, Hawaii, TMK 8-1-07: 1, 54, and 55

We have reviewed the subject document forwarded by your office's letter of transmittal dated April 28, 2000, and have the following comments:

1) We confirm that the project site, as represented on the location map, is designated within the State Land Use Agricultural and Conservation Districts. In order to determine a more precise location of the district boundary relative to the project's boundary, we suggest that a boundary interpretation request be submitted to our office pursuant to §15-15-22, Hawaii Administrative Rules.

2) Based on the description of the proposed project, limited agricultural opportunities will be available for the lots on the makai portions of the project site. The Conceptual Master Plan indicates that these makai lots represent the majority of the 125 lots proposed. We also note that non-agricultural uses, such as an 18-hole golf course and members' hale, will be included in the project. In light of the project site's overall limitation for agricultural uses and the relatively urban nature of the project, it may be more appropriate for the applicant to seek a boundary amendment to reclassify the project site to the Urban District.

3) We request that our office be included as a consulted party to the draft environmental impact statement.

We have no further comments to offer at this time. We appreciate the opportunity to comment on the subject document.

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

Sincerely,

ESTHER UEDA
Executive Officer

EU:aa

cc: County of Hawaii Planning Dept.
OEQC
OP

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

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

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Ms. Ueda:

Thank you for your letter dated May 11, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments:

1) At the appropriate time in the review and permitting process, a boundary interpretation request will be submitted to your office pursuant to Section 15-15-22, Hawaii Administrative Rules.

2) The Keopuka Lands project will be developed in accordance with the requirements of Chapter 205, *Hawaii Revised Statutes* and the Hawaii County Zoning Code which designates the project area for Agricultural uses.

3) We will be providing you with a copy of the EIS and will include the Land Use Commission as a consulted party.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard

James Leonard, AICP
Managing Director - Hilo Office

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

HONOLULU OFFICE
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DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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

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

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

Ref. No. P-8587

April 26, 2000

Mr. James Leonard
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Leonard:

Subject: Environmental Assessment (EA)
Environmental Impact Statement (EIS) Notice of Preparation
Keopuka Lands
Kona Coast, Island of Hawaii
TMK: 8-1-07: 1, 54, and 55

Landowner Pacific Star, LLC is proposing to develop a 125-lot agricultural subdivision including an 18-hole golf course, clubhouse, and 100 unit members' hale on approximately 660 acres of land located at Keopuka and Onouli, South Kona District, Island of Hawaii. On-site infrastructure is expected to range from $20 to $25 million and construction of the golf course, clubhouse and related facilities would cost approximately $25 million.

The project, named Keopuka Lands, is located makai of Mamalahoa Highway north of the town of Captain Cook. The project area consists of approximately 660 acres bounded on the west by the Pacific Ocean, on the east by Mamalahoa Highway, on the north by the ahupuaa of Onouli 1 and 2, and on the south by the ahupuaa of Kaawaloa. The makai portion of the project area encompasses approximately 1 mile of shoreline. South of the property are the Kealakekua Bay Marine Life Conservation District (also known as the Kealakekua Bay State Underwater Park), and the Kealakekua Bay State Historical Park.

Of the 660 acres, approximately 610 acres are within the State Land Use Agricultural District, and approximately 50 acres, located along the shoreline and the southwestern portion of the parcel, are within the State Land Use Conservation District. Soils within the project site are classified C, D, and E. These soil types are described in the EA as generally moderate to very poorly suited for agricultural use. The Property is currently zoned Agriculture – 5 acre (A- 5a). Under Chapter 205-2 and Chapter 205-4.5 Hawaii Revised Statutes (HRS), golf courses, country

clubs, and other buildings as well as uses normally considered as accessories to golf course/country club use, are allowed in the State Land Use Agricultural District with soil classifications of C, D, and E.

The 125-lot subdivision will include lots ranging in size from 1 to 5 acres, an 18-hole golf course, club house and 100 unit members' hale. The members' hale will provide hotel accommodations to include a lobby, administration offices, dining/kitchen facilities, and other related amenities. The members' hale is proposed to be constructed on approximately 15 acres with Special Permit approval from the County. An application for a County Planned Unit Development will be submitted with lot sizes from 1 to 2 acres. The larger lots (5-acres) planned for the project will be located mauka of the proposed Mamalahoa Highway Bypass. This area already is utilized as macadamia nut orchard, and is used to justify residential/agricultural lots and transient accommodations (members' hale) within the Agricultural District. According to the information provided in the EA, income from the macadamia nut production will subsidize the incomes of property owners of the 1 to 2-acre lot subdivision proposed for the area makai of the Mamalahoa Highway Bypass.

The proposed project is within the Kealakekua Hydrological Aquifer. Although pockets of soil are found throughout the project area, A'a and Pahoehoe cover most of the property. Lack of coastal caprock and the permeability of the soils prevent the buildup of a thick basal lens within the aquifer. It is further possible that high level groundwater may occur inland. Golf courses have the potential to be significant sources of pollutants that could reach coastal resources through run-off, or leach into the groundwater resources. The Underwater Park was established to protect the marine habitat and features from the negative impacts resulting from an increasing amount of visitors to the area. The Bay's marine life resources and the adjoining State Historical Park could be negatively impacted by the increased activity the proposed project will bring into the area. The DEIS should include a discussion of proposed management measures to control increased access to the parks and to prevent pollution of groundwater and coastal water resources from project area runoff during and after construction.

The Draft Environment Impact Statement (DEIS) should include a discussion on how the proposed residential and recreational uses proposed for the property will impact the existing macadamia nut production. Are the macadamia nut operations leased? The discussion should include an agricultural business plan that explains how revenues from the existing macadamia nut operation will be used to subsidize the owners of lots with limited agricultural opportunities. The developer should contact the State Department of Agriculture for comments regarding the proposed agricultural uses of the property.

The DEIS should provide information as to whether covenants will be attached to the property to ensure agricultural use since the property is in the Agricultural District.

The proposed project appears to be a gated community. It is not clear from the information provided in the EA how the project proposes to provide public access to the shoreline. Two historic unimproved roads traverse the property. An Old Government Road is located approximately at the 80 to 100-foot elevations, with another Old Government Road approximately at the 360-foot level. These two roads traverse the property in a north to south direction, and intersect with the unimproved Kaawaloa Road from Mamalahoa Highway. It appears from the information provided that these roads do not provide direct access to the shoreline. Neither does the conceptual master plan for the property show where "public" parking could be located for those seeking access to the shoreline.

The Office of Hawaiian Affairs should be contacted regarding the proposed project's impact on any native Hawaiian cultural practices that may be, or may have been customarily and traditionally exercised on the property.

The EA mentions that the area along the coast will generally be kept in a natural state. The DEIS should more specifically state whether the coastal area will be kept entirely in its natural state or if not what other uses are planned.

The alternatives section should discuss the alternative of clustering development and preserving large areas of open space as articulated in publications such as Rural by Design by Randall Arendt within the minimum lot size of one acre allowed in the Agricultural District.

We look forward to receiving a copy of the Environmental Impact Statement. Thank you for the opportunity to comment on the subject project. If you have any questions, please contact Judith Henry at 587-2803.

Sincerely,

David W. Blane
Director
Office of Planning

cc: Esther Ueda, LUC

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

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

OP Ref. No.: P-8587

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Blane:

Thank you for your letter dated April 26, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments:

Your letter summarizes the project description in paragraphs 1 - 4. We would, however, like to clarify that the members' hale will serve a specific member clientele, unlike a hotel which is open to the general public. Therefore, your characterization of the members' hale as a hotel is not accurate.

Water resources. According to a study of the water resources in the region by Waimea Water Services, high level groundwater above the Mamalahoa Highway have been successfully exploited and is now a part of the County Department of Water Supply system.

Golf course impact to coastal marine and groundwater resources. To address the potential impacts of golf course operation, several studies including a marine baseline study and water quality monitoring plan prepared by Richard Brock, Ph.D., a golf course management program by William Lee Berndt, Ph.D., and an agricultural management plan by Agricon Hawaii are described in the EIS. You may be aware that with the implementation of Best Management Practices (BMP) in the operation of golf courses, the monitoring and research studies performed over the past 20 years by Dr. Brock and other Hawaii scientists along the West Hawaii coastline indicate that golf courses have not adversely affected our nearshore waters.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

HONOLULU OFFICE
1001 BISHOP STREET, PACIFIC TOWER, SUITE 650, HONOLULU, HAWAII 96813-3429
TELEPHONE: (808) 521-5631 FAX: (808) 523-1402 E-MAIL: pbrhi@aloha.net

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Agricultural issues. The Agricon Hawaii report notes that 10 acres of macadamia orchard are currently under commercial cultivation The development of large lots (5+ acres) in the upper portion of the project would allow farming to continue but may result in the loss of a few trees. The agricultural program will be in accordance with State and County requirements and will include the remaining trees and some additional plantings in an open space buffer area where natural soils exist. Types of plantings may vary over time depending on market conditions for certain crops.

Public access. The Old Government Road and Old Cart Road are lateral alignments which are somewhat parallel to the coastline and do not provide shoreline access at Keopuka. A full discussion of the public access proposals, including shoreline access and public parking, will be provided in the DEIS.

OHA. The Office of Hawaiian Affairs is a consulted agency and will be provided with all relevant documents on this project.

Clustering Alternative. The project master plan is based on a clustering concept whereby development areas are concentrated while preserving large areas of open space. This concept is consistent with the concepts articulated in publications such as *Rural By Design*. The alternative is to develop the area in accordance with the existing zoning which will allow approximately 125 five acre lots to be created, with no provisions for common open space or clustering of dwellings.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard

James Leonard, AICP
Managing Director - Hilo Office

BENJAMIN J. CAYETANO
GOVERNOR

PAUL G. LeMAHIEU, Ph.D.
SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

April 5, 2000

Mr. James Leonard
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813

Dear Mr. Leonard:

Subject: Keopuka Lands EA/EISPN

The Department of Education (DOE) offers the following comments on the subject environmental assessment/environmental impact statement preparation notice:

1. Based on a total of 125 lots in the proposed project, the DOE estimates the following enrollment impacts:

School	1999 Capacity	1999 Enrollment	Estimated Impact
Konawaena Elementary	625	765	31
Konawaena Middle	189	231	13
Konawaena High	1,533	1,187	13

2. By this letter, we are recommending that the County of Hawaii impose a fair-share condition for this project. The following language is recommended:

"The applicant shall contribute to the development, funding, and/or construction of school facilities, on a fair-share basis, as determined by and to the satisfaction of the Department of Education (DOE). Terms of the contribution shall be agreed upon by the applicant and the DOE prior to applicant applying for grading permits."

3. The DOE's fair-share contribution amount is currently $1,125 per residential unit or lot. Monies collected as a result of this contribution will be earmarked for capital improvement projects within the affected school complex.

Thank you for the opportunity to respond. If you have any questions, please call Mr. Sanford Beppu at 733-4862.

Very truly yours,

Paul G. LeMahieu, Ph.D.
Superintendent of Education

PLeM:hy

cc: Paula Yoshioka, DAS
OEQC
Virginia Goldstein, Hawaii County Planning Dept.

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Paul G. LeMahieu, Ph.D., Superintendent of Education
State of Hawaii
Department of Education
PO Box 2360
Honolulu, Hawaii 96804

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Dr. LeMahieu:

Thank you for your letter dated April 5, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments:

1. The draft EIS will identify expected project impacts on public educational facilities. The Keopuka Lands project is a master planned agricultural and recreational community that is expected to appeal to older and/or second home buyers. Accordingly, we anticipate that the impact of the project development on educational facilities to be minimal.

2. It is our understanding that fair-share educational requirements are generally imposed when land is reclassified to the State Urban District and when a proposed development will significantly affect school enrollment. This project does not meet the criteria for such a condition.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

May 11, 2000

00-054/epo

Mr. James Leonard
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Leonard:

Subject: Environmental Assessment/Environmental Impact Statement Preparation Notice
Keopuka Lands
Kona Coast, Hawaii
TMK:8-1-07:1, 54, 55

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Fugitive Dust Concerns

The proposed master planned agricultural and recreational community will include approximately 125 agricultural lots surrounding an 18-hole golf course, a members' hale, and related improvements in the community. The 125 agricultural lots will range in size from 1 to 5 acres. Proposed actions affecting air quality includes removing vegetation, grading, trenching, excavation, and other construction activities.

There is a significant potential for fugitive dust emissions during the construction activities. The Department of Health suggests that a dust control management plan be developed which identifies and addresses activities that have a significant potential for fugitive dust to be generated. Implementation of adequate dust control measures during all phases of construction is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at 586-4200.

Wastewater

The subject project is located in the critical wastewater disposal area as determined by the Hawaii County Wastewater Advisory Committee. No new cesspools will be allowed in the subject area.

There is no existing sewer service system in the area, but the Environmental Assessment states that a new wastewater collection system and treatment facility will be built to serve the needs of this project. The Department of Health concurs with this proposal. Also, we suggest that effluent reuse be implemented. As of this writing, we have not received any wastewater plans for review. Should County sewers become available in the near future, connection will be required.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems," and we reserve the right to review these plans.

Should you have any questions, please contact the Planning/Design Section of the Wastewater Branch at (808)586-4294.

Drinking Water

The Safe Drinking Water Branch (SDWB) reserves the opportunity to evaluate and submit detailed comments when the Draft Environmental Impact Statement (DEIS) becomes available for our review. The subject EA/EISPN does not discuss in enough detail drinking water requirements, wastewater disposal, surface drainage systems, and golf course impacts. The DEIS should provide important details from which the SDWB can provide more substantive comments.

Please find enclosed a copy of our Guidelines Applicable to Golf Courses in Hawaii, August 1999, Version 6.

Any questions regarding these comments may be directed to Mr. Chauncey Hew of the SDWB at 586-4258.

Sincerely,

Gary Gill
Deputy Director
for Environmental Health

enclosure

c: CAB
WWB
SDWB

ENCLOSURE

DRAFT

STATE OF HAWAI'I
DEPARTMENT OF HEALTH
August 1999 (Version 6)

GUIDELINES APPLICABLE TO GOLF COURSES IN HAWAI'I

The State Department of Health recommends the following guidelines for all golf courses in Hawai'i to promote, protect, and enhance environmental quality and public health. These recommendations cover measures that could prevent groundwater and surface water pollution, soil contamination, chemical spills, noise and solid waste nuisances, and unsafe exposure to applied chemicals. Under certain situations, a state or county regulation may be necessarily applicable to a given activity, and such a regulation would require mandatory compliance. However, the intent of these guidelines is to voluntarily foster environmental protection and safety. Thank you for supporting these guidelines and caring about Hawai'i.

1. A groundwater or soil water monitoring plan for the purpose of preventing or minimizing groundwater contamination should be established with the following components:

   a. Baseline groundwater quality;

   b. Monitoring locations consisting of monitoring wells or lysimeters, or combination of both;

   c. Routine groundwater and/or soil water monitoring at frequencies such as quarterly, semiannually, or annually depending on the use of chemicals and the detection of contaminants;

   d. A list of chemicals and fertilizers that will be or have been used that may affect soil or groundwater adversely, and the analyses for such contaminants;

   e. Recordkeeping of monitoring results and a system of tracking trends in order to prevent, minimize, or mitigate occurrences of contamination;

   f. A procedure to notify all affected parties and the Department of Health of occurrences of contamination that pose, or may pose, a threat to public health or the environment.

2. A surface water monitoring plan, if applicable, for the purpose of preventing or minimizing surface water contamination should be established using the principles of item No. 1.

3. If the golf course uses reclaimed water (treated wastewater) for irrigation, please refer to the Department of Health's Guidelines for the Treatment and Use of Reclaimed Water, November 22, 1993, for reclaimed water requirements. Information about this subject may be obtained from the Department's Wastewater Branch at 586-4294 (Honolulu).

4. The use of an above-ground storage tank for petroleum products - used for fueling golf carts, maintenance vehicles, or emergency generators - is advantageous for detecting leaks which may not be easily detected if an underground storage tank is used. An above-ground storage tank, with all applicable safety considerations, should be preferred over an underground storage tank in order to minimize the risk of soil and groundwater contamination resulting from a leaking storage tank. Information about underground storage tanks may be obtained from the Department's Solid and Hazardous Waste Branch at 586-4226 (Honolulu).

5. Buildings used to store fertilizers, pesticides, algicides, fungicides, herbicides, and other chemicals especially in liquid form should be designed purposely for the containment and recovery of a catastrophic spill or leak of contents. An early warning system for spill or leak detection is advantageous.

6. Noise and dust from maintenance or construction activities should not disturb neighbors. Maintenance or construction activities should be scheduled and conducted accordingly.

7. Solid wastes should be managed without creating a nuisance. Furthermore, all green waste generated by the golf course should be reused on-site. Mulching and composting are activities that precede the reuse of green waste as a soil conditioner or a ground cover for weed control. Space and equipment should be provided to accomplish these activities. Additionally, where practicable, locally produced compost and soil amendments should be used whenever available.

8. Chemicals should be handled and applied according to instructions, and offsite drift during application should not occur. Methods of application and weather conditions should be chosen to optimize success.

9. A Best Management Practices (BMP) plan should be made for the golf course. The BMP plan functions as a hands-on environmental and worker safety maintenance manual that describes in plain English the elements and procedures for irrigation, chemical use, processing and reuse of green wastes, minimizing or preventing runoff, soil erosion and nuisance conditions, and sustaining worker safety. Use of the BMP should prevent the occurrence or reoccurrence of environmental or safety problems.

10. Agencies or organizations such as the State Department of Agriculture, the Federal National Resource Conservation Service, and the Golf Course Superintendents Association of America may provide ideas or practices that would integrate, supplement, and help to achieve the intent of these guidelines. Inquiries to these sources of information are advantageous.

The Department of Health appreciates your cooperation to preserve and protect environmental quality in Hawai'i. Questions about these guidelines may be directed to the Groundwater Pollution Control Section of the Safe Drinking Water Branch at 586-4258 (Honolulu). Direct toll free calls can be made from Kaua'i: 274-3141, ext. 64258; Maui: 984-2400, ext. 64258; Big Island: 974-4000, ext. 64258; Molokai and Lana'i: 1-800-468-4644, ext. 64258.

DRAFT

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	--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 586-422.6

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

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Gary Gill, Deputy Director for Environmental Health
State of Hawaii
Department of Health
PO Box 3378
Honolulu, Hawaii 96801

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Gill:

Thank you for your letter dated May 11, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to the comments raised in your letter.

Fugitive Dust Concerns

An air quality study by B. D. Neal & Associates has been prepared for the project and will be included in the EIS. In addition, a dust control management plan would be developed as part of the construction documents for the project and be prepared in accordance with Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust. As required, the project will implement dust control measures during all phases of construction.

Wastewater

A private wastewater collection system and treatment facility is planned to serve the project. The EIS identifies options for effluent reuse within the golf course and buffer area. All wastewater plans will conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems" and will be submitted to the DOH for review.

Drinking Water

The Draft EIS will contain detailed studies on drinking water requirements, wastewater disposal, surface drainage systems, and golf course management and impacts and will be provided to you for review.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

HONOLULU OFFICE
1001 BISHOP STREET, PACIFIC TOWER, SUITE 650, HONOLULU, HAWAII 96813-3429
TELEPHONE: (808) 521-5631 FAX: (808) 523-1402 E-MAIL: pbrhi@aloha.net

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HILO OFFICE
101 AUPUNI STREET, HILO LAGOON CENTER, SUITE 310, HILO, HAWAII 96720-4276
TELEPHONE: (808) 961-3333 FAX: (808) 961-1089

We acknowledge receipt of the DOH's Draft "Guidelines Applicable to Golf Courses in Hawaii", August 1999 (Version 6). Two studies which have been prepared for the EIS - Golf Course Management Plan by William Lee Berndt. Ph.D. and Water Quality Monitoring Program by Richard Brock, Ph.D. - contain measures which address the draft guidelines.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard

James Leonard, AICP
Managing Director - Hilo Office

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

TIMOTHY E. JOHNS
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

JANET E. KAWELO
DEPUTY DIRECTOR

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P.O. BOX 621
HONOLULU, HAWAII 96809

April 3, 2000

Mr. James Leonard
PBR Hawaii
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813

Dear Mr. Leonard:

SUBJECT: Review of EA/EISNOP for Keopuka Lands Project
South Kona, Hawai'i (TMK: 8-1-07: 1, 54, and 55)

Thank you for the opportunity to review the EA/EISNOP for the Keopuka Lands project which adjoins the Ka'awaloa Section of Kealakekua Bay State Historical Park.

General Comments:

- Section 1.2 (page 2) - Kealakekua Bay SHP abuts the property to the south, not east. It might also be good to clarify that the "Old Government Road" refers to the coastal jeep road since it is not labelled as such on Figures 1 and 2.

- Section 1.6 (page 5) - The correct site name is the Kealakekua Bay Historical District and it is listed on the National Register of Historic Places (1973) but not the Hawai'i Register.

- Section 4.7 (page 23) - The other hazard associated with hurricanes along the Kona Coast is high surf. There was surf damage to Nāpo'opo'o in 1992.

State Parks Concerns:

- Section 5.5 (page 30) - The *makai* portion of the project area abuts the park property and therefore, is not separated by the Ka'awaloa *ahupua'a* below the 400 foot elevation (approximate). As a result, there will be a direct visual impact from the Ka'awaloa section of the park. Although you mention the golf course serving as an open space buffer for the park, a golf course will alter the natural and historical setting along the property line. Therefore, we would recommend maintaining the natural landscape along the *makai* portion of the property line (Figure 3 indicates the golf course extends to the property line). We will await completion of the visual analysis referenced in this section before making additional comments on the visual impacts of the project.

- Recognizing the continuity of archaeological sites from the shoreline of Ka'awaloa to Keopuka, we encourage and support your efforts to preserve and protect these sites while maintaining the natural character of the shoreline within the boundaries of the conservation zone.

- Consideration is also requested for a service road to the park boundary, probably in conjunction with the existing coastal jeep road (Old Government Road).

We look forward to ongoing discussions on how we can best maintain the historical setting of the Ka'awaloa Section of Kealakekua Bay State Historical Park in conjunction with your development proposal.

Very truly yours,

RALSTON H. NAGATA
State Parks Administrator

cc: OEQC
Planning Dept., County of Hawaii
Planning Branch, Land Division
Historic Preservation Division

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Ralston H. Nagata, Administrator
State of Hawaii
Department of Land and Natural Resources
Division of State Parks
PO Box 621
Honolulu, Hawaii 96809

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Nagata:

Thank you for your letter dated April 3, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments:

General Comments

- The Draft EIS is being prepared and will incorporate the corrections cited in your letter.

- The coastal shoreline of the Keopuka property consists a rocky cliff of approximately 40+ acres of Conservation District land which is setback approximately 300 feet inland. The Flood Insurance Rate Map indicate a narrow band within the Conservation lands in the Flood Hazard Areas Inundated by 100-Year Flood. Low impact improvements are planned within the Conservation District to allow public access for fishing, gatherings, and camping.

  In response to the community concerns about the lack of infrastructure and services relative to the current use of the Ka'awaloa portion of the Kealakekua Bay State Historical Park, the Keopuka Lands project is proposing to provide resources to assist your Division of State Parks in the management of this area. In this regard, the Keopuka Lands project would like to discuss with you actions that may become appropriate improvement extensions in an "adopt-a-park" type of scenario, while maintaining district boundaries at the Keopuka/Kaawaloa borders.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

HONOLULU OFFICE
1001 BISHOP STREET, PACIFIC TOWER, SUITE 650, HONOLULU, HAWAII 96813-3429
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State Parks Concerns

- The Draft EIS will include a full discussion of the projects impacts on the visual resources in the area. This assessment will include a computer generated view shadow analysis that will identify where key design elements of the Keopuka Lands project will be visible (and conversely, where they will not be visible.) To supplement this analysis, a photographic documentary of the project site will be presented.

- The conceptual master plan has been revised to avoid the complex of archaeological sites at the Kaawaloa boundary. These sites will not be disturbed and will be preserved in situ. Minor landscaping improvements are planned, including the removal of exotic vegetation and planting of appropriate coastal native plants. These plans will be coordinated with the State Historic Preservation Division and your Division of State Parks.

- The applicant will work with State Parks with regard to providing service access through Keopuka to Kaawaloa.

The applicant recognizes the historical importance of these lands and intends to develop the Keopuka Lands project with dignified sensitivity and elegance to create a low density, unique community.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard

James Leonard, AICP
Managing Director - Hilo Office

STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUACULTURE 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

May 8, 2000

LD-NAV
Ref.: KEOPUKALANDS.RCM

Honorable Virginia Goldstein
Planning Director, Planning Department
County of Hawaii
25 Aupuni Street, Room 109
Hilo, Hawaii 96720-4252

Dear Ms. Goldstein:

SUBJECT: Review of Environmental Assessment for Keopuka Lands Project - Applicant: Pacific Star LLC, South Kona, Hawaii TMK: 8-1-07, 54 and 55

Thank you for the opportunity to review and comment on the subject Special Permit Application.

Attached herewith is a copy of our Na Ala Hele Hawaii Trail & Access System, Division of Aquatic Resources and Land Division Engineering Branch comments on the proposed project.

The Department has no other comment to offer on the subject matter. Should you have any questions, please feel free to contact Nicholas Vaccaro of the Land Division's Support Services Branch at 808-587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

C: Hawaii District Land Office
PBR Hawaii
Pacific Star, LLC

NA ALA HELE
Hawai'i Trail & Access System

MEMORANDUM

TO: Dean Y. Uchida, Administrator
Land Division

FROM: Rodney Oshiro, Na Ala Hele

DATE: May 5, 2000

SUBJECT: Keopuka Lands
Environmental Assessment-EIS Notice of Preparation

The project area is bisected by the Old Cart Road and the Old Government Road from Kealakekua Pali to Kainaliu (TMK 8-1-07). These alignments are owned by the State of Hawaii. The applicant is urged to employ mitigative measures to minimize impact on these alignments in terms of the number of breaches, use of buffers, and maintaining trail ambience. The mere superimposition of a golf course design, irrespective of the locations of these alignments is unacceptable.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

April 10, 2000

LD/NAV
Ref.: KEOPUKALANDS.COM

Suspense Date: 4/27/00

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks Recreation
OOO Historic Preservation Division
OOO Natural Area Reserve System (RECEIVED DIRECTLY)
OOO Na Ala Hele Division (RECEIVED DIRECTLY)
Division of Boating and Ocean ion (RECEIVED DIRECTLY)
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
OOO Hawaii District Land Office (RECEIVED DIRECTLY)
XXX Shoreline Processing Services

FROM: Dean Y. Uchida, Administrator
Land Division

SUBJECT: ENVIRONMENTAL ASSESSMENT - EIS NOTICE OF PREPARATION

Please review the following:

"ENVIRONMENTAL ASSESSMENT" is available for review in room 220

Please submit your comments (if any) on Division letterhead within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Signed: [signature]

Date: 4/20/00

STATE OF HAWAII
Department of Land and Natural Resources
Division of Aquatic Resources

SUSPENSE DATE: April 27, 2000

MEMORANDUM

To: William Devick, Administrator
From: Richard Sixberry, Aquatic Biologist

Subject: Comments on Environmental Impact Statement Preparation Notice (EISP)

Comments Requested By: Dean Uchida, Land Division

Date of Request: 4/10/00 Date Received: 4/13/00

Summary of Project

Title: Keopuka Lands

Proj. By: Pacific Star LLC

Location: Kona Coast, Hawaii

Brief Description:
The applicant has provided a Environmental Assessment as a prelude to the forthcoming Environmental Impact Statement that would allow them to develop agricultural lot subdivisions, golf course, a members' hale, open space recreational area, and other related uses.

Comments:

Although the EA describes briefly the proposed project and the potential effects on the environment, we suggest the forthcoming DEIS discuss in detail potential short term impacts and propose specific means for averting or minimizing adverse effects, and provide possible mitigation or compensation for unavoidable damage to natural resource values. The applicant should maintain any existing public access to the shoreline for fishermen and other ocean recreational users.

All proposed shoreline improvements or modifications should be adequately described in the DEIS and the Department should have the opportunity to review all activities that could affect or impact aquatic resources in this vicinity.

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Dean Uchida, Administrator
State of Hawaii
Department of Land and Natural Resources
Land Division
PO Box 621
Honolulu, Hawaii 96809

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Uchida:

Thank you for your letter dated May 8, 2000 concerning the Keopuka Lands EA/EISNOP

We would like to clarify that this review is limited to a Chapter 343, HRS review and does not include a Special Permit Application at this time.

We note and respond to the comments from the Division of Aquatic Resources, Land Division, and Na Ala Hele Hawaii Trail & Access System.

Division of Aquatic Resources

The Draft EIS discusses the potential short term impacts to natural resource values and proposes mitigative measures if impacts are unavoidable.

The shoreline at Keopuka is a rocky cliff and consists of pahoehoe lava. There are no sandy beaches, therefore, recreational uses are limited to shoreline casting for slide bait ulua fishing and hiking. Public access for these users will be maintained.

Land Division Engineering Branch

The project will comply with rules and regulations of the National Flood Insurance Program (NFIP) and all applicable County Flood Ordinances. Corrections to the Drainage section will be made in the Draft EIS.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

HONOLULU OFFICE
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TELEPHONE: (808) 961-3333 FAX: (808) 961-3889

Na Ala Hele Hawaii Trail & Access System

Pacific Star LLC will work with the Department of Land and Natural Resources to confirm ownership of the historic trails through the project area. We will also be working with the appropriate agencies and community to identify and preserve key access corridors through the project area, including identification of trail improvements, buffers and relationship to surrounding land uses. A full discussion of the public access proposals, impacts and mitigation measures, including shoreline access and public parking, will be included in the DEIS.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
STP 8.9488

April 7, 2000

Mr. James Leonard
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Leonard:

Subject: Keopuka Lands
Draft Environmental Assessment (DEA)
TMK: 8-1-07: 1, 54, and 55

Thank you for your transmittal requesting our review of the subject draft assessment.

The subject development is not anticipated to have a significant impact on our State transportation facilities. The portion of Mamalahoa Highway fronting the subject project and the project access point to the Mamalahoa Bypass (Alii Highway extension) is under the jurisdiction of the county.

We appreciate the opportunity to provide comments.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Director of Transportation

c: Ms. Genevieve Salmonson, Office of Environmental Quality Control

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Hayashida:

Thank you for your letter dated April 7, 2000 concerning the Keopuka Lands EA/EISNOP.

We note your comment that the proposed development of the project is not anticipated to affect State Highways since the roadways fronting the subject property (Mamalahoa Highway and proposed Bypass Road) are under the jurisdiction of the County of Hawaii.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard

James Leonard, AICP
Managing Director - Hilo Office

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

HONOLULU OFFICE
1001 BISHOP STREET, PACIFIC TOWER, SUITE 650, HONOLULU, HAWAII 96813-3429
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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Blvd, Rm 3-122
Box 50088
Honolulu, HI 96850

APR 25 2000

In Reply Refer To: JAK

Mr. James Leonard
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Re: Environmental Assessment (EA) / Environmental Impact Statement Notice of Preparation (EISNOP) for Keopuka Lands Project, South Kona, Hawaii

Dear Mr. Leonard:

The U.S. Fish and Wildlife Service (Service) received your March 20, 2000, request for our review of the EA/EISNOP for Keopuka Lands Project, South Kona, Hawaii. The proposed project sponsor is Pacific Star, LLC. The proposed project will allow for the establishment of approximately 125 agricultural lots, an 18-hole golf course, a 100-unit meeting facility, and will utilize the proposed Mamahaloa Highway Bypass. The Keopuka Lands Project Area consists of approximately 660 acres. We offer the following comments for your consideration.

Based on our review of the information provided with your letter and in our database, there are no federally endangered, threatened, or candidate species, or other federal trust resources known to occur within the proposed project area. However, the Service recommends that surveys address the presence of anchialine pools in the area, which provide habitat for six federally recognized candidate shrimp species, *Antecaridina lauensis*, *Calliasmata pholidota*, *Metabetaeus lohena*, *Palaemonella burnsi*, *Procaris hawaiana*, and *Vetacaris chaceorum*. In general, we recommend that the project be designed to avoid unnecessary adverse impacts and minimize unavoidable impacts to all native resources and control sedimentation and avoid unnecessary discharges into areas that support coral reef communities.

The Service appreciates the opportunity to offer our comments on the proposed project. If you have questions regarding these comments, please contact Fish and Wildlife Biologist James Kwon by telephone at (808) 541-3441 or by facsimile transmission at (808) 541-3470.

Sincerely,

Donald Palawski
for Paul Henson
Field Supervisor
Ecological Services

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Paul Henson, Field Supervisor
US Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Blvd., Rm 3-122
Box 50088
Honolulu, Hawaii 96850

FWS Ref.: JAK

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Henson:

Thank you for your letter dated April 25, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments:

Several studies of the terrestrial wildlife (Phil Bruner), cave arthropod resources (Reginald David, Ph.D. and Steven Montgomery, Ph.D.), and botanical resources (Ron Terry, Ph.D. and Patrick Hart, M.S.) which have been completed for the preparation of the EIS confirm that there are no rare, threatened, or endangered species onsite the project land.

A baseline survey of the marine resources by Richard Brock, Ph.D. indicates that the green sea turtle and spinner porpoise, both protected species, utilize the South Kona nearshore waters including the area fronting the Keopuka Lands through Kealakekua Bay. Dr. Brock, a recognized expert in Hawaii anchialine ponds, did not find any anchialine ponds within the project site.

The project is designed to avoid any unnecessary adverse impacts and will minimize impacts to the native resources. Stands of native plants, including the ohia and kukui, and coastal plants will be preserved and integrated into the project design to the extent practicable.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard

James Leonard, AICP
Managing Director - Hilo Office

Hawaii Electric Light Company, Inc. • PO Box 1027 • Hilo, HI 96721-1027

April 24, 2000

PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Attention: Mr. James Leonard

Gentlemen:

SUBJECT: Keopuka Lands EA/EISNOP
TMK 8-1-07: 1, 54, and 55

Thank you for the opportunity to comment on the subject EA/EISNOP. The following is Hawaii Electric Light Company Inc's (HELCO's) comments:

Section 5.8.6 Electrical and Communications Systems (Page 32-33):

1. Generation capacity - The current capacity of the HELCO system is 200.2 megawatts (MW) and the system peak is 170.2 MW on December 13, 1999. At the time of the system peak, HELCO had in place 28 load management contracts totaling 7,600 kW under Rider M, Rider T, and Schedule U, which reduced the evening peak by approximately 7,000 KW. In addition, HELCO had residential and commercial & industrial DSM programs in place, which reduced the peak by an estimated 4,000 KW. With the planned addition of the HEP generating facility in Honokaa, HELCO anticipates adequate generation to meet the projected load additions.

2. Electrical Substation - The area is currently served by our Captain Cook electrical substation and a single 12,470 volt distribution overhead system. This electrical system will not be adequate to serve the development's anticipated load. A new substation is be installed close to the Mamalahoa Highway, mauka portion of TMK 8-1-07: 1, to interconnect the existing 69,000 volt transmission line. This new substation will convert the transmission voltage from 69,000 volts to 12,470 volts to serve the development. A substation lot with a minimum size of 150' X 150' must be deeded to HELCO for the construction of the new substation.

3. Electrical Distribution System - Two 12,470 volt circuits are required to serve the anticipated loads. These circuits are required to connect the new substation to the on-site 12,470 volt distribution system.

4. HELCO agrees with the energy efficient and conservation measures proposed to reduce the maximum electrical demand and energy consumption. The developer may call HELCO's Customer Service department at 935-1171 for questions or details on available programs.

It is encouraged that the developer's electrical consultant open a service request with HELCO Engineering department as soon as practicable to ensure timely electrical facility installation. If you have any questions, please contact H. Kamigaki at 969-0322.

Sincerely,

For Clyde H. Nagata, Manager
Engineering Department

CC: H. Kamigaki

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Clyde H. Nagata, Manager
Engineering Department
Hawaii Electric Light Company, Inc.
PO Box 1027
Hilo, Hawaii 96721-1027

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Nagata:

Thank you for your letter dated April 21, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to the comments raised in your letter.

1. **Generation capacity.** We note that HELCO anticipates adequate generation capacity to meet the needs of the Keopuka Lands project with the planned addition of the HEP generating facility in Honokaa.

2. **Electrical Substation.** We understand that the development of the Keopuka Lands project would require a new substation close to Mamalahoa Highway, possibly above TMK 8-1-07:1, to allow adequate generation to meet the needs of the project. As such, the siting and disposition to HELCO of a 150-ft x 150-ft (approximately ½ acre) lot for the substation, and its construction would need to be coordinated between the applicant and HELCO.

3. **Electrical Distribution System.** We understand that, based on your analysis, the new facility would also require two 12,247 volt circuits to connect the new substation to an on-site distribution system. As with the substation, design and implementation of the on-site distribution system would be coordinated between the applicant and HELCO.

4. **Coordination with HELCO.** The applicant will coordinate with HELCO's Customer Service Department regarding available programs regarding energy efficiency and conservation measures. In addition, the applicant will consult with the Engineering Department at the appropriate time to plan for electrical facility installation.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

See
1) Hawaii Newspaper Index
2) Hawaii/Pacific Journals Index

See me or talk to librarians about how to access.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

MOKU · LOA · GROUP

SIERRA CLUB • HAWAI'I CHAPTER

April 21, 2000

William Moore
Pacific Star LLC
159 Halai St.
Hilo, HI 96720

Dear Bill,

Thank you very much for meeting with the Conservation Committee of the Sierra Club Moku Loa Group on Wednesday night. We appreciated the time you took to share the proposal for the development of the Keopuka Lands Project overlooking Kealakekua Bay. We have some concerns that should be addressed during the scoping for the EISPN, in addition to and supplementary to the comments prepared by Sierra Club Hawaii Chapter. Please include us as a consulted party and send us copies of the DEIS and FEIS.

We discussed native plants on the parcel. How and to what extent will the existing native flora will be left intact, and how will the coastal and golf course landscaping incorporate native xerophytic flora? To what extent will the developer avoid bulldozing and grading the natural a'a and older pahoehoe features? Will any non-native vegetation be introduced in the conservation district?

You stated that the both the cart trail and the old government trail will be intersected by roads. How will the developer mitigate the visual, asthetic and cultural impacts to the historic trail and road? Will the developer pledge to make both trails fully accessible to the public? How will the public gain access to the trails and shoreline if the road is gated? Please describe the nature of the permit system you alluded to. How will public parking be handled? How will the historic and pre-historic cultural sites be protected?

You said that the project plans to put the power lines underground. Can you guarantee this will take place? You stated that street lighting will be shunned in favor of low landscape lighting. How much light will be visible from the shore? How will impacts to seabirds and marine life be avoided?

With regard to the lava tube survey that you mentioned, how did you select the person who conducted the lava tube assessment for cultural and biological resources, and what were his/her credentials? (Several individuals with mainland experience have explored and mapped caves in the national park and other areas, but have overlooked numerous resources subsequently found by more observant eyes.)

P.O. BOX 1137 • HILO • HAWAII • 96721

Since the steep terrain is overlain by pahoehoe containing lava tubes, how much contaminated water can be expected to leach through the porous lava and lava channels to the coastline? How will waste water be treated? How long will it take for agricultural, residential and resort effluent to reach the coastal waters? Please describe the nature of the discharge for each type of use.

Finally we would like to thank you for the invitation to visit the project site on May 7, 2000. During this visit, we would like to know if the lava tube cave can be accessed for a second opinion. I can be reached at 966-7361, if you have any questions. Thank you!

Sincerely,

Deborah Ward

Deborah Ward
Conservation Committee
Moku Loa Group Sierra Club

Cc:
Alice Kawahara, County of Hawai'i Planning Department
25 Aupuni St. #109
Hilo, HI 96720

PBR
101 Aupuni St. #310
Hilo, HI 96720

Genevieve Salmonson, OEQC
235 S. Beretania St. #702
Honolulu, HI 96813

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Ms. Deborah Ward
Conservation Committee
Moku Loa Group Sierra Club
Sierra Club - Hawaii Chapter
PO Box 1137
Hilo, Hawaii 96721

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Ms. Ward:

Thank you for your letter dated April 21, 2000 concerning the Keopuka Lands EA/EISNOP. On behalf of William Moore, we would like to express our appreciation for your organization's attendance at the recent meeting on April 12th and site visit on May 7th. We offer the following responses to the comments raised in your letter.

Native plants. A botanical study of the project area has been prepared by Ron Terry, Ph.D. and Patrick Hart, M.S. This study has identified and inventoried the botanical resources within the project area and will be included in the Draft EIS. A full discussion of the recommended mitigation measures, including preservation of key stands of native trees and shrubs, will be provided. A discussion of the landscaping plans for the golf course and conservation areas will also be described in the Draft EIS.

A full discussion of the public access proposals, including shoreline access and public parking, will be included in the DEIS.

Old Government Road and Cart Trail. We are currently discussing with DLNR the status of the Old Government Road and the Old Cart Trail. The managed public access which presently occurs through the property will continue to be provided through a permit system. Users generally consist of fishermen who cast from the rocky cliff near the south boundary of the property. Proposed improvements will allow safe parking and camping facilities and a comfort facility. Access for hikers will also be enhanced through a proposed coastal trail. While the improvements will be low impact, they will allow safer access for the public.

A visual impact analysis is described in the DEIS.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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Archaeological sites. The conceptual master plan is designed around the sites which are recommended for preservation by the archaeological consultant. Treatment of the archaeological sites will be implemented in accordance with the requirements of the State Historic Preservation Division.

Powerlines and lighting. Utility lines and lighting will be constructed according to County of Hawaii requirements. At this time, on-site utility lines are planned to be installed underground within the roadway easement.

Lava tube survey. The survey of lava tube arthropod resources was completed by Reginald David of Rana Productions, Ltd. and Steven Montgomery, Ph.D. Dr. Montgomery is a qualified entomologist who has lived and worked in Hawaii for more than 30 years . The study found no native arthropod species in the lava tubes and concluded that the relatively young pahoehoe lava flows on the Keopuka property have not had sufficient time or the moisture required to support native arthropod species.

Impact to groundwater and nearshore marine waters. Measures to minimize negative impacts to groundwater and nearshore waters are described in a Golf Course Management Plan by William Lee Berndt, Ph.D. and Marine Water Quality Monitoring Plan by Richard Brock, Ph.D. Wastewater treatment options have been described by the project civil engineer in order to assess the best alternative to serve the Keopuka Lands project.

The Draft EIS will contain the full studies referenced above. We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard

James Leonard, AICP
Managing Director - Hilo Office

SIERRA CLUB, HAWAI'I CHAPTER

P.O. Box 2577,
Honolulu, Hawai'i 96803
(808) 538-6616

April 20, 2000

William Moore
Pacific Star LLC
159 Halai St.
Hilo, HI 96720

Alice Kawahara
County of Hawai'i Planning Department
25 Aupuni St. #109
Hilo, HI 96720

PBR
101 Aupuni St. #310
Hilo, HI 96720

Genevieve Salmonson
OEQC
235 S. Beretania St. #702
Honolulu, HI 96813

The following are the Sierra Club's comments on the Keopuka Lands Project Draft EISPN. Please include us as a consulted party and send us copies of the DEIS and FEIS. Although the Sierra Club has strenuous objections to several elements of this project, this letter does not outline our specific objections. Instead, this letter asks that the EIS properly disclose ALL social and environmental impacts of this project. The EIS should, at a minimum, fully address the following:

* What will be the impact on water quality at Kealakekua Bay?

* What are the current levels of all the pollutants identified in Hawaii Administrative Rules 11-54-04 measured at the shoreline? What are they on the other side of the bay near the houses? How will each of these levels change if this project is fully built-out?

* How much runoff is expected to be generated and what would the nature of this runoff be (including pesticides, fertilizers and sediment)?

* How much contaminated water (by nutrients, pesticides, or other contaminants) can be expected to leach through the porous lava and make its way into the coastal waters (i.e, not surface runoff, but percolation)? What specific studies of similar areas on the Big Island does the EIS rely on to support its conclusions?

* What kind of wastewater treatment facility will be built? Individual septic systems? Or will an actual wastewater facility be built for all the sewage? If so, to what extent will the sewage be treated -- primary, secondary or tertiary? Where will it be discharged? If the applicant proposes to discharge it through an underground injection well, please disclose how long it takes such effluent to reach the coastal waters and the level of contamination.

A complete Environmental Impact Statement will reveal the cumulative impact of all runoff and leaching on coastal waters. This includes pesticides/biocides (including the impact of the alternative biocides that are lower in toxicity), fertilizers, sedimentation, heavy metals, grease, other urban runoff, and the increase in sewage effluent. To understand the full cumulative impact, the EIS should examine the impact of runoff traditionally associated with coastal development, including sediment runoff during construction, waste oil and other rubbish associated with urban uses. It should study the amount of nonpoint source water pollution associated with similar hillside developments and discuss the degradation of coral reefs and coastal water quality caused by similar hillside projects. Such impact can be expected from a project of this magnitude with storm water flushing urban trash directly into Kealakekua Bay. A complete EIS would not glibly assume that mitigation measures would take care of all nonpoint source water pollution problems.

* Please fully describe the so-called "100--unit members hale." What features does it have? How many people can become members? What is the cost?

* Will powerlines be above or below ground?

* The EIS should include computer generated scenic impact studies that show the view from:

- the trail the public currently uses to hike down to the monument;
- the ocean;
- the old government highway
- the new Mamaloa bypass road
- the ocean (as viewed by a kayaker or a passing tourboat -

* How much more people-traffic will the Bay suffer as a consequence of this development? Can the Bay's carrying capacity handle this increase in growth?

* What specific landscaping plans does the applicant have for the conservation district? Will there be any bulldozing or grading of this wild and scenic landscape? Will any non-native vegetation be introduced (including grasses) in the conservation district?

* How deep is the land in the conservation district -- i.e., how many feet from the shoreline does the conservation district end?

* Will the applicant change the old government road/ trail in any form? Will construction vehicles drive over the trail? Will any rocks be moved?

* Who assumes the liability if a hiker is struck by a golf ball while hiking on the trail (particularly since the first, second, third and fourth fairways cross the trail? What is the effect on the

wilderness experience for hikers who will now have to hike through a hail of golf balls and manicured lawns?

* Describe the houses that are being built. Are they farmhouses? What will a lot cost? What will a lot with a house on it cost?

* What will the impact of lighting be on seabirds and marine life?

* Are there any records of tsunamis hitting the area? If so, how high did they reach?

* What cultural and historic sites are located in the project area?

Please ensure that the DEIS answers all these questions completely. Please respond directly to these questions in your response to us -- instead of referring us to a section in the DEIS.

Please send all correspondence on this issue c/o P.O. Box 1185, Volcano, HI 96785.

Sincerely,

David Kimo Frankel
Sierra Club, Hawai`i Chapter Chair

PBR
-H-A-W-A-I-I-

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. David Kimo Frankel, Hawaii Chapter Chair
Sierra Club, Hawaii Chapter
PO Box 1185
Volcano, Hawaii 96785

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Frankel:

Thank you for your letter dated April 20, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments:

We will be providing you with a copy of the Draft and Final EIS and will include the Sierra Club as a consulted party.

Cumulative Impact. A discussion of the project's cumulative impacts will be provided in the Draft EIS in accordance with Section 11-200-17 of the Hawaii Administrative Rules relating to Environmental Impact Statements.

Water Quality. A water quality monitoring plan and a baseline study have been prepared for the project by Richard Brock, Ph.D. The marine water quality fronting the project site will be fully described in the EIS.

Potential Runoff. The proposed project, including the golf course and the agricultural uses, will implement Integrated Pest Management (IPM) as noted in studies by William Lee Berndt, Ph.D. and Agricon Hawaii. Together with the studies by Dr. Brock, the EIS will describe the potential impacts including groundwater contamination.

Wastewater Treatment Facilities. The project engineer, Belt Collins and Associates, has described wastewater treatment and disposal options for the project. These options are described in the EIS.

Members' Hale. A description of the Members' Hale is provided in the EIS, including an economic study by the Hallstrom Appraisal Group, Ltd.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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Powerlines. Electrical and communication lines within the project will be placed in underground conduits.

Powerlines. Electrical and communication lines within project will be placed in underground conduits.

Visual analysis. The Draft EIS will include a full discussion of the project's impacts on the visual resources in the area. The assessment will include a computer generated view shadow analysis that will identify where key design elements of the Keopuka Lands project will be visible (and conversely, where they will not be visible.) To supplement this analysis, a photographic documentary of the project site and key structures will be presented.

People impact to Kealakekua Bay. The Draft EIS will include a discussion of the relationship of the Keopuka project on the Kealakekua Bay State Park, including a discussion of possible mitigation measures. The Keopuka Lands project has been prepared in consultation with the *Kealakekua Bay State Historical Park Conceptual Plan* (Belt Collins Hawaii 1997 for Division of State Parks, Department of Land and Natural Resources) which limits vehicular access from Keopuka to Kaawaloa via the Old Cart Road. Hence, access will be by pedestrian hikers. We note that boater access to the bay is beyond the control of this project; therefore, this EIS is not the proper forum to address this issue.

Conservation District. The Draft EIS will include a discussion of the proposed activities within the Conservation District.

Old Government Road.. The Old Government Road will be crossed by the project's access road, however, special pavement treatment will be implemented to denote the trail.

Liability. Liability issues will be studied by the applicant's attorneys.

Agricultural Lot Dwelling Units. The Draft EIS will include a discussion of the agricultural lots and dwellings.

Lighting. Lighting will adhere to County standards for outdoor lighting.

Tsunami. Documentation regarding tsunami incidence at Keopuka has been researched. The FIRM map designates that the coastline is subject to high waves. No structural improvements are proposed in areas within the Tsunami inundation zone. Furthermore, the nearest dwelling will be over 300 feet from the shoreline.

Cultural and Historic Sites. Archaeological studies by Cultural Survey Hawaii and Paul H. Rosendahl, Inc. have been completed for the project and are fully described in the EIS.

We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

Skycliff Investments LLC

845 Bellevue Pl. E. #101
Seattle, WA 98102 USA

telephone (206) 323-0653
facsimile: (206) 325-5855

Mr. James Leonard
PBR Hawaii
Hilo Lagoon Center, Suite 310
101 Aupuni Street
Hilo, HI 96720

Ms. Virginia Goldstein
Planning Director
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Notice of Preparation for EIS for Keopuka Lands Project
South Kona HI (TMK: 8-1-07: 1, 54, & 55)

Dear Mr. Leonard and Ms. Goldstein, May 19, 2000

Skycliff Investments LLC is the owner of lands directly adjoining the Keopuka Project area in particular TMK 8-1-10-3.

Skycliff was not given direct notice of the EA and did not discover the publication of the EA until the comment period for the EA had expired. In spite of its clear standing in the case, Skycliff has effectively been denied the opportunity to comment on the EA and, more importantly, the scope of the EIS. Skycliff would appreciate the inclusion of this letter in the draft EIS, as agreed, for notification purposes.

Skycliff reserves its comment on its multiple concerns regarding the project until it has had an opportunity to review the Draft EIS. Skycliff requests that copies of any and all relevant documentation, including but not limited to, the Draft EIS, be promptly mailed to Skycliff at the address above and each of its legal counsel at the addresses provided below:

Tim Lui-Kwan Esq.
Carlsmith, Ball
Pacific Tower
1001 Bishop Street
Honolulu, HI 96809

Michael Gibson Esq.
Ashford & Wriston
Kuakini Tower
Suite 208
Kailua-Kona, HI 96740

Christopher Yuen Esq.
Attorney at Law
Hilo Lagoon Center
101 Aupuni St.
Hilo, HI 96720

Yours truly,

Skycliff Investments LLC
By its Manager, C. L. Norrie

6/27/00
To Chris Norrie

pg. 64-67 clipped

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Chris L. Norrie, Manager
Skycliff Investments LLC
845 Bellevue Pl., E. #101
Seattle, WA 98102

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Norrie:

Thank you for your letter dated May 19, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments.

It is our understanding that you have obtained a copy of the EA/EISNOP from the Office of Environmental Quality. We also note that copies of the EA/EISNOP have been mailed to you and your legal counsel as requested by you. Specifically, the following copies have been provided each time we have received a telephone call from you.

Chris Norrie	Received copy from OEQC: April 26, 2000
Chris Norrie	Copies mailed: May 2, 2000 and May 8, 2000
Tim Lui-Kwan, Esq.	Copy mailed: May 8, 2000
Chris Yuen, Esq.	Copy mailed: May 18, 2000
Michael Gibson, Esq.	Copy mailed: May 18, 2000

We note that we have followed the specifications contained within Chapter 343, *Hawaii Revised Statutes,* Department of Health, Title 11 Rules for EISs, and the OEQC Guidelines for EISs in the public notification process for the EA/EISNOP. We note that any interested party who identifies him/herself may become a consulted party.

Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

June 27, 2000

Mr. Chris L. Norrie, Manager
Skycliff Investments LLC
845 Bellevue Pl., E. #101
Seattle, WA 98102

RE: KEOPUKA LANDS
RESPONSE TO COMMENTS ON THE ENVIRONMENTAL ASSESSMENT / ENVIRONMENTAL IMPACT STATEMENT NOTICE OF PREPARATION

Dear Mr. Norrie:

Thank you for your letter dated May 19, 2000 concerning the Keopuka Lands EA/EISNOP. We offer the following responses to your comments.

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Wm. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

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We appreciate your participation and comments on the Notice of Preparation.

Sincerely yours,

PBR HAWAII

James Leonard, AICP
Managing Director - Hilo Office

13.0

Appendices

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A Agricultural Management Plan for Keopuka Lands
Agricon Hawaii LLC, June 2000

B Evaluation of Water Resources for The Lands of Keopuka South Kona, Hawaii
Waimea Water Services Inc., April 2000

C Status of Nearshore Marine Communities and Coastal Water Quality Fronting the Keopuka Lands Parcel, South Kona, Hawaii Preconstruction Baseline Report
Richard E. Brock, Ph.D., Environmental Assessment Co., April 2000

D Draft Comprehensive Nearshore and Coastal Water Quality Monitoring Program in Support of the Development of Keopuka Lands South Kona, Hawaii
Richard E. Brock, Ph.D., Environmental Assessment Co., April 2000

E Environmental Best Management Practices For The Keopuka Lands
William Berndt Associates, International Management Consulting, May 31, 2000

F Wildlife Surveys

F-1 Survey of the Avifauna and Feral Mammals at Keopuka, North and South Kona, Hawaii
Phillip L. Bruner, March 4, 1992

F-2 Updated Survey of the Avifauna and Feral Mammals at Keopuka, South Kona, Hawaii
Phillip L. Bruner, April 28, 2000

G Botanical Reconnaissance Keopuka Lands Keopuka/Onouli, South Kona, Hawaii
Ron Terry, Ph.D., and Patrick Hart, M.A., May 2000

H Survey of Lava Tube Arthropod Resources Keopuka, South Kona, Island of Hawaii
Rana Productions, Ltd. and Steven Lee Montgomery, Ph.D., March 2000

I Archaeological Surveys

I-1 Archaeological Field Inspection Survey Keopuka Lands Parcel Lands of Onouli 2nd and Keopuka 1st & 2nd South Kona District, Island of Hawaii
Paul H. Rosendahl, Ph.D., Inc., June 2000

I-2 Archaeological Inventory Survey and Limited Subsurface Testing of a 500-Acre Parcel in the Ahupua'a of Keopuka, District of South Kona , Island of Hawaii (TMK 3-8-1:06-11, 13-19)
Hallett H. Hammat, Ph.D., Patrick O. Walsh, M.A., Jennifer J. Robins, B.A., Mark Stride, and Timothy R. Barr, B.S., Cultural Surveys Hawaii, March 1995

I-3 Oral History Interviews, and an Assessment of Cultural Impacts for Keopuka, South Kona, Hawai'i Island [TMK: 8-1-7:01, 54 and 55]
Leann McGerty, B.A., and Robert L. Spear, Ph.D., March 2000

J A Traffic Impact Analysis Report For Keopuka Lands
M&E Pacific, Inc., May 17, 2000

K Project No. 00-12 Noise Quality Impact Study Keopuka Lands South Kona, Hawaii
Darby & Associates, June 2000

L Air Quality Study For the Proposed Keopuka Lands Project
B.D. Neal & Associates, April 2000

M Keopuka Development Social Impact Assessment
Earthplan, May 2000

N Market Study, Economic Impact Analysis, and Public Costs/ Benefits Assessment of the Proposed Keopuka Lands Subdivision Keopuka, South Kona, Hawaii
The Hallstrom Group Inc., June 2, 2000